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 Grogs 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”
Then She Connects The Code To Speech Sounds
Wilma! Barbecue at the Grogs Friday!
Phonemic Awareness

"T-A-B-L"  "T-A-B-L"

"T-A-B-L"  "T-A-B-L"

"T-A-B-L"  "T-A-B-L"
Letter Knowledge
Phonics

The Alphabetic Principle

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

A ➔ apple

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

cat ➔ cat

(Growing Kinders)
Fluency

Accuracy in Decoding

Expressiveness/prosody

Automaticity or reading effortlessly
Comprehending The Message

Reading Strategies:

- **Predict**: Try to figure out what might happen next.
- **Visualize**: Picture the people, places, and events being described.
- **Connect**: Connect what you are reading to other texts and the real world.
- **Question**: Ask questions about the material you are reading.
- **Clarify**: Investigate, identify main points and summarise.
- **Evaluate**: Judge the story and the actions of the characters.
Remembering 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-ops information processing systems designed to do other things. This is inefficient.
The Neurobiology of Reading, i.e. The Co-Opted Systems

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

Shaywitz, 1998
Brain Performing Discrete Tasks
The cortical reading network

- Broca's area
- Primary motor cortex
- Arcuate fasciculus
- Primary auditory cortex
- Wernicke's area
- Angular gyrus
- Primary visual cortex
- VWFA
- Dorsal m-route
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
ar 'skrɪm!!

Ice cream
ar 'krɪm

I saw her race
ar 'sɔː hər 'reɪs

I saw her ace
ar 'sɔː hər 'eɪs
Phonemic Awareness Ain’t Easy

"T-A-B-L"  "T-A-B-L"

"T-A-B-L-E"  "T-A-B-L-E"
So Letter Sound Association May Not Be Easy
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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   Auditory Processing and Auditory-Visual Association

3) Ventral occipitotemporal system
   Letter and Word Form Constancy

Shaywitz, 1998
Effective Vs Ineffective Readers While Decoding
"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

- Broca's area
- Supramarginal gyrus
- Angular gyrus
- Primary auditory area
- Wernicke's area
The Alphabetic Principle

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

A → apple

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

cat → cat

A → apple

growingkinders
A Failure Of Phonemic Awareness And Phonics

Przyblizzone
Fluency

- Accurate reading
- At speed
- With expression
What Could Go Wrong With Fluency?

- Frustration with decoding leads to avoidance
- Avoidance limits practice
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1) Anterior left inferior frontal region
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   Phoneme Processing and Letter-Sound Connections

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   Visual Letter and Word Form Constancy

Shaywitz, 1998
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1) Anterior left inferior frontal region
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Shaywitz, 1998
Brain Performing Discrete Tasks
But a $p$ is not a $q$

$p$ vs $q$
How do you spell …..

Dawg
Daug
Doug
Dahg
Dog
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
Aaoccdrnig to a rscheearch at Cmabrigde Uinervtisy, it deosn’t mttaer in what oredr the ltteers in a word are, the olny iprmoetnt tihng is that the frist and lsat ltteer be at the rghtit pclea. The rset can be a total mses and you can still raed it wouthit problem. This is bcuseae the huamn mnid deos not raed ervey lteter, but the wrod as a wlohe.
What Could Go Wrong With Comprehension & Retention?
Weak Decoding Limits Access To Text

I have to do a paper for school on Ken and Abel.

I've been looking all through the Old Testament, and I've found Abel, but I can't find Ken...

Do you think maybe I'm using the wrong translation?

I never know what to say...

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Lack of Fluency: A Problem of Stamina

Waiting On A Slow Train Is Exhausting
Semantics

Angstrom
Words Mean Many Things
Syntax

The girl went to the store with the dog
It was too hot to eat.
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 = 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
- Action
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  - MultiModal Representation
  - Networking
- Retrieval Practice
The Big Picture
The Details
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?
Area = \pi \times r^2
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
  - MultiModal Representation
  - Networking
- 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?

* The Big Picture Library System
* Action
* Working With Memory How Memory Works For You
  * MultiModal Representation
  * Networking
* Retrieval Practice
Brain Performing Discrete Tasks
The Brain Remembering And Understanding
Multimodal Learning: VATK

- Kinesthetic
- Tactile
- Visual
- Auditory
What Do We Know And Remember About Hammers?
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
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

The Ebbinghaus Forgetting Curve

- Immediate Recall
- 19 min
- 63 min
- 525 min
- 1 day
- 2 days
- 6 days
- 31 days

Retention (100%) vs. Elapsed Time Since Learning
Forgetting Can Be Reduced By Daily Retrieval Practice
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

I'm getting out of my comfort zone!
"For the things we have to learn before we can do them, we learn by doing them.”
-Aristotle
Stress Level vs Performance Level
The Stress Response
Freeze With A Purpose

DON'T JUST DO SOMETHING,

STAND THERE!
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
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
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

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
Life is not about how fast you run or how high you climb but how well you bounce.

~Vivian Komori
Need I Say More?
The Little Engine That Did
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Resources On Reading Disorders

* [http://dyslexia.yale.edu/](http://dyslexia.yale.edu/)
* [https://www.learningally.org](https://www.learningally.org)
* [https://dyslexiaida.org/](https://dyslexiaida.org/)
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