

The Principles Of Reading Development, What Can Go Wrong, And What You Can Do

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Today's Story

- * Reading Disorders
 - * What Causes Them
 - * How To Identify Them
 - * How To Address The Fundamental Issue
 - * How To Develop Effective Learners Who Do Not Read Or Spell Well

Reading Was Invented By The Groggs About 3000 BC



Invite To The Barbecue

FRED and
WILMA...
BBQ FRIDAY !

I CAN'T HEAR
YOU !!



Mrs. Grog's Great Observation



Mrs. Grog Invents “The Code”

**ABCDEF
GHIJKL
MNOPQ
RSTUV
WXYZ**

Then She Connects The Code To Speech Sounds



Vowel Chart from
*Phonics Charts
and Games*



Wilma !
Barbecue at
the Grogs
Friday !

Phonemic Awareness



Letter Knowledge


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 Z


Phonics

The Alphabetic Principle

Alphabetic Understanding
Words are made up of letters that represent sounds.

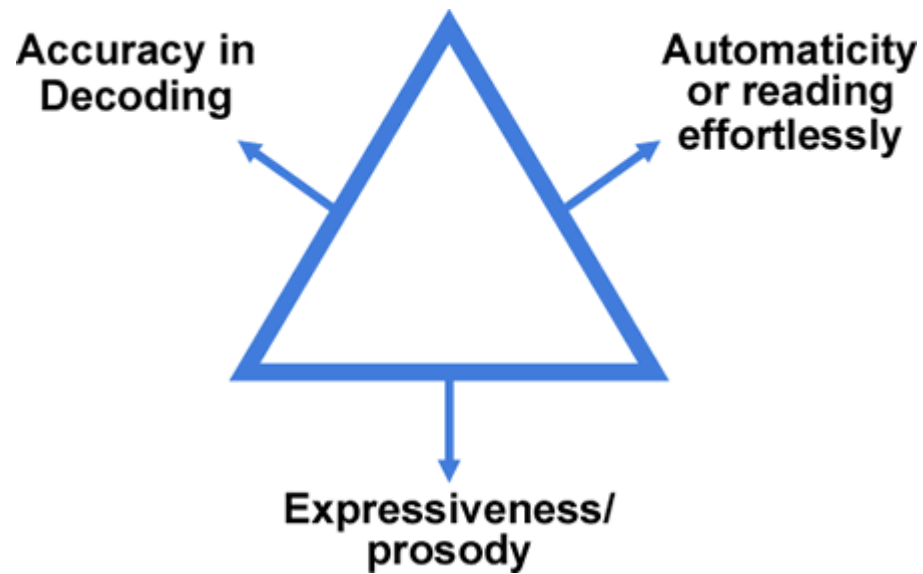
Phonological Recoding
Using letter-sound correspondence to pronounce or spell words

A → 

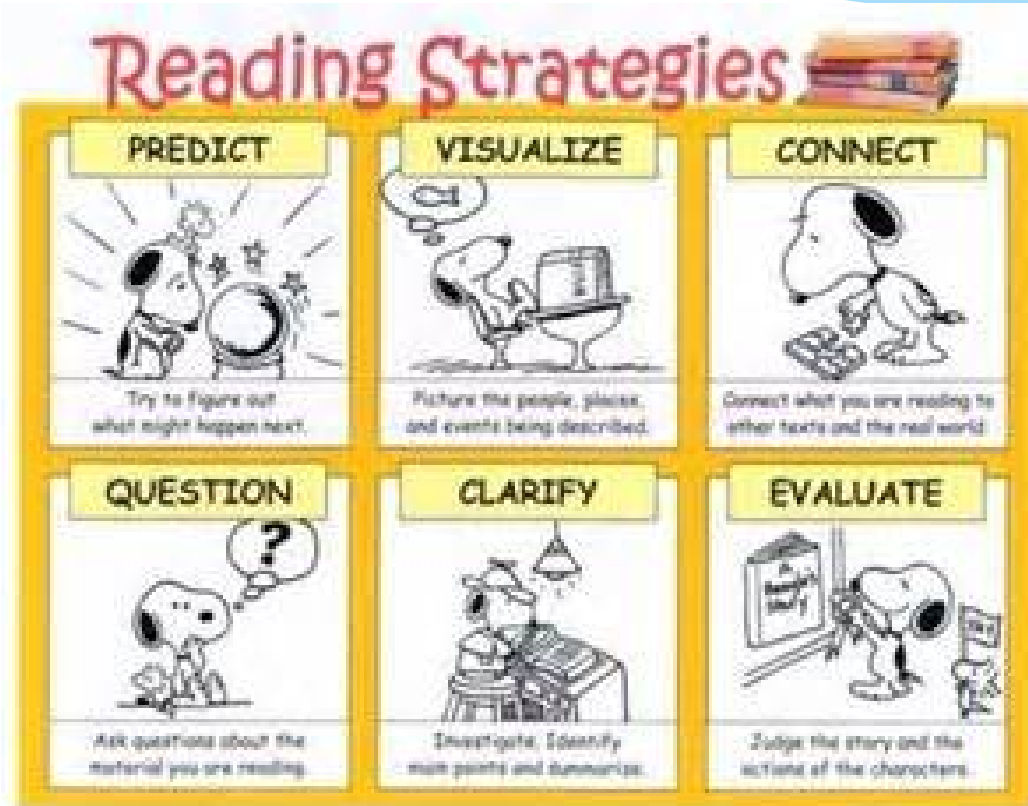
cat → 

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Fluency



Comprehending The Message



10 %

- * Decoding
- * Encoding (Spelling)
- * Fluency (automatic reading at speed with expression)

How Could This Happen ?

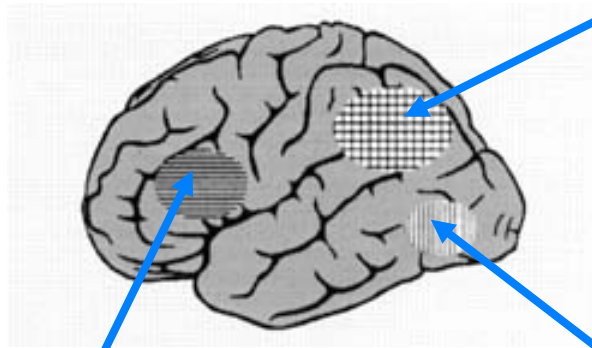
- * The Nature of Reading
- * The Nature of Speech
- * The Nature of the 10 %

The Nature of Reading: It Is Invented

- * Language is hardwired
- * We learn to speak by passively listening to others talk
- * Reading is not hard wired. We must be actively taught to read.
- * Reading is only 5000 years old. So, no processing systems in brain dedicated to reading.
- * Reading co-opts information processing systems designed to do other things. This is inefficient.

The Neurobiology of Reading, i.e. The Co-Opted Systems

Left Hemisphere



1) Anterior left inferior frontal region

Speech Production

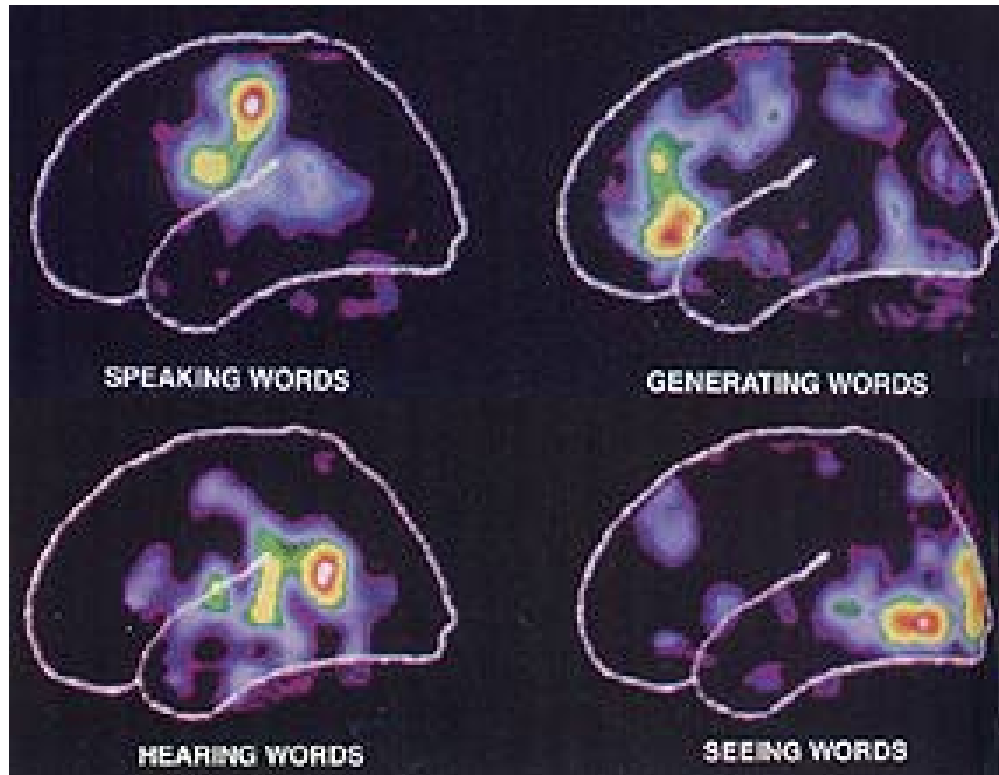
2) Dorsal parietotemporal system

Auditory Processing and Auditory-Visual Association

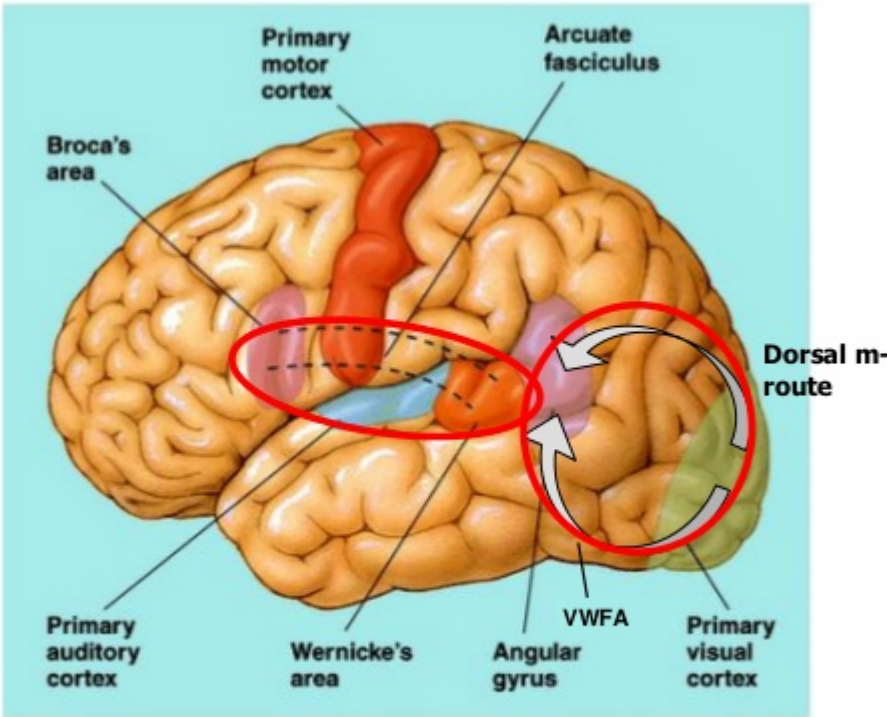
3) Ventral occipitotemporal system

Visual Form Recognition

Brain Performing Discrete Tasks



The cortical reading network





The Nature Of Speech

We Talk Funny

English: Designed by Congress

- * Italian: 23 sounds represented by 33 letter combinations
- * English: 43 sounds represented by 1100 letter combinations
- * “ou” says ???

Co-Articulation



I scream !!
aɪ 'skri:m !!



Ice cream
,aɪs 'kri:m



I saw her race
aɪ 'sɔ: hɜ: 'reɪs



I saw her ace
aɪ 'sɔ: hɜ: 'eɪs

Phonemic Awareness Ain't Easy



So Letter Sound Association May Not Be Easy



Vowel Chart from
*Phonics Charts
and Games*

The Nature Of The 10 %

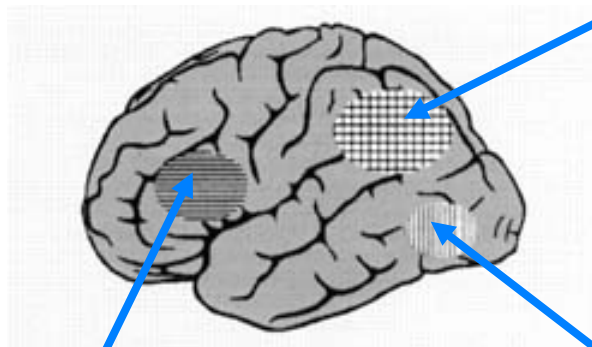
- * Not all brains play well with sounds
- * Not all brains play well with visual forms
- * Not all brains associate auditory and visual data well
- * Not all brains retrieve sound/word labels efficiently

The Nature Of The 10 %

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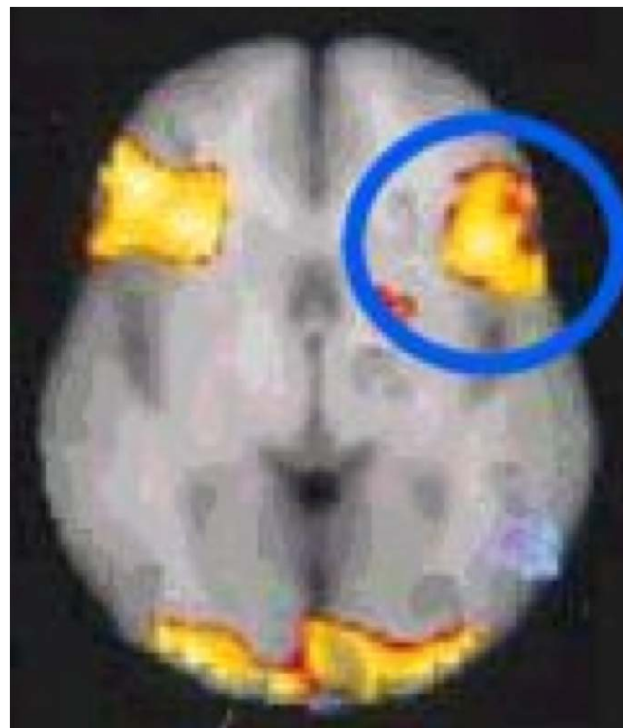
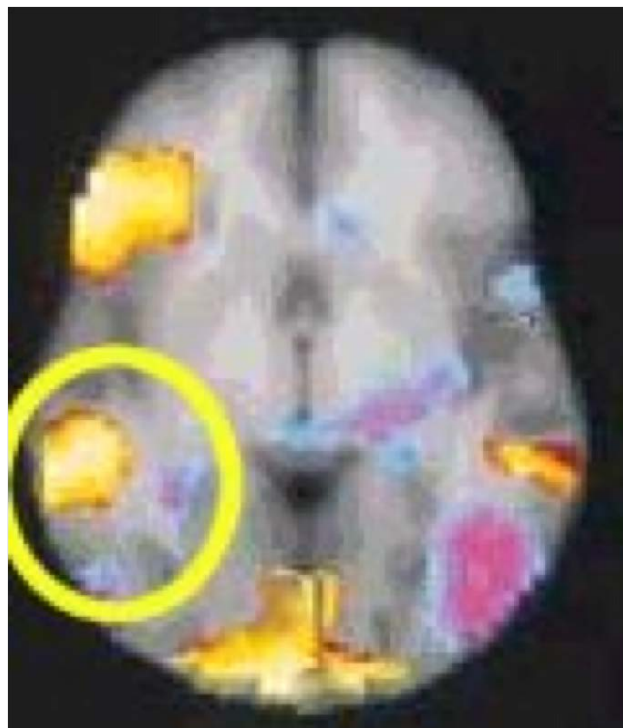
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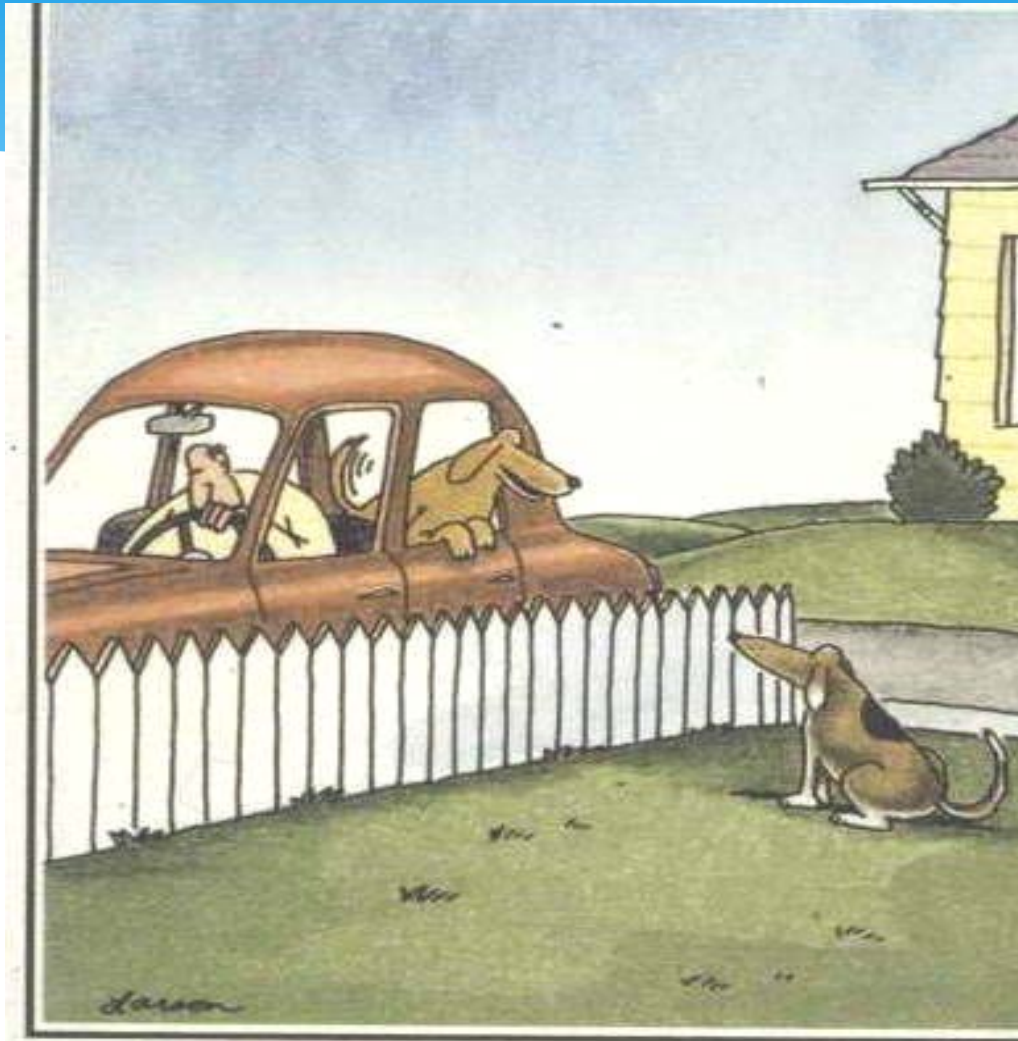
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Letter and Word Form Constancy

Effective Vs Ineffective Readers While Decoding



Auditory Processing Disorder

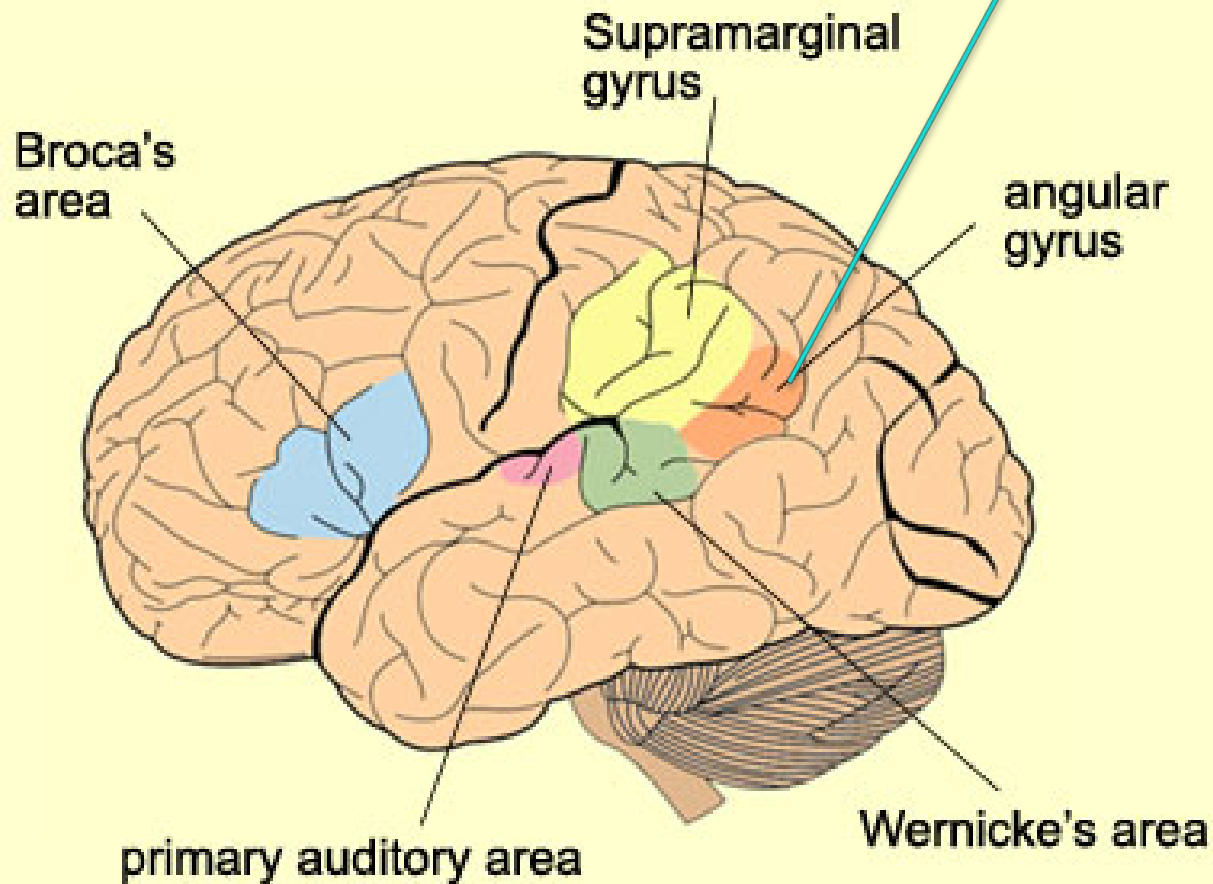


"Ha ha ha, Biff. Guess what? After we go to the drugstore and the post office, I'm going to the vet's to get tutored."

The Nature Of The 10 %

- * Not all brains play well with sounds
- * **Not all brains associate auditory and visual data well**
- * Not all brains play well with visual forms
- * Not all brains retrieve sound/word labels efficiently

The MixMaster





Phonics

The Alphabetic Principle

Alphabetic Understanding
Words are made up of letters that represent sounds.

Phonological Recoding
Using letter-sound correspondence to pronounce or spell words

A → 

cat → 

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A Failure Of Phonemic Awareness And Phonics

Przybliżone

Auditory Visual Associative Memory Disorder and Label Retrieval Issue

PEANUTS

Charles Schulz



Fluency

- * Accurate reading
- * At speed
- * With expression

What Could Go Wrong With Fluency ?

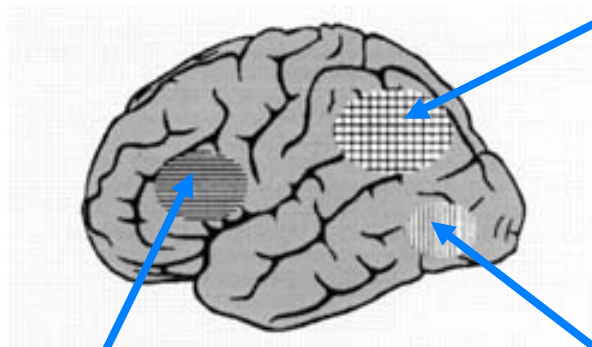
- * Frustration with decoding leads to avoidance
- * Avoidance limits practice

The Nature Of The 10 %

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- * Not all brains associate auditory and visual data well
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Speech Production

2) Dorsal parietotemporal system

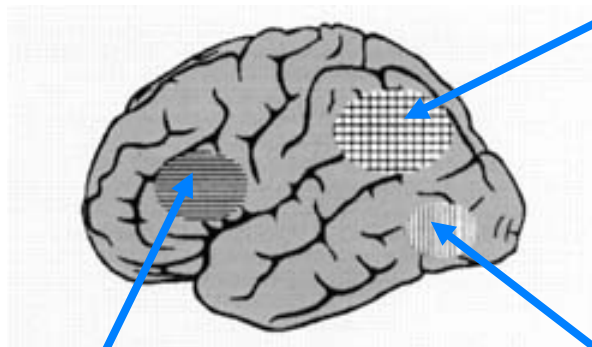
Phoneme Processing and Letter-Sound Connections

3) **Ventral occipitotemporal system**

Visual Letter and Word Form Constancy

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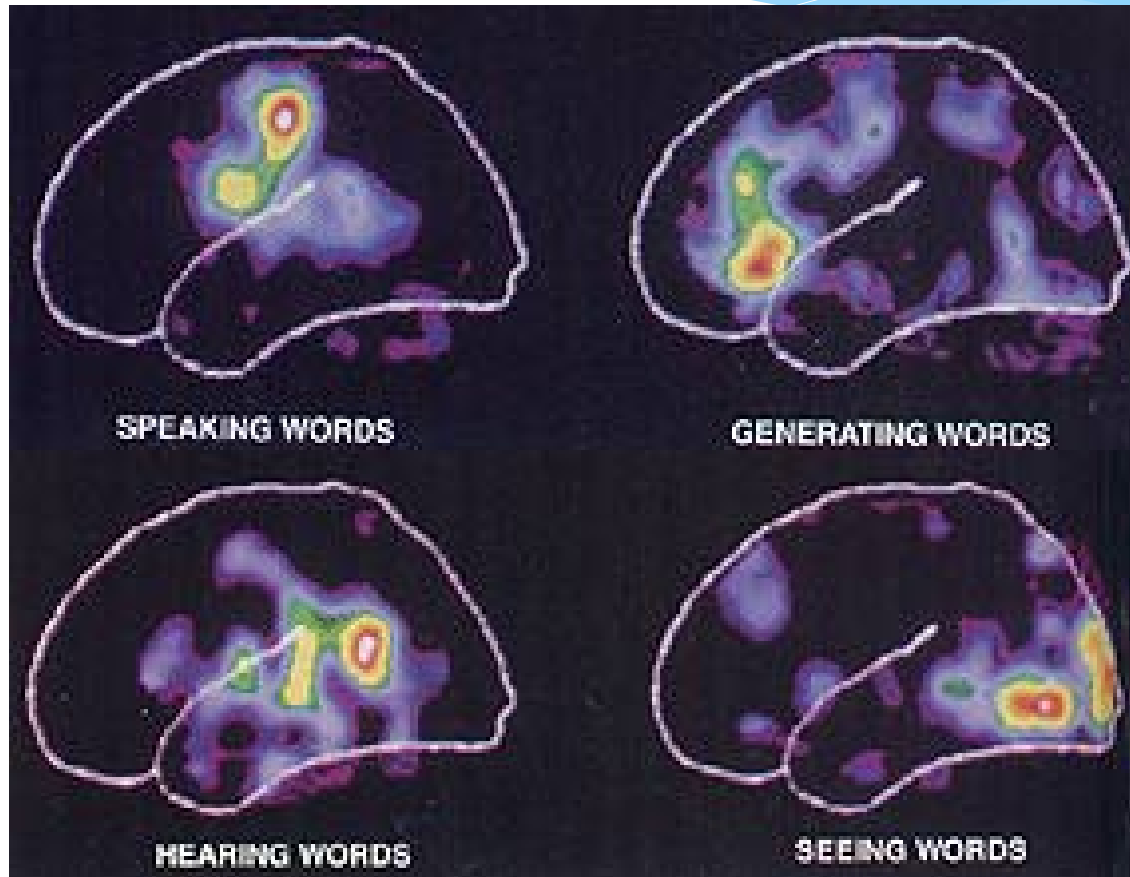
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Phoneme Processing and Letter-Sound Connections

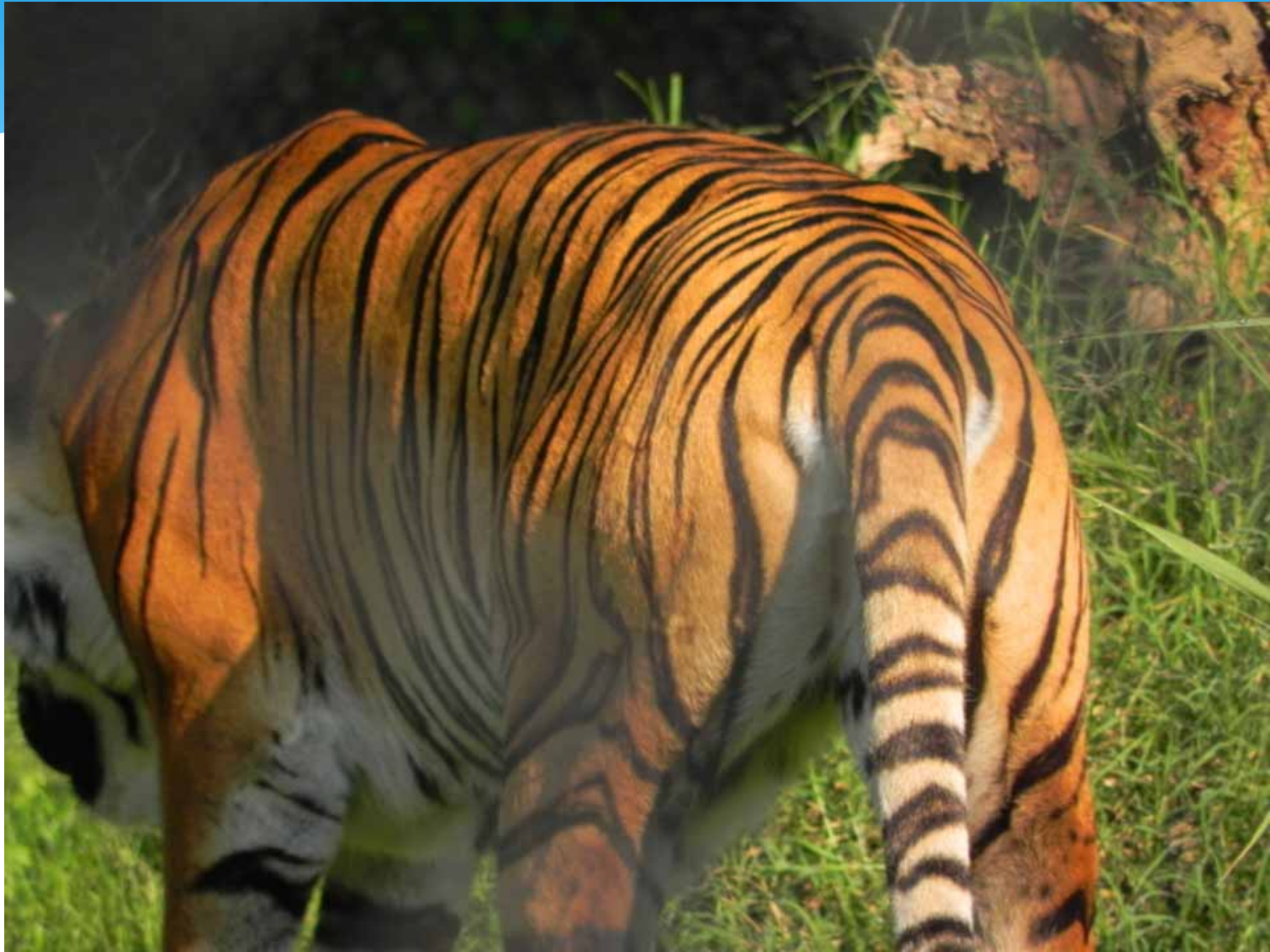
3) **Ventral occipitotemporal system**

Visual Letter and Word Form Constancy

Brain Performing Discrete Tasks







But a **p** is not a **q**

p vs q



Vertical lines of varying lengths and positions, possibly representing a barcode or a list of items.

How do you spell

Dawg

Daug

Doug

Dahg

Dog

The Nature Of The 10 %

- * Not all brains play well with sounds
- * Not all brains play well with visual forms
- * Not all brains associate auditory and visual data well
- * **Not all brains retrieve sound/word labels efficiently**

Rapid Automatic Naming

Speed of retrieval of sounds or words stored in one's lexicon when confronted with a symbolic representation of it



a g r n o p d h t

h j r w q l b y s

j x u z m d r i k

According to a research at Cambridge

University, it doesn't matter in what order the letters in a word are, the only important thing is that the first and last letter be at the right place.

The rest can be a total mess and you can still read it without problem. This is because the human mind does not read every letter, but the word as a whole.

What Could Go Wrong With Comprehension & Retention ?

Weak Decoding Limits Access To Text



Lack of Fluency: A Problem of Stamina

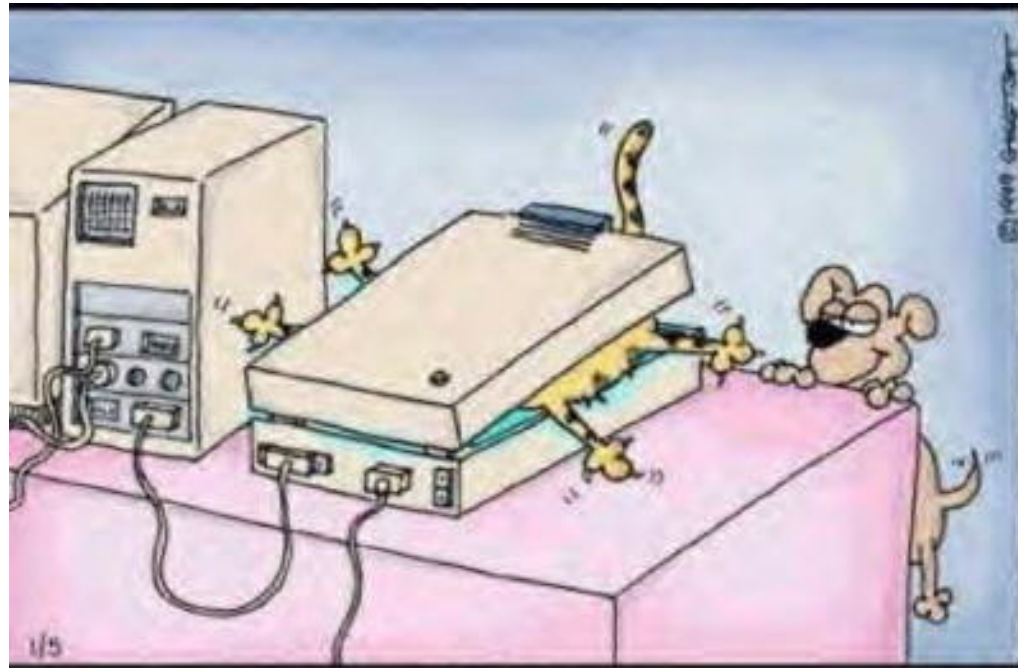


Waiting On A Slow Train Is
Exhausting

Semantics

Angstrom

Words Mean Many Things



"Cat Scan"

Syntax

The girl went to the store with
the dog

Text Context

It was too hot to eat.

BACKGROUND KNOWLEDGE



Intervention Components

- * Identify
- * Remediate
- * Accommodate
- * Bypass
- * Compensate
- * Learn to Prevail

Remediation Begins With Early Identification

The Preschool Years

Difficulty learning (and remembering) the names of letters, numbers, colors, shapes, kids in the class

Doesn't recognize rhyming patterns like *cat*, *bat*, *rat*

A family history of reading and/or spelling difficulties

Developmental history of delays in speech or language

Any medical issue interfering with hearing

Remediation Begins With Early Identification

Kindergarten & First Grade

Does not understand that words come apart

Does not associate letters with sounds

Cannot sound out even simple words like cat, map, nap

Complains about how hard reading is or “disappears”
when it is time to read

Remediation Begins With Early Identification

Second Grade and Up

Reading is slow and awkward

Trouble reading unfamiliar words,
often making wild guesses

Lacks a strategy for reading new
words

Avoids reading out loud

Pre-Instruction Screening

- * Measures of pre-literacy skills
 - * Phonological awareness
 - * Letter knowledge
 - * Rapid Non-Symbolic Naming
 - * Vocabulary
 - * Results in over-identification
- * Reading behavior + brain structure and fMRI and ERP data greatly improve prediction accuracy, sensitivity and specificity
- * Hybrid Bayesian multi-factorial model improves diagnostic accuracy

Post-Instruction Onset Screening

- * Performance on tests of reading
 - * Decoding
 - * Sight word vocabulary
 - * Fluency
 - * Listening comprehension > reading comprehension
- * Response to instruction

Intervention Components

- * Identify
- * Remediate
- * Accommodate
- * Bypass
- * Compensate
- * Learn to Prevail

Remediation

- * Optimum Window For Initiating Remediation: K -1
- * Phonics: Multi-sensory, experiential, direct instruction in phonics
- * Fluency: Repeated practice under timed conditions with immediate feedback about speed and accuracy
- * Time and labor intensive: 1-3 years, 2-3 times per week, year around
- * The processing problems don't change so there may be an upper limit to reading/spelling growth and effectiveness
- * 20 – 50 % of these students will fail to respond

The Long Term Objective

To Learn From Books By Hook Or By Crook

Intervention Components

- * Identify
- * Remediate
- * Accommodate
- * Bypass
- * Compensate
- * Learn to Prevail

Intervention Components

- * Identify
- * Remediate
- * Accommodate
- * Bypass
- * Compensate

Accommodations

Remove Or Reduce The Size Of The Hurdles In The Learning Pathway

Extended time to complete tests and reading/writing/calculation intensive tasks

Access to a reader or text to speech apps

Access to a scribe or speech to text apps

Access to teacher or student generated notes

Access to non-phonics based foreign languages

Access to alternate format books

Intervention Components

- * Identify
- * Remediate
- * Accommodate
- * **Bypass**
- * Compensate
- * Learn to Prevail

Bypass Tools

- * Talk to others about what they read or know
- * You Tube videos
- * Spark Notes
- * Experiential learning activities
- * Audiobooks
- * Speech to Text Apps
- * Text to Speech Apps

Intervention Components

- * Identify
- * Remediate
- * Accommodate
- * Bypass
- * **Compensate**

Intervention Components

- * Identify
- * Remediate
- * Accommodate
- * Bypass
- * **Compensate**
- * Learn to Prevail

Teach To Compensate By

- * Know the student's **Strengths**
- * Invite the **Strengths** to the **Learning Party**
- * **Add Learning Tools** to the student's toolbox



Learning

Learning = Understanding + Remembering

You Know You Have Learned If And Only If

- * You Can Explain It To Someone Else, **and**
- * You Can Demonstrate How It Works and How To Use It,
- * **Without Looking Back At It**

How Do We Create Memories And Understanding ?

- * The Big Picture Library System
- * Action
- * Working With Memory How Memory Works For You
 - * MultiModal Representation
 - * Networking
- * Retrieval Practice

How Do We Create Memories And Understanding ?

- * **The Big Picture Library System**
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The Big Picture



The Details



Feed Me



Big Picture Tools

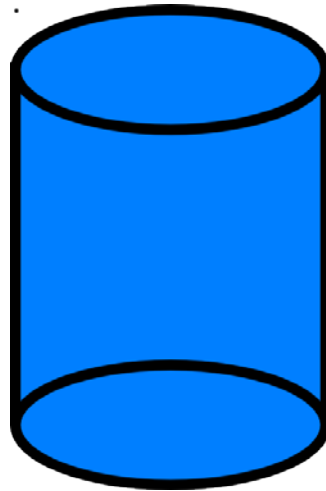
SQ4R

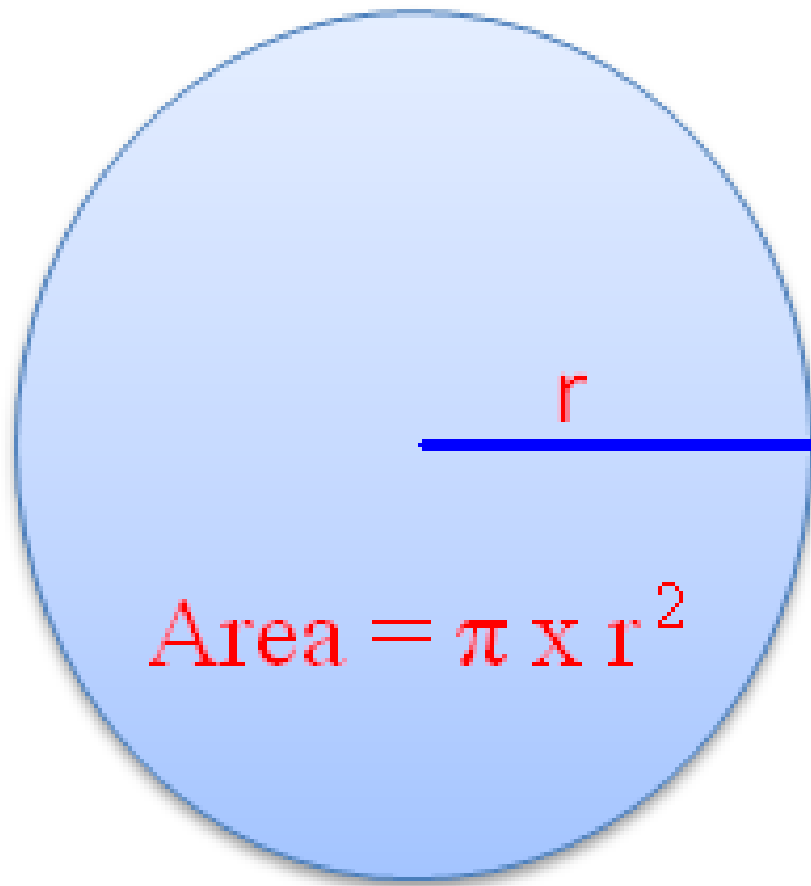
Idea Maps

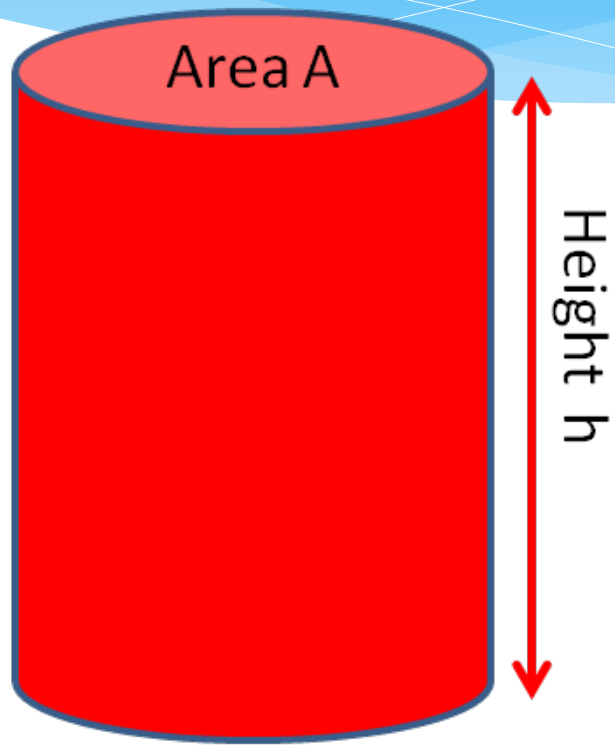
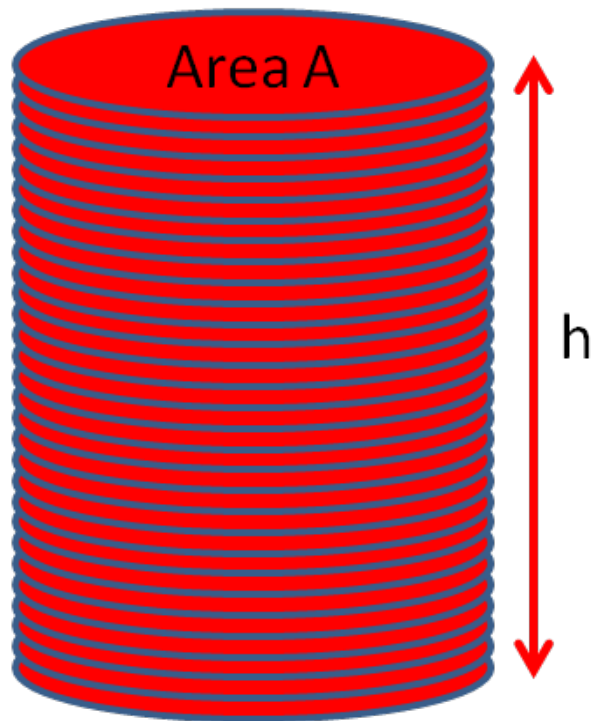
The Fuzzy Mental Model: The Big Picture In Operation

- * Holistic
- * Dynamic
- * Imprecise
- * The FMM is the framework for storing and comprehending linear, segmented, discrete, language based information
- * Like a Dynamic Dewey Decimal System

What Is The Formula For The Volume Of A Cylinder ?

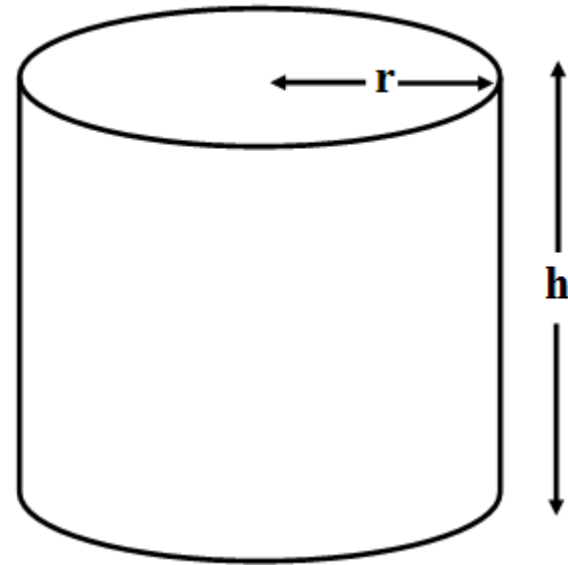






Volume = Ah

$$V = \pi r^2 h$$



How Do We Create Memories And Understanding ?

- * The Big Picture Library System
- * **Action**
- * Working With Memory How Memory Works For You
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- * Retrieval Practice

The Med School Learning Model

- *See One
- *Do One
- *Teach One

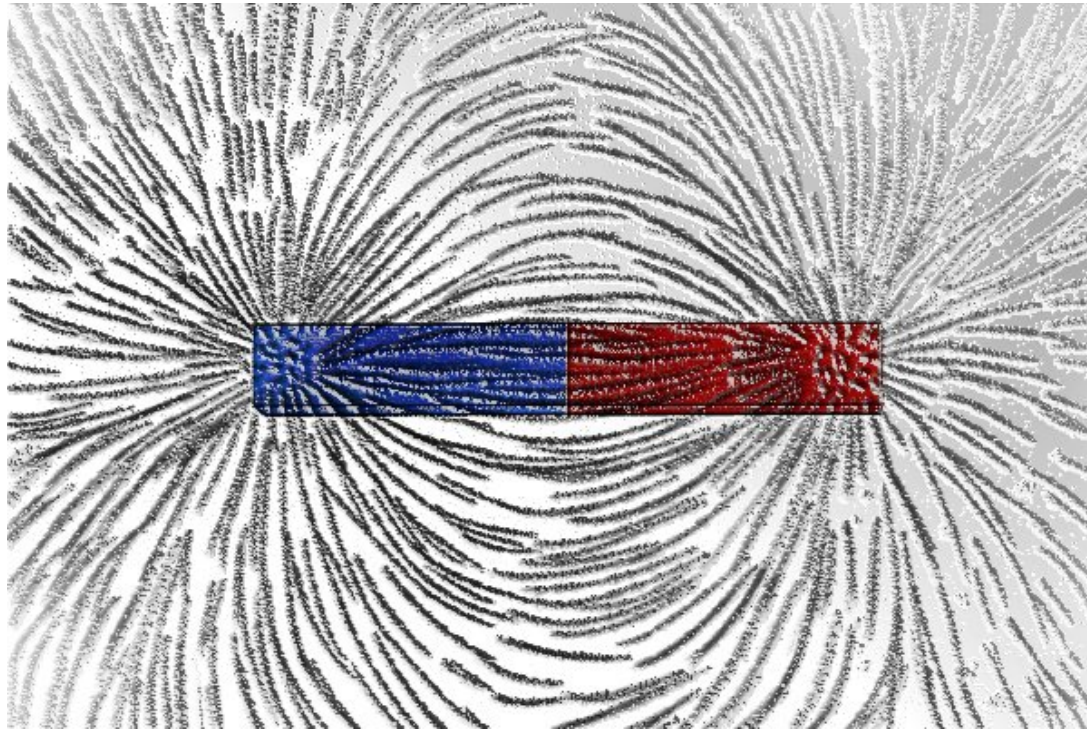




Learn Through **Action**

- * **Action** brings information to life
- * If you have **done it**, you “**get it**” better
- * If you have done it, you have an **event connected** with it which helps you remember

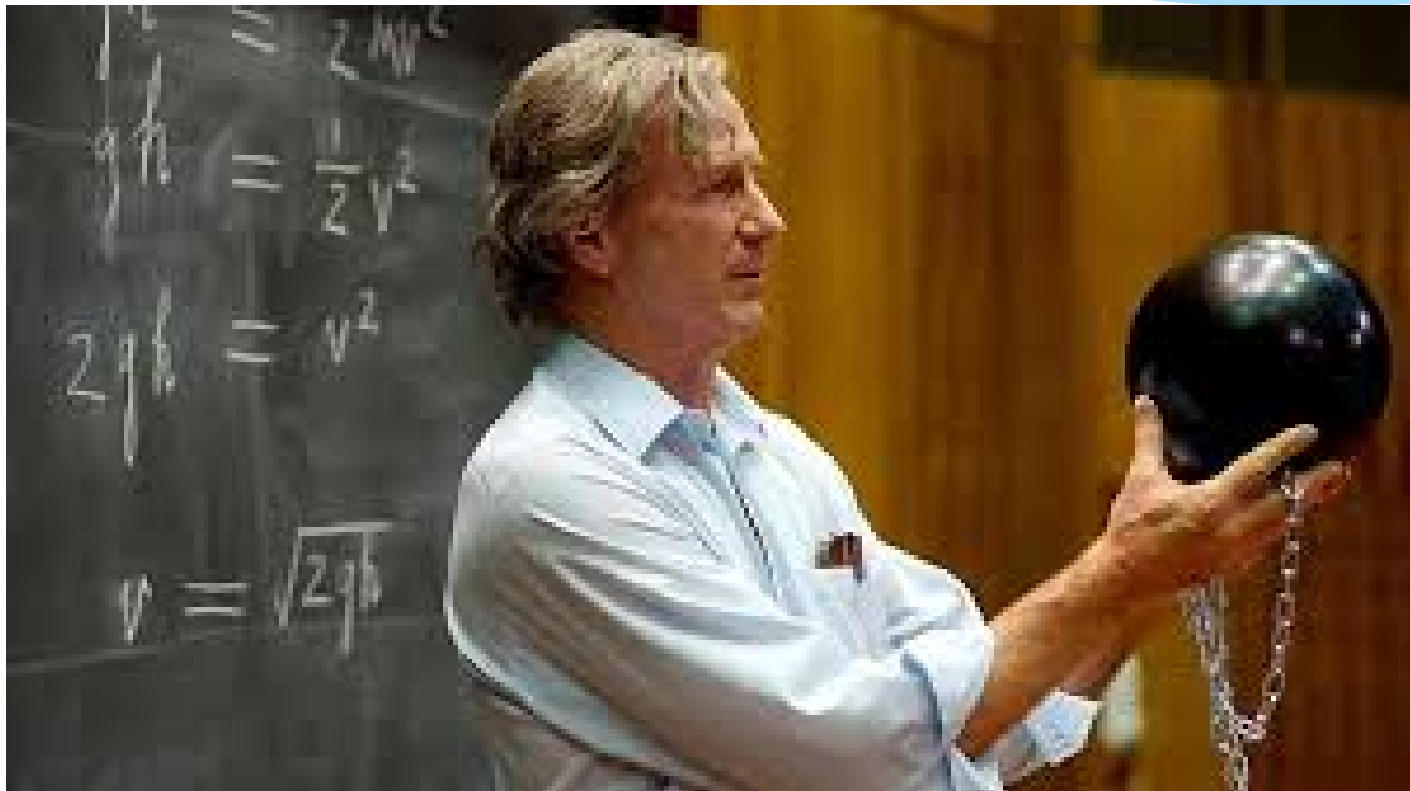
Action Based Learning Refines The FMM Big Picture



Would You Like To Be Taught Pendulum Action This Way ?



Or This Way ?



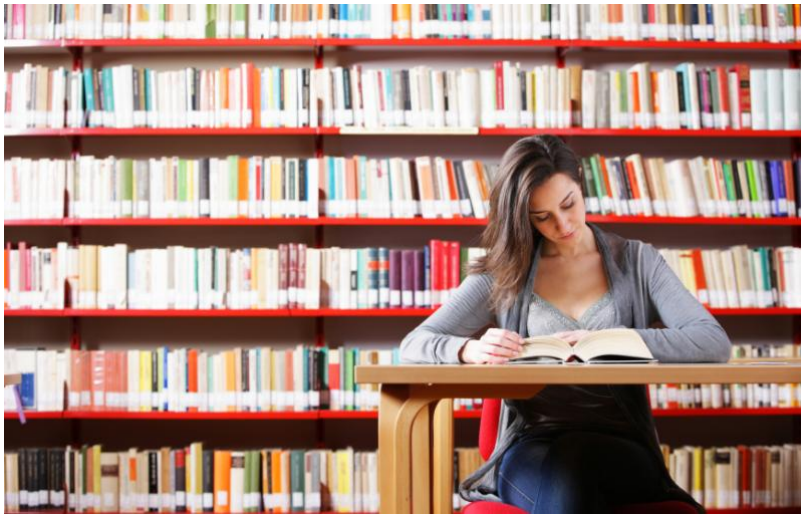
With Action



Best Way To Learn To Sing ?

Scales, Pitch, Phrasing,
Soprano

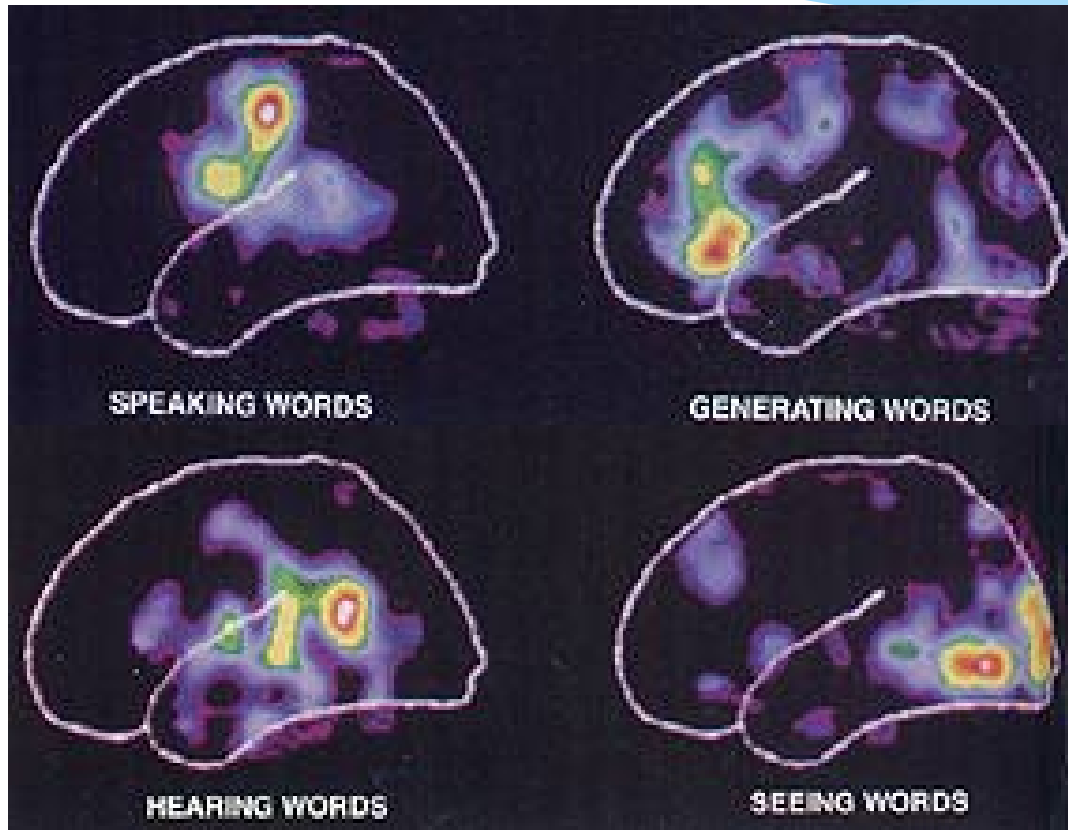
Singing



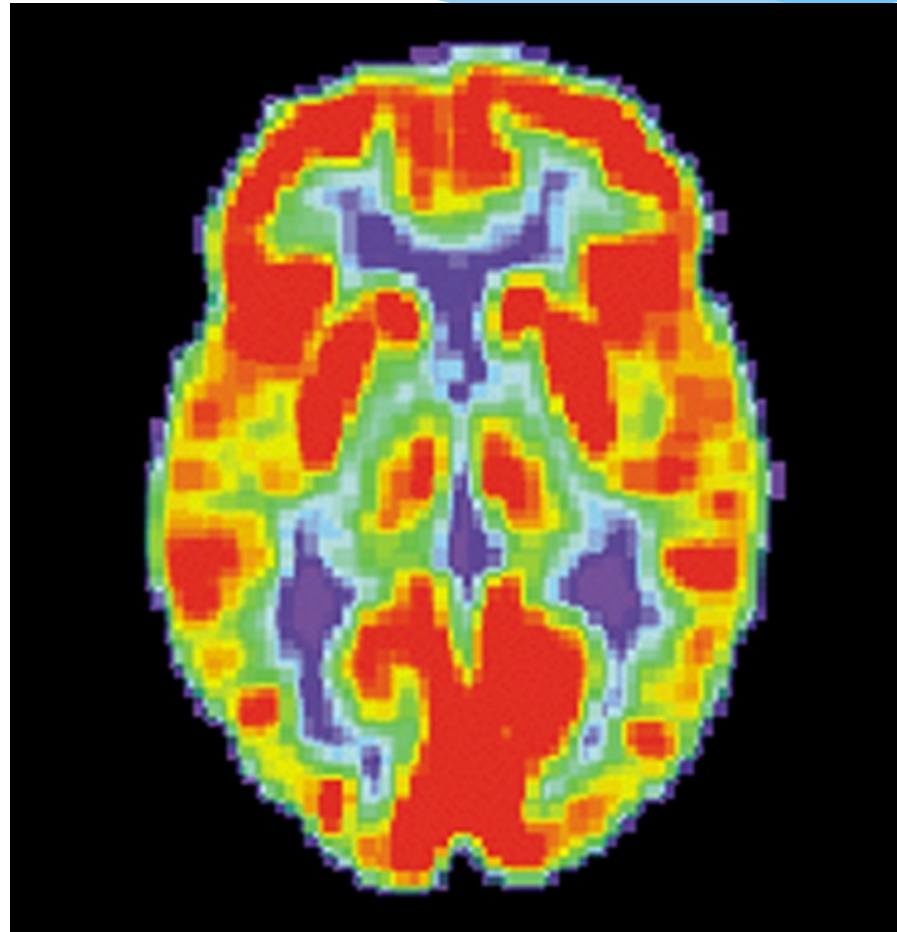
How Do We Create Memories And Understanding ?

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Brain Performing Discrete Tasks



The Brain Remembering And Understanding



Multimodal Learning: VATK



Kinesthetic



Tactile



Visual



Auditory



What Do We Know And Remember About Hammers ?



VATK Exception



Kinesthetic



Tactile

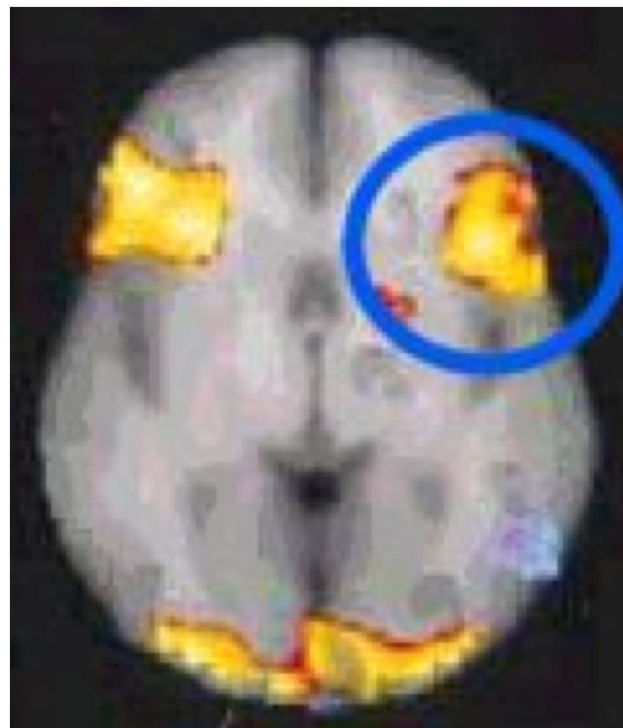
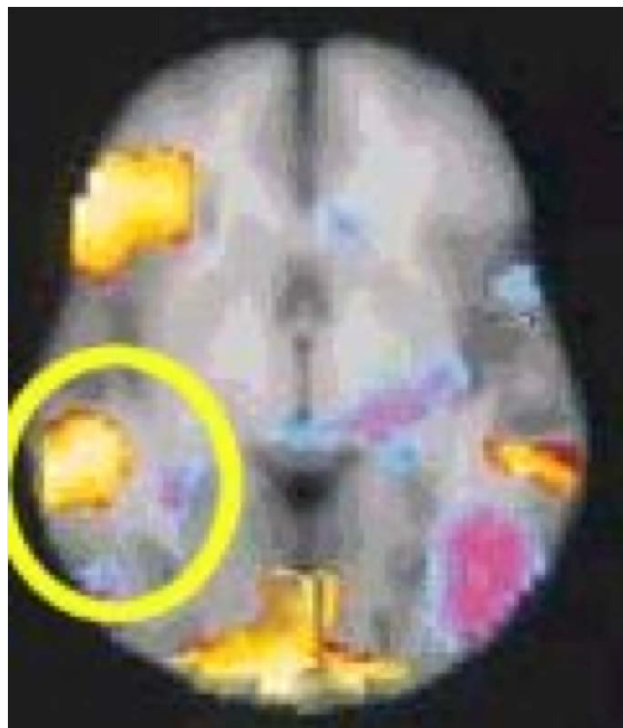


Visual



Auditory

Effective Vs Ineffective Readers While Decoding



The 10 % May Be Good At

- * Big Picture Thinking
- * Conceptualizing
- * Visual-Spatial Processing
- * Recognizing Dynamic Patterns and Relationships
- * Experiential Learning

Networking To Understand And Remember



BACKGROUND KNOWLEDGE



The More Connections The Better





putrid

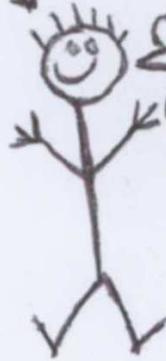


putrid

make smaller, condense, shorten

condense
compact

Bill
Clinton



I am only
going to
speak 3min
instead of
10min.

extend
expand



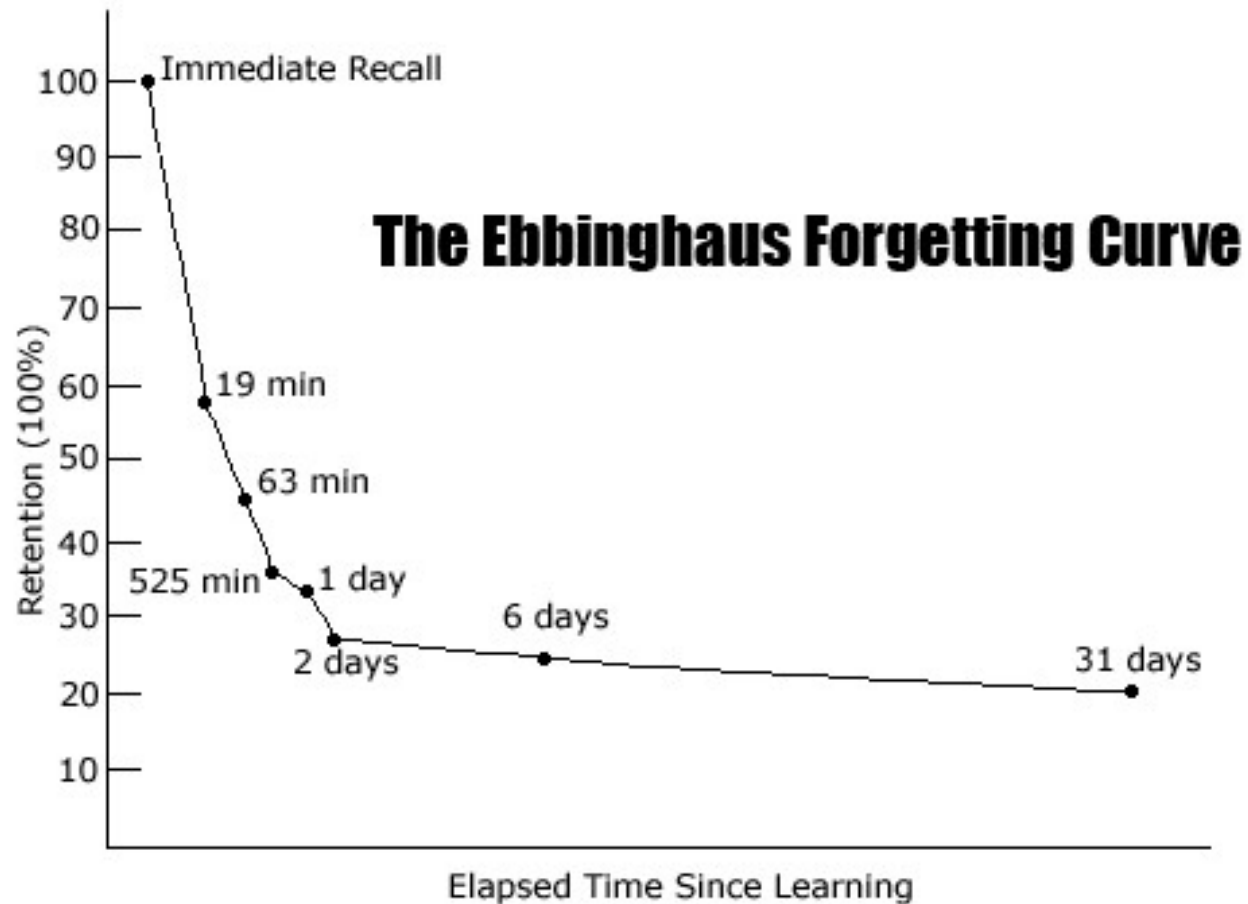
The club president decided to abridge the meeting
due to other activities going on that afternoon.

Learning "Abridge" Through Action, Multiformats,
and Networks

How Do We Create Memories And Understanding ?

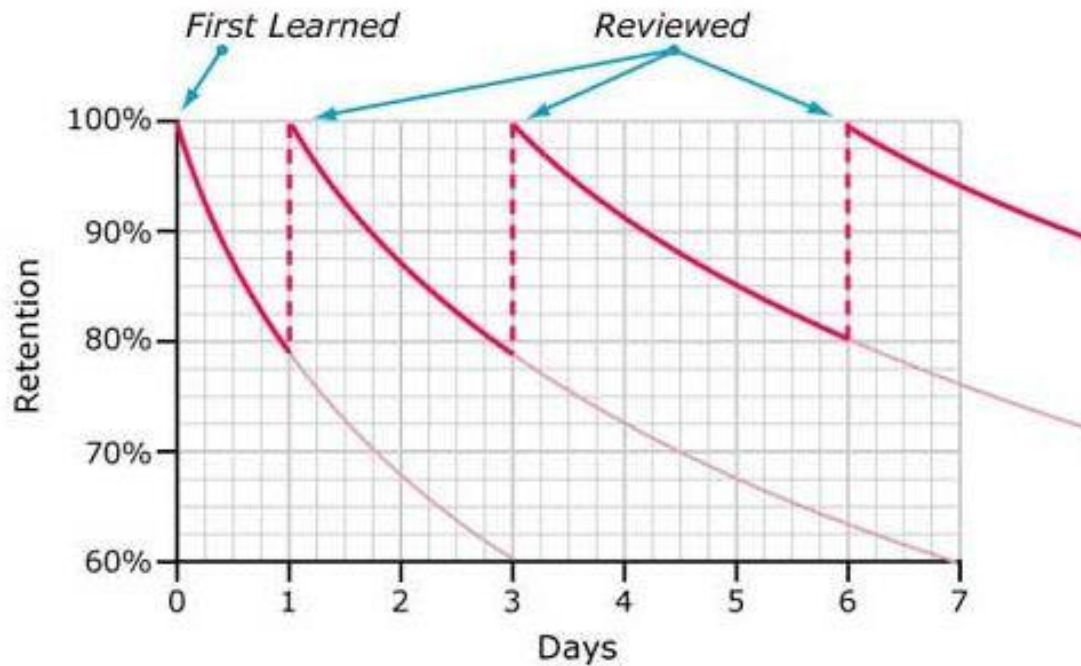
- * The Big Picture Library System
- * Action
- * Working With Memory How Memory Works For You
 - * MultiModal Representation
 - * Networking
- * **Retrieval Practice**

Remembering Is Hard



Forgetting Can Be Reduced By **Daily** **Retrieval Practice**

Typical Forgetting Curve for Newly Learned Information



The Med School Learning Model

- *See One
- *Do One
- *Teach One



Looking Over It Again Is Not Retrieval Practice !

Looking Over It Again Activates **Recognition Memory** Which Produces **The Illusion of Knowing**

Retrieval Practice By Self-Testing Or Teaching Others Activates **Free Recall Memory** Which Provides **Hard Evidence Of Learning**

Tests Are Retrieval Activities, Not Storage Activities

Self-Testing Strengthens the Neural Networks and
Rehearses the Retrieval Strategies

Make Retrieval Practice a Core Part of Learning
Activities



What Do We Do To Create Memory And Understanding ?

- * The Big Picture creates a library system for the Details
- * Action creates understanding
- * Information is stored in memory in
 - Many Forms
 - Through A Spider Web of Connections
- * Regular Re-visiting of the information
 - * Expands and strengthens the spider web of connections
 - * Strengthens and refreshes the memory of the strategies used for retrieval
 - * Reduces memory decay

Intervention Components

- * Identify
- * Remediate
- * Accommodate
- * Bypass
- * Compensate
- * Learn to Prevail

The Gift Of Dyslexia



Be Prepared To Support The Student Emotionally

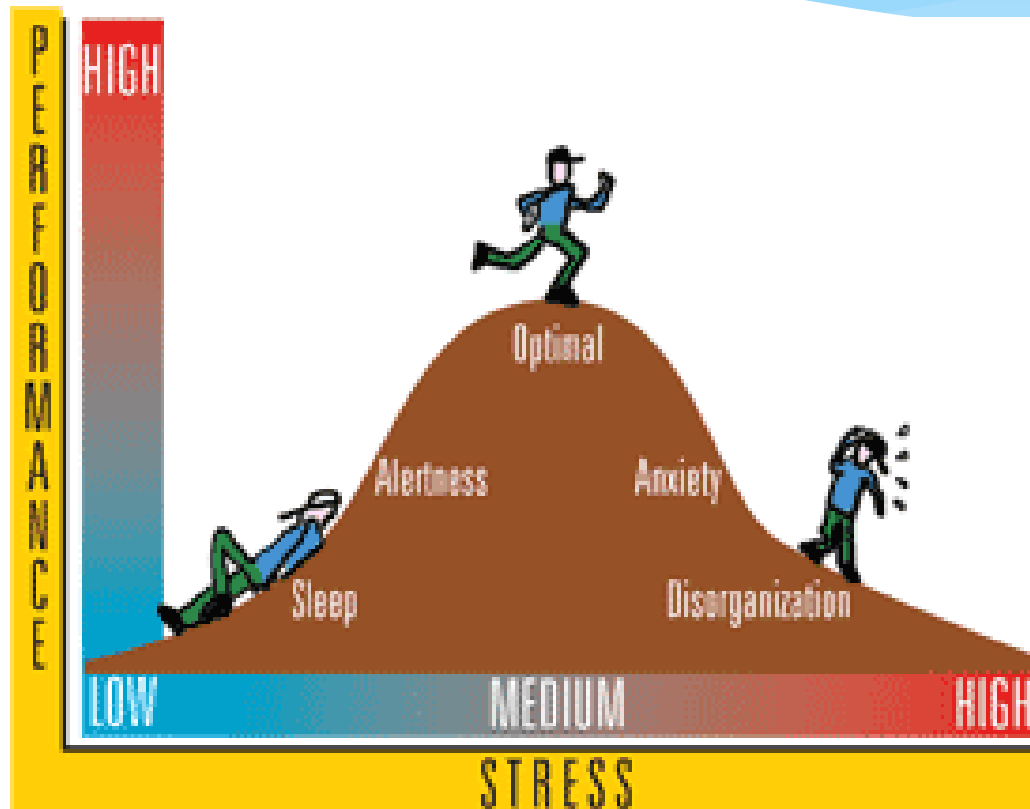


"For the things we have to learn before we can do them, we learn by doing them."

-Aristotle

Stress Level vs Performance Level

Stress Performance Connection




The Stress Response



Freeze With A Purpose





Calming The Limbic System

just take a breath

Flee With A Purpose: Create Mental Distance And Work Space

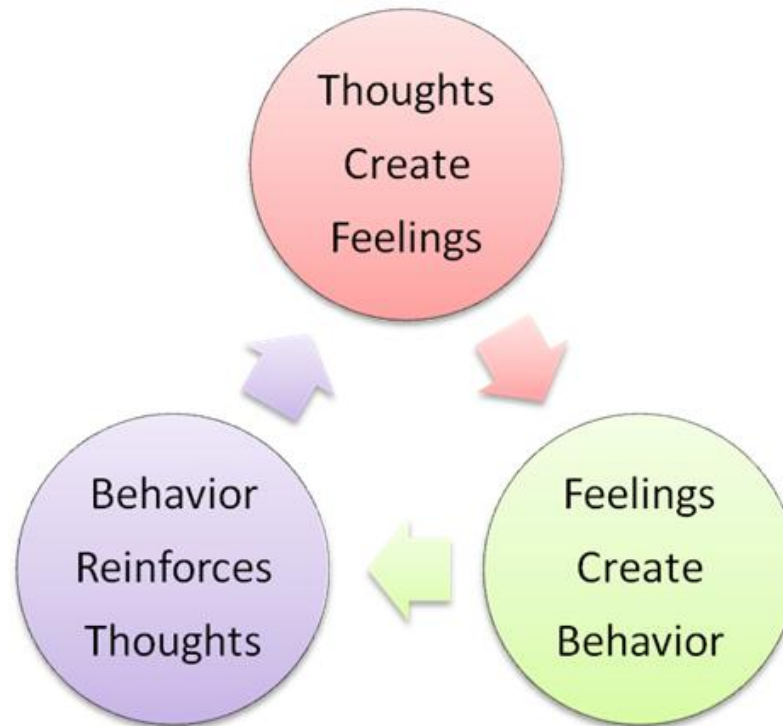
in the
moment...



Fight With A Purpose: Open Mind To Alternate Views



Thinking, Feeling, Doing





The Fixed Mindset

- * The Fixed Mindset: **When You Fail You Are A Failure**
- * **If I am a failure, inherently, my plight cannot change.**

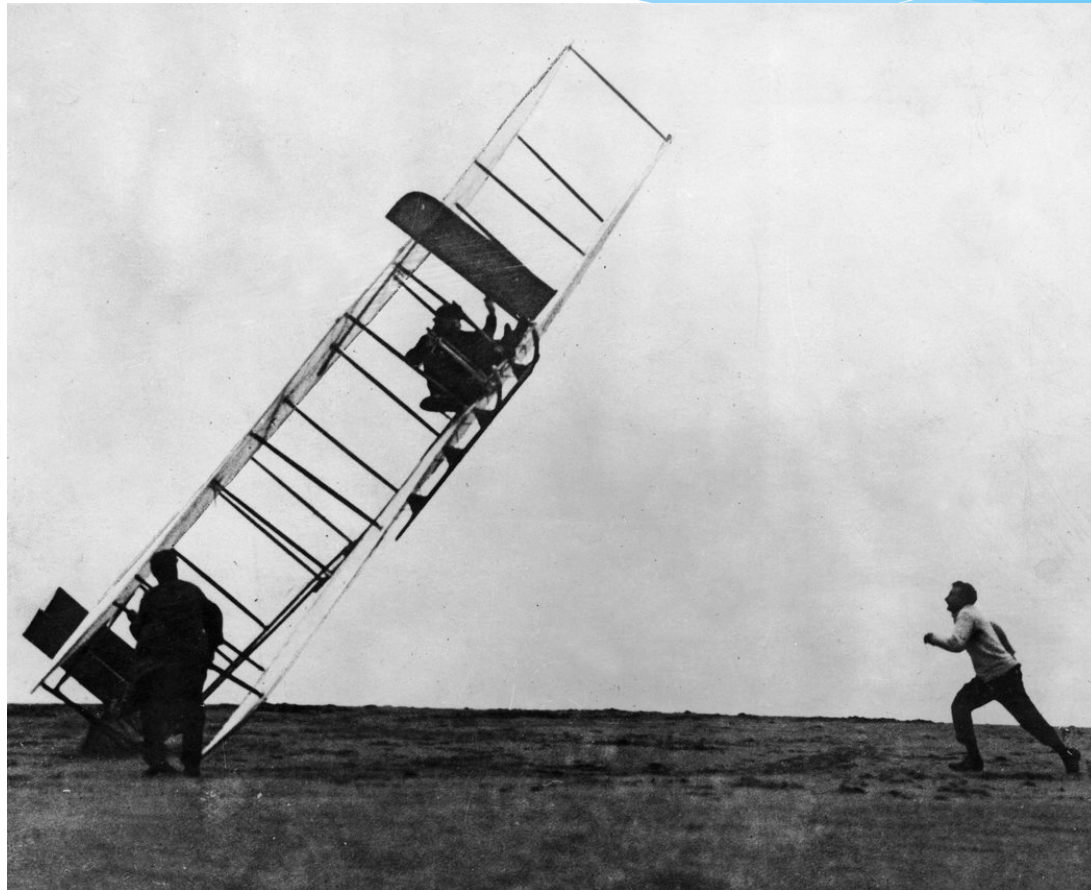
The Growth Mindset

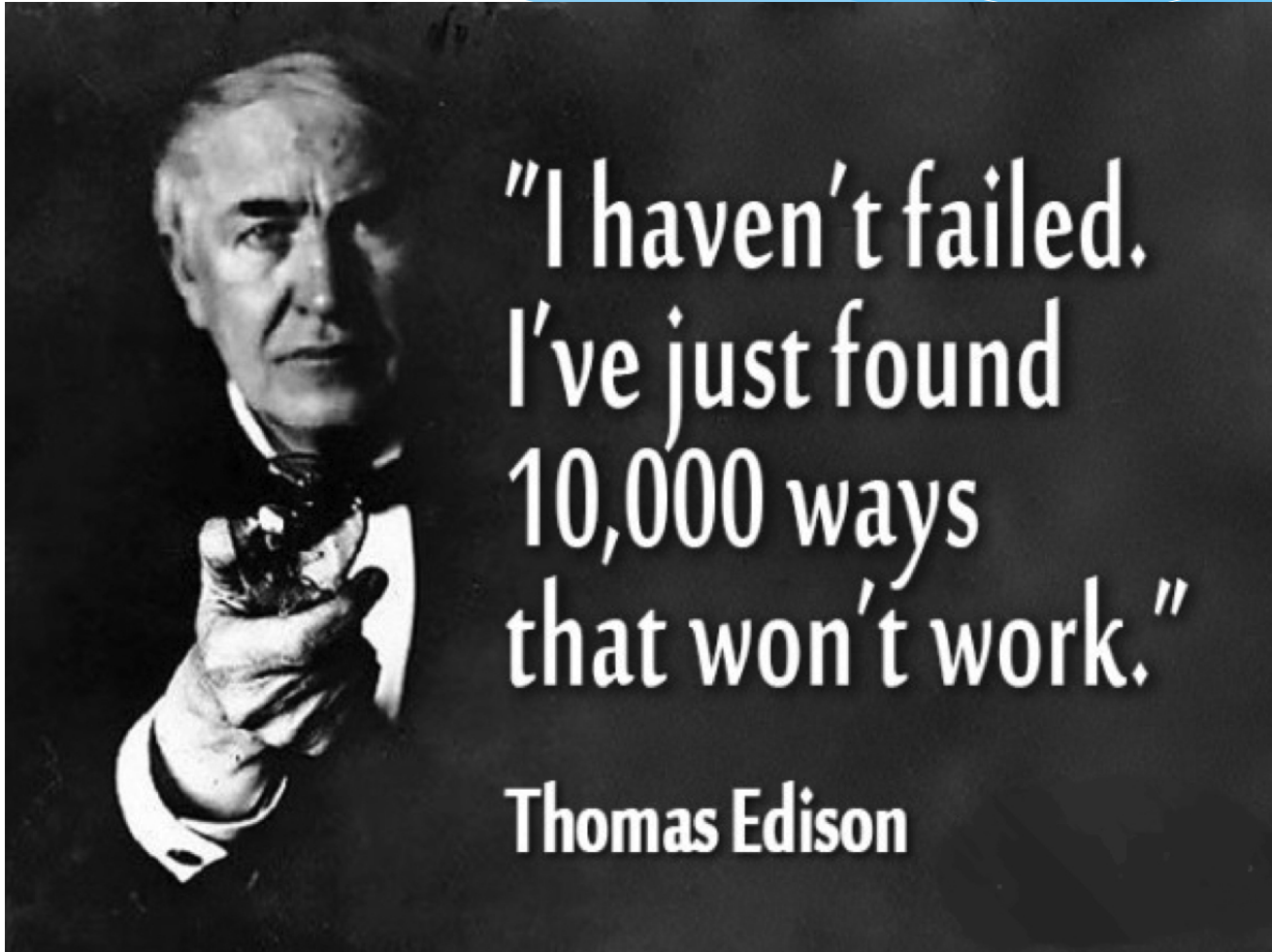
- * The Growth Mindset: **When You Fail You Are Learning**
- * Re-defines Failure
- * Re-defines Success
- * Internalizes Control
- * I Can Grow, I Am Not Stuck In This Place

Re-Define Failure

- * In the Learning Zone you may **Fail**
- * Failure is the only way to know what you need to do to get to the next level
- * Failure is painful in a good way
- * The Love-Hate relationship with failure leads to success

Wright Brothers





"I haven't failed.
I've just found
10,000 ways
that won't work."

Thomas Edison

Re-Define Success

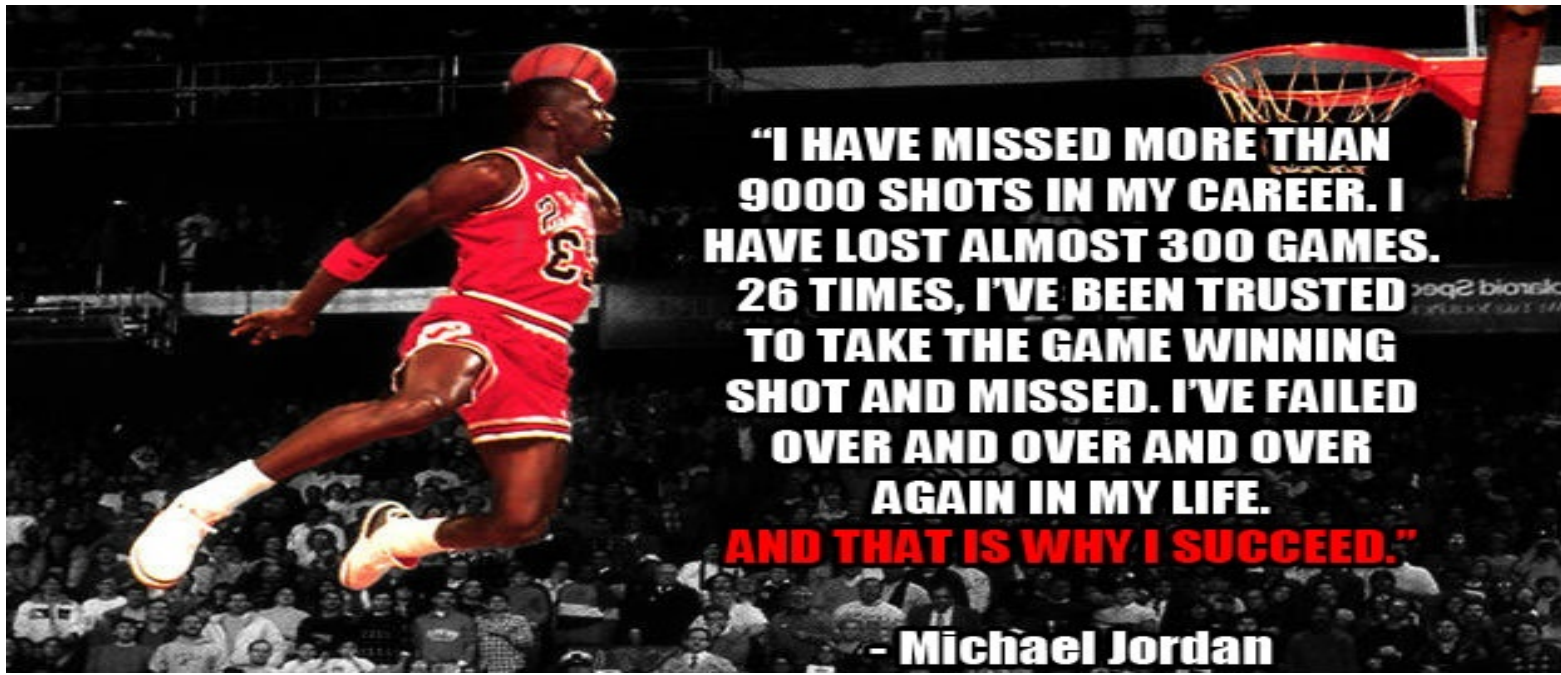
- * I have beaten my personal best
- * I have added to my skills
- * I have grown from the failure
- * It does not mean I accomplished 100 % of what I set out to do.
- * It does not mean I achieved perfection

I never lose.
I either **win** or **learn**.

Nelson Mandela



A Gritty guy with a growth mindset



**"I HAVE MISSED MORE THAN
9000 SHOTS IN MY CAREER. I
HAVE LOST ALMOST 300 GAMES.
26 TIMES, I'VE BEEN TRUSTED
TO TAKE THE GAME WINNING
SHOT AND MISSED. I'VE FAILED
OVER AND OVER AND OVER
AGAIN IN MY LIFE.
AND THAT IS WHY I SUCCEED."**

- Michael Jordan

The Best in NBA History

50 %

The Guide On The Side

How do I help him or her find a pathway to success and do so in a way s/he is stronger for taking the journey

You Will Be Safe

The process will be frustrating

But, I won't let you drown

You will participate in your own
survival

And, You will Grow

Provide The Child Space To Have Experiences

Embrace Experience: A Source Of Internalized Controls

Where Does Good Judgment Come From ?
Experience.

Where Does Experience Come From ?
Bad Judgment, Examined.

A Sweater is

What the child has to put on when the mother feels
cold

The Kidictionary, 2016



Allow Experience To Happen

Do Not Rescue The Student From A Growth Zone
Experience.

Facilitate The Processing Of It.

Become A Process Junkie



What To Process

- * The failures: How do you make your F's ?
- * The successes: What about the A's ?
- * It is all about the decisions
- * Decisions = Control
- * The goal is Internalized Control

Because I Have Processed My Experiences

I Know What I Do That Creates and Limits Success

Therefore, I Have A Choice As To What I Do

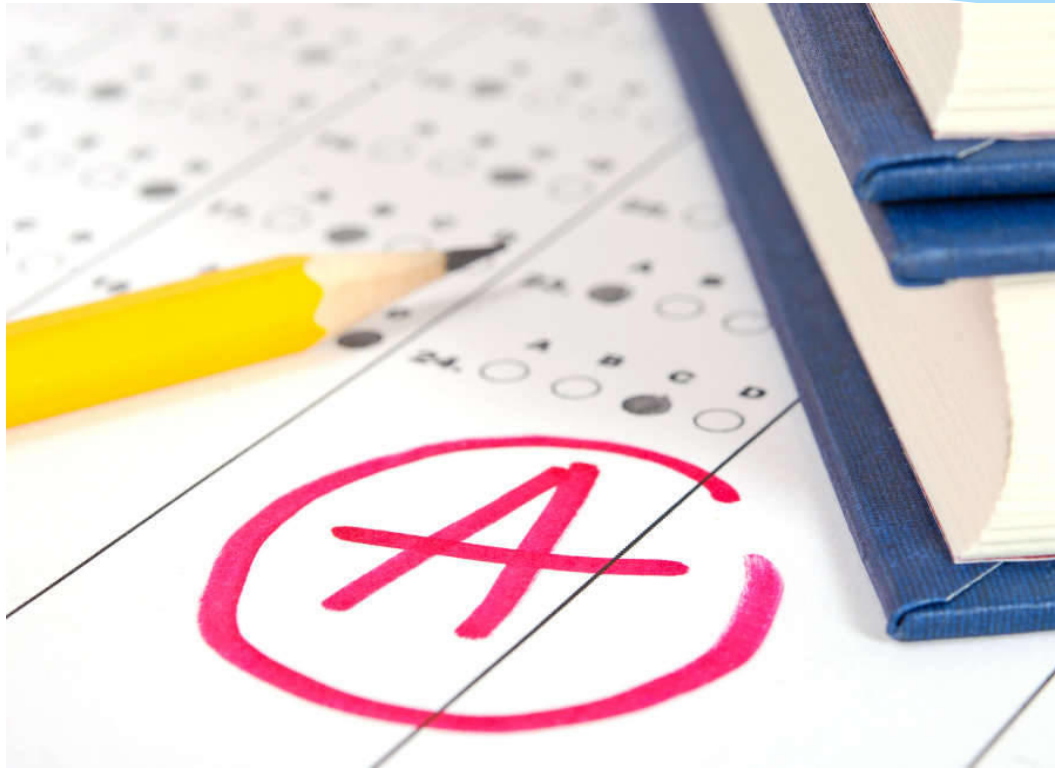
Therefore, I Have Control

Control is Power

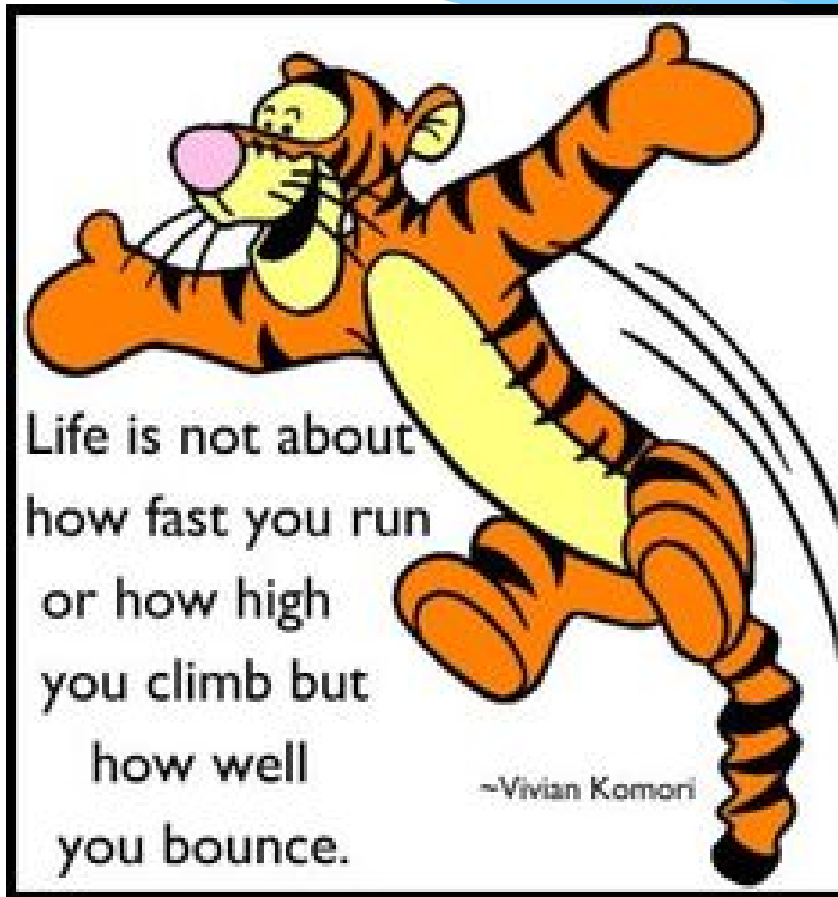
Process Trumps Outcome







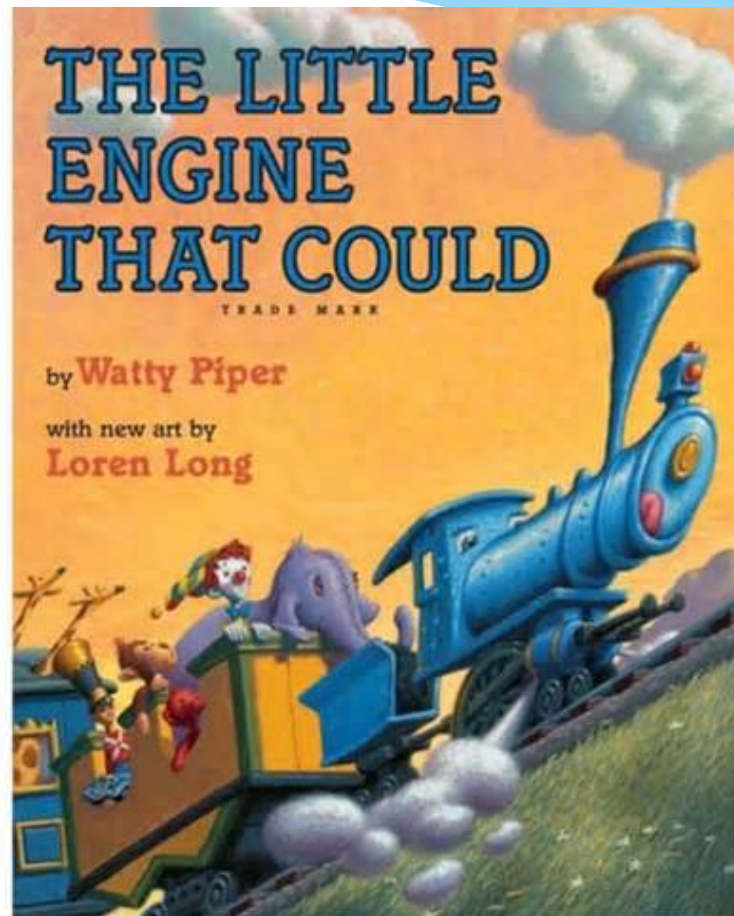
Bounces Back



Need I Say More ?



The Little Engine That Did





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Resources On Reading Disorders

- * <http://dyslexia.yale.edu/>
- * <https://www.learningally.org>
- * <https://www.nichd.nih.gov/health/topics/reading/conditioninfo/pages/disorders.aspx>
- * <https://dyslexiaida.org/>
- * <https://www.nichd.nih.gov/health/topics/reading/conditioninfo/pages/faqs.aspx>

Resources On Learning

- * ***Make It Stick.*** Brown, Roediger, and McDaniel
- * ***How We Learn.*** Benedict Carey
- * ***Thinking, Fast and Slow.*** Daniel Kahneman
- * ***Growth Mindset,*** Carol Dweck, PhD