Why All Children & Adults Can Be Taught to Read and Comprehend: The Sensory-Cognitive Foundation of Imagery
We believe, passionately, that children and adults can be taught to read and comprehend.

We believe that sensory-cognitive functions are the first dominoes in language and literacy skills.

We believe that imagery is a primary sensory-cognitive domino.
Sensory-Cognitive Functions

• **Phonemic Awareness (PA):** the ability to perceive the identity, number, and sequence of sounds within words.

• **Symbol Imagery (SI):** the ability to create mental representations for sounds and letters within words.

• **Concept Imagery (CI):** the ability to create an imaged gestalt (whole) from oral or written language.
Independence
Self-Correct
Monitor
Sensory Input
The K-12 Pipeline

Weak language and literacy skills are the primary cause of failure to make one year of gain for one year of instruction.

Weakness in sensory-cognitive functions underlies weakness in language and literacy skills.
The Reading Circles
A Paradigm of Integration

*Sensory-cognitive* functions for the component parts of reading.

- **Auditory**
  - PA & SI
  - Word Attack

- **Visual**
  - SI
  - Word Rec.

- **Language**
  - Contextual Reading
  - Vocabulary

Comprehension
Sensory-cognitive functions are the first dominoes.

Processing language is a cognitive act.

Instruction in language and literacy should match a theory of cognition.
Allan Paivio created Dual Coding Theory (DCT), a general theory of cognition.

“Performance is mediated by the joint activity of verbal and nonverbal systems...cognition is always an interplay between the verbal and nonverbal systems.”

Paivio suggested that linguistic competence and performance are based on a substrate of imagery.

“Individuals differ in the extent, manner, and efficiency of employment of each of the systems according to their verbal and nonverbal habits and skills.”
Imagery and the Language Processing Spectrum

Decoding
- Dyslexia

Comprehension
- Hyperlexia/Autism

Two types of imagery are needed for language processing:
- **Symbol Imagery**
- **Concept Imagery**
Imagery and the Language Processing Spectrum

Dyslexia

Lance

CA: 16-2 years, 10th grade
PPVT: 17-11 Mental Age
Retained in second grade
Struggled early to learn to read
Always in summer school
Taught with many different reading programs like:
  • Formula Phonics
  • Total Reading
  • Slingerland
  • Orton-Gillingham

Hyperlexia/Autism

Michelle

Comprehension

Auditory

Visual

Language

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Lance

Cannot decode but *can comprehend.* (Dyslexic?)

CA: 16-2 years, 10th grade
PPVT: 17-11 Mental Age

LAC Test:
Word Attack: 64/100
Word Recognition: 2.2 Grade Level
Paragraph Reading: 5.1 Grade Level
Spelling: 5.8 Grade Level
Oral Directions: <3.0 Grade Level

75th Percentile
Students cannot self-correct because they cannot auditorily perceive (PA) and visually image (SI) that they omitted the ‘r.’
Symptoms of Weakness
Phonemic Awareness & Symbol Imagery

• Weak word attack skills
• Weak word recognition skills
• Difficulty learning and retaining sight words
• Weak phonological spelling skills (opportunity for opportunity)
• Weak orthographic spelling skills (opportunity for opportunity)
• Difficulty reading fluently in context
• Difficulty monitoring, self-correcting reading & spelling errors
• Slow and laborious decoding skills
• May be labeled Dyslexic
Lance
CA: 16-2 years, 10th grade
PPVT: 17-11 Mental Age
Retained in second grade
Struggled early to learn to read
Always in summer school
Taught with many different reading programs like:
  • Formula Phonics
  • Total Reading
  • Slingerland
  • Orton-Gillingham

Michelle
CA: 17-4 years, 12th grade
PPVT: 17-2 Mental Age
Dropping out of high school
  • Not enough credits to graduate
Flat affect
Soft spoken
No eye contact
Poor self-esteem
Michelle

Can decode but cannot comprehend. (Hyperlexic/Autistic?)

CA: 17-4 years, 12th grade
PPVT: 17-2 Mental Age

LAC Test:
  Word Attack: 100 (+6)
  >12.9 Grade Level
  Word Recognition: >12.0 Grade Level
  Paragraph Reading: >12.0 Grade Level
  Spelling: >12.0 Grade Level
  Reading Comp.: 9th Percentile
  Silent Rdg. Comp.: 10th Percentile
  Oral Directions: 9th Percentile
Students process PARTS as they read.
Imagery is **sensory** information that prevents language from going in one ear and out the other.

**Imaged Gestalt (whole)**

**Oral Language**

**Written Language**

**Higher Order Thinking**

- Main Idea
- Conclusion
- Inference
- Predict/Extend
- Evaluate
Symptoms of Weakness
Concept Imagery

Difficulty with:

• written language comprehension
• oral language comprehension
• critical, logical, abstract thinking and problem solving
• following directions
• expressing language orally
• expressing language in writing
• grasping humor
• interpreting social situations
• cause and effect
• attention and focus
• mental mapping
• responding to a communicating world
Our Programs
A Brief Overview

• Seeing Stars® (SI™) program

• Lindamood Phoneme Sequencing® (LiPS®) program

• Visualizing and Verbalizing® (V/V®) program

• Talkies® program

• On Cloud Nine® (OCN™) Math program
What Happened to Lance?

Lance
CA: 16-2 years, 10th grade
PPVT: 17-11 Mental Age

LAC Test: 64/100
Word Attack: 2.2 Grade Level
Word Recognition: 5.1 Grade Level
Paragraph Reading: 5.8 Grade Level

100/100
10.1 Grade Level
9.8 Grade Level
8.9 Grade Level
Students with Dyslexia

Average Hours of Instruction: **121**

\( n = 1,368 \) • Average Grade Level: **4th**

Pre- and Posttest Percentiles

*Statistically significant (\( p \leq .05 \))

Based on students with third-party diagnoses of Dyslexia who received between 20 and 240 hours of SI only instruction at Lindamood-Bell Learning Centers, 2008 through 2016.
Students with Dyslexia

Average Hours of Instruction: 121

\(n = 1,368\) • Average Grade Level: 4th

Average Standard Score Changes

Based on students with third-party diagnoses of Dyslexia who received between 20 and 240 hours of SI only instruction at Lindamood-Bell Learning Centers, 2008 through 2016.
What Happened to Michelle?

Michelle
CA: 17-4 years, 12th grade
PPVT: 17-2 Mental Age

Reading Comp: 9th Percentile
Silent Rdg. Comp: 10th Percentile

Auditory
Visual
Language

Comprehension

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Comprehension Only Students

Average Hours of Instruction: 99

\( n = 4,201 \) • Average Grade Level: 6th

Pre- and Posttest Percentiles

*Statistically significant \((p \leq .05)\)

Based on students who received between 20 and 240 hours of V/V only instruction at Learning Centers, 2008 through 2016.
Comprehension Only Students

Average Hours of Instruction: 99

\( n = 4,201 \) • Average Grade Level: 6th

Average Standard Score Changes

Based on students who received between 20 and 240 hours of V/V only instruction at Learning Centers, 2008 through 2016.
Gray matter volume changes following reading intervention in dyslexic children

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Gray Matter Volume Changes Following Seeing Stars Instruction with Dyslexic Children

- Eleven children, identified as *dyslexic*, received explicit instruction in symbol imagery as applied to reading.
- After eight weeks of reading intervention, the children in the study showed marked improvement in several reading and reading related skills.
  - Significant at $p<.001$: LAC, SI, Word Recognition
  - Significant at $p<.01$: Rapid Naming
  - Significant at $p<.05$: Word Attack
  - Significant at $p<.05$: Passage Comprehension
- Improvements in reading ability were accompanied by changes in brain structure.

*Krafnick et al., 2011*
Gray Matter Volume Changes Following Seeing Stars Instruction with Dyslexic Children

- Four areas of brain structure showed increased volume at the end of the intervention. These areas included those involved in memory and mental imagery.

- Left hemisphere in anterior fusiform/hippocampus and precuneus.

- The precuneus is involved with episodic memory, visuospatial processing, and aspects of consciousness.

*Krafnick et al., 2011*
Gray Matter Volume Changes Following Seeing Stars Instruction with Dyslexic Children
Increases maintained after the intervention ended.
For more information or to sign up for an evaluation:

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