THE PICTURE OF DYSLEXIA

ANN W ALEXANDER, M.D.
THE MORRIS CENTER
GAINESVILLE, FL
www.TheMorrisCenter.com

TIM CONWAY, Ph.D.
UNIVERSITY OF FLORIDA
GAINESVILLE, FL

IDA 2007
THE PICTURE OF DYSLEXIA

THE

WHO

WHAT

WHEN

WHERE

WHY

&

WHAT IT LOOKS LIKE

WHAT TO DO
WHAT IT ISN’T

DYSLEXIA IS …

- **NOT** A VISUAL PROBLEM
- **NOT** A LACK OF INTELLIGENCE
- **NOT** DUE TO LACK OF EFFORT
- **NOT** A DEVELOPMENTAL LAG.
- **NOT** UNCOMMON – 5 – 17.5 % OF POPULATION
- **NOT** RESPONSIVE TO STANDARD READING INSTRUCTION
WHAT IT IS

**DYS** = TROUBLE

**LEXIA** = WORDS

**TROUBLE WITH WORDS**

- NEUROLOGIC IN ORIGIN - GENETIC
- LIFELONG – ENVIRONMENT MAY ALTER COURSE
- CORE DEFICIT IN PHONOLOGICAL COMPONENT OF LANGUAGE
- READING COMPREHENSION > WORD READING
- ACCOMPANYING CHALLENGES (50%)
  - ADHD
  - SENSORY MOTOR DIFFICULTY
  - BEHAVIORAL PROBLEMS
- MORE CHALLENGING TO REMEDIATE
THE PICTURE OF DYSLEXIA
(All Symptoms Do Not Occur With Everyone)

STRENGTHS

LEADERSHIP SKILLS

THINKING “OUT OF THE BOX”

CHURCHILL

JFK

TED TURNER

THOMAS EDISON (PHONOGRAPHER)

PATTON

POLITICAL & MILITARY

ENTREPRENEURS

SCIENTISTS & INVENTORS
THE PICTURE OF DYSLEXIA
(All Symptoms Do Not Occur With Everyone)

STRENGTHS

CREATIVITY

WRITERS
ARTISTS
MUSICIANS
ACTORS / DIRECTORS

HANS CHRISTIAN ANDERSEN
LEONARDO Da VINCI
MOZART
HARRISON FORD & STEVEN SPEILBERG

(All Symptoms Do Not Occur With Everyone)
THE PICTURE OF DYSLEXIA
(All Symptoms Do Not Occur With Everyone)

STRENGTHS

VISUOSPATIAL / MOTOR SKILLS

SURGEONS

ATHLETES

NEUROSURGERY

MOHAMMAD ALI

NOLAN RYAN
WHAT TO DO?

COMPENSATE

REMEDIATE

ACCOMMODATE

PROMOTE
WHAT TO REMEDIATE?

“IF YOU DON’T KNOW THE CAUSE YOU GET INSTRUCTIONAL PARADIGMS BUILT ON FAULTY ASSUMPTIONS.”

G. Reid Lyon, Ph.D.
PHONOLOGICAL AWARENESS

THE CORE DEFICIT
WHAT IS PHONOLOGICAL AWARENESS?
PHONOLOGICAL AWARENESS

- THE UNDERSTANDING THAT WORDS ARE MADE UP OF SMALL BITS OF SOUND – PHONOLOGICAL SENSITIVITY

  Do the words cat and fat sound the same at the end?

  What is the first sound in the word man?

- INNATE IN A TYPICAL BRAIN RECEIVING APPROPRIATE LANGUAGE INPUT

Torgesen, www.fcrr.org
PHONEMIC AWARENESS

- THE ABILITY TO IDENTIFY, THINK ABOUT, AND MANIPULATE THE INDIVIDUAL SOUNDS (PHONEMES) IN WORDS.

- THE IMPLICATION OF A GROWING ABILITY TO IDENTIFY INDIVIDUAL SOUNDS IN WORDS.

Torgesen, www.fcrr.org
EARLY LANGUAGE DEVELOPMENT

- BRAIN IS TUNED TO PARENTS’ LANGUAGE

- NEWBORN: INTEGRATES:
  - ORAL-FACIAL MOVEMENTS
  - SPEECH SOUNDS – PHONOLOGY
  - SOCIAL – EMOTIONAL (NON VERBAL TONES & GESTURES) - PRAGMATICS
LANGUAGE
(BUILDING BLOCKS)

9 YEARS

5 YEARS

18 MONTHS

9 MONTHS

1 MONTH

PHONOLOGY
(SYNTAX)

PHONETICS
(SYNTACTIC)

SEMANTICS
(MEANING)

PRAGMATICS
(FUNCTION)

METALINGUISTIC
(WRITING)

SPELLING
(READING)

LANGUAGE
(BUILDING BLOCKS)
PRINCIPLES OF LEARNING

- WHAT FIRES TOGETHER, WIRES TOGETHER – MULTIPLE SENSES STRENGTHEN PATHWAYS

- OPTIMAL ATTENTION

- CONSISTENT INPUT

- INTENSITY
  - SALIENT
  - FREQUENT
  - REPETITION, REPETITION, REPETITION

Alexander, 2003
READING
(PERCEPTION / PRODUCTION)

EXECUTIVE FUNCTION / INTENTION

WORKING MEMORY
HOLD / MANIPULATE

ORTHOGRAPHIC
REPRESENTATION

ARTICULATORY
REPRESENTATION

PHONOLOGIC
REPRESENTATION

PROSODIC
REPRESENTATION

MORPHOSYNTACTIC
REPRESENTATION

ATTENTION / AROUSAL

SEMANTIC / LEXICAL
REPRESENTATION

PHONICS RULES

SYNTACTIC
REPRESENTATION

DYSLEXIC
THE EFFECTS OF WEAKNESSES IN ORAL LANGUAGE ON READING GROWTH
(Hirsch, 1996)

5.2 years difference

High Oral Language in Kindergarten

Low Oral Language in Kindergarten

Torgesen, www.fcrr.org
EARLY READING DEVELOPMENT

BREAKING THE CODE
RECIPE FOR READING

DECODING (MECHANICS) + LANGUAGE COMPREHENSION → READING COMPREHENSION
WHAT IS “PHONICS”?

IT’S A LEARNED SKILL

PRONOUNCE THESE WORDS...

blit frachet

IT MUST BE TAUGHT

NEED PA (SOUNDS) TO HOOK TO ABSTRACT WRITTEN SYMBOLS (LETTERS)
GROWTH IN “PHONICS” ABILITY OF CHILDREN WHO BEGIN FIRST GRADE IN THE BOTTOM 20% IN PHONEME AWARENESS AND LETTER KNOWLEDGE (Torgesen & Mathes, 2000)
GROWTH IN WORD READING ABILITY OF CHILDREN WHO BEGIN FIRST GRADE IN THE BOTTOM 20% IN PHONEME AWARENESS AND LETTER KNOWLEDGE (Torgesen & Mathes, 2000)

- **Average**
  - Grade 1: 1.1
  - Grade 2: 2.2
  - Grade 3: 3.5
  - Grade 4: 4.8
  - Grade 5: 5.7

- **Low**
  - Grade 1: 1.3
  - Grade 2: 2.5
  - Grade 3: 3.2
  - Grade 4: 4.3
  - Grade 5: 5.4

Torgesen, www.fcrr.org
GROWTH IN READING COMPREHENSION OF CHILDREN WHO BEGIN FIRST GRADE IN THE BOTTOM 20% IN PHONEME AWARENESS AND LETTER KNOWLEDGE (Torgesen & Mathes, 2000)
3 – LEGGED STOOL

COMPREHENSION

FLUENCY

AUDITORY / SOUNDED OUT

VISUAL / SIGHT WORDS

LANGUAGE / VOCABULARY GRAMMAR

NORMAL READER
WHERE

- ANYWHERE
  - “SIGNATURE” BRAIN IMAGES ARE THE SAME
- DIFFERENT LANGUAGES AFFECT THE PICTURE
  - ITALIAN VS ENGLISH
WHO

- ANYONE
- ALL AGES
- ALL WALKS OF LIFE

- PREPONDERANCE IN:
  - ARCHITECTS
  - ENGINEERS
  - SURGEONS
  - ENTREPRENEURS
  - SCHOOL DROPOUTS
  - PRISON INMATES
WHEN

- AS EARLY AS THE NEWBORN PERIOD
- IDENTIFICATION OF A PHONOLOGIC "GLITCH"
- THE WEAKER THE PHONOLOGY, THE EARLIER THE STRUGGLE
THE PICTURE OF DYSLEXIA

WHAT DOES IT “LOOK” LIKE?
THE PICTURE OF DYSLEXIA
(ALL SYMPTOMS DO NOT OCCUR WITH EVERYONE)

ORAL LANGUAGE CHALLENGES

LISTENING

Poor PHONOLOGICAL AWARENESS

Memory for word sequence (phone numbers, directions)

Foreign Language

SPEAKING

Word Finding

Multi-syllables

Sequencing Ideas

Foreign Language
THE PICTURE OF DYSLEXIA
(ALL SYMPTOMS DO NOT OCCUR WITH EVERYONE)

WRITTEN LANGUAGE CHALLENGES

READING
- Mechanics
- Comprehension
- Speed

SPELLING/WRITING
- Mechanics
- Expressing Ideas
- Speed
THE PICTURE OF DYSLEXIA
(ALL SYMPTOMS DO NOT OCCUR WITH EVERYONE)

ACCOMPANYING CHALLENGES
(SENSORIMOTOR)

Messy Eating → Oral Motor
Writing/knots → Fingers
Words Swim → Lose Place
Tired
Left/Right
Up/Down

Spatial Awareness

Eyes
THE PICTURE OF DYSLEXIA
(ALL SYMPTOMS DO NOT OCCUR WITH EVERYONE)

ACCOMPANYING CHALLENGES
(BEHAVIORAL)

Attention / Executive Function

Brain / Behavior Disorders

Anxiety

OCD

Oppositional Behavior

Depression

Parents with similar challenges
DEVELOPMENTAL DIFFERENCES

- **PRESCHOOL:**
  - SENSORIMOTOR
  - ORAL LANGUAGE
  - ATTENTION

- **EARLY ELEMENTARY:**
  - PRINT RECOGNITION
  - LETTER – SOUND KNOWLEDGE
  - MECHANICS OF READING
  - HANDWRITING
  - ATTENTION
DEVELOPMENTAL DIFFERENCES

- **MID ELEMENTARY / MIDDLE SCHOOL:**
  - COMPREHENSION
  - WRITTEN EXPRESSION
  - ATTENTION

- **HIGH SCHOOL / ADULT:**
  - READING EFFICIENCY
  - COMPREHENSION
  - FOREIGN LANGUAGE
  - ATTENTION
WHAT TO DO

ASSESSMENT OF STRENGTHS AND WEAKNESSES

- NEUROCOGNITIVE
- PSYCHOSOCIAL

ASSESSMENT DRIVES TREATMENT
BELL SHAPED CURVE
NORMAL POPULATION DISTRIBUTION
## PROFILE GRAPH

### BRAIN TEAM

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### ATTENTION / INTENTION

- Visual
- Auditory

### INTELLIGENCE / COGNITION

- Fluid Reasoning
- Executive Processes
- Processing Speed

### ORAL LANGUAGE

- Phonological Awareness
- (Morpho)Syntactic Awareness
- Receptive (Listening)
- Expressive (Speaking)
- Word Retrieval (Naming)

### MEMORY

- Aud. Working Memory
- Vis. Working Memory

### SENSORIMOTOR

- Visual Processing
- Visuo/Motor Ability
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PRESCHOOL PREDICTORS OF FUTURE READING SUCCESS

PHONOLOGICAL AWARENESS

LETTER NAME KNOWLEDGE

RAPID NAMING of OBJECTS, COLORS

ALL OF THESE PREDICTORS ARE DEPENDENT ON A STRONG PHONOLOGICAL SYSTEM

NOT IQ !!! Torgesen, www.fcrr.org
TREATMENT

- EARLY IDENTIFICATION
  - PREVENTION OF READING DIFFICULTIES

- LATER IDENTIFICATION
  - INTERVENTION FOR READING DIFFICULTIES
PREVENTION STUDY

- MID KG – END 2ND GRADE
- SCREENING - BOTTOM 10TH %ILE
- FREQUENCY – 20 MINUTES / 4 DAYS / WEEK
- INTENSITY – 1:1, 67 HRS.
- TEACHERS & AIDES

- 4 METHODS – PASP (MULTISENSORY, “BOTTOM UP”- LiPS)
  EP (TRADITIONAL RDG INSTRUCTION WITH EXPLICIT PHONICS)
  RCS (SUPPORT OF CLASSROOM TEACHING)
  NTC (NO TREATMENT CONTROL)  
  Torgesen et al, 1999
  NICHD
PREVENTION STUDY OUTCOME

- ONLY PASP YIELDED SIGNIFICANT PHONOLOGICAL AWARENESS AND WORD READING GAINS

- END OF 2ND GRADE: 50TH %ILE WORD READING SKILLS (ACCURACY AND FLUENCY).

- OTHERS NO BETTER THAN NO TREATMENT CONTROL

- BEST PREDICTORS OF GROWTH IN READING: ATTENTION/BEHAVIOR, HOME BACKGROUND, AND P/A.
A SOLUTION TO THE PROBLEM OF THE FLUENCY GAP: PREVENTIVE INTERVENTIONS

WORD READING

Accuracy

Rate

Torgesen et al, 2003
PASP (LiPS) USES A MORE EXPLICIT, CONCRETE, MULTISENSORY (“BOTTOM UP”) APPROACH TO DEVELOP PHONOLOGICAL AWARENESS.
GROWTH IN WORD READING ABILITY

NATIONAL PERCENTILE

OCTOBER  JANUARY  MAY

30th  70th  30th

75th  50th  25th
AT RISK READER

KINDERGARTEN FIRST GRADE

Left Right

BEFORE INTERVENTION

Before

INTERVENTION

AFTER INTERVENTION

AFTER

INTERVENTION

Simos et al, 2005
REMEDIATION STUDY

- OLDER CHILDREN (8 – 10 YRS)
- SEVERE DYSLEXIA
  2nd %ILE FOR WORD READING
  35th %ILE IQ
- 2 TREATMENTS – BOTH EXPLICIT PHONICS RX
  A “BOTTOM UP” (LiPS) VS A “TOP DOWN” (EP)
- EQUAL TIME AND INTENSITY
  1:1
  100 MINS DAILY
  8-9 WEEKS
  TOTAL 67.5 HRS

Torgesen et al. 2001, NICHD
RESEARCH DEMONSTRATES BOTH IMMEDIATE & LONG LASTING RESULTS IN BROAD READING (DECODING+COMPREHENSION)

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Normal Range of Performance

- Initial Test
- Pre-Treatment Test
- Post-Treatment Test
- 1 Year After Treatment
- 2 years

9-Week Intensive Program

16 Mos. Special Ed Class

Torgesen, Alexander, Wagner et al, 2001
TWO YEAR FOLLOW UP
READING RESULTS

WRMT-R

N = 50
* p = <.05

Torgesen, Alexander, Wagner et al, 2001
TWO YEAR FOLLOW UP READING RESULTS

GORT-R

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N = 50

* p = <.05

Torgesen, Alexander, Wagner et al, 2001
SPOKEN LANGUAGE GAINS
GROWTH IN SPOKEN LANGUAGE DURING INTERVENTION & FOLLOW-UP

Pretest   Post Test  1 year  2 years

Standard Score

LIPS
CELF-R-RLS
CELF-R-ELS

EP
CELF-R-RLS
CELF-R-ELS

Torgesen, Alexander, Wagner et al, 2001
## EFFECT SIZE OF TREATMENT ON LANGUAGE COMPREHENSION

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<td>0.16</td>
</tr>
<tr>
<td>SA</td>
<td>0.75</td>
<td>0.49</td>
<td>0.76</td>
<td></td>
</tr>
</tbody>
</table>

ES of 5 – 7 moderate; 8+ large

P <= 0.05
TREATMENTS EFFECTS ON BRAIN ACTIVITY

Decreased activity in right hemisphere

Increased activity in left hemisphere

Simos et al 2002
EXCITING RESULTS!

HOWEVER.........
LATE VS EARLY INTERVENTION (PREVENTION)

WORD READING ACCURACY AND RATE

BEGINNING % ile

TREATMENT AGE

2nd grade

30th % ile

STANDARD SCORE

Accuracy

Rate

4th grade

2nd grade
PROJECTED GROWTH IN “SIGHT VOCABULARY” OF NORMAL READERS AND DISABLED CHILDREN BEFORE AND AFTER REMEDIATION

Later intervention does not close fluency gap – early intervention does

Torgesen, www.fcrr.org
EARLY INTERVENTION IS URGENT!

- 10th %ILE 5th GRADE READER
  50,000 WORDS A YEAR

- 50th %ILE 5th GRADE READER
  600,000 WORDS A YEAR

AVERAGE STUDENTS RECEIVE ABOUT 10 TIMES AS MUCH PRACTICE IN A YEAR

<table>
<thead>
<tr>
<th>Percentile Rank</th>
<th>Minutes Per Day</th>
<th>Words Read Per Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Books</td>
<td>Text</td>
</tr>
<tr>
<td>98</td>
<td>65.0</td>
<td>67.3</td>
</tr>
<tr>
<td>90</td>
<td>21.2</td>
<td>33.4</td>
</tr>
<tr>
<td>80</td>
<td>14.2</td>
<td>24.6</td>
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<tr>
<td>70</td>
<td>9.6</td>
<td>16.9</td>
</tr>
<tr>
<td>60</td>
<td>6.5</td>
<td>13.1</td>
</tr>
<tr>
<td>50</td>
<td>4.6</td>
<td>9.2</td>
</tr>
<tr>
<td>40</td>
<td>3.2</td>
<td>6.2</td>
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<tr>
<td>30</td>
<td>1.8</td>
<td>4.3</td>
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<tr>
<td>20</td>
<td>0.7</td>
<td>2.4</td>
</tr>
<tr>
<td>10</td>
<td>0.1</td>
<td>1.0</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

(Anderson, Wilson, & Fielding, 1988)
RESPONSE TO INTERVENTION MODEL

APPLICATION OF EVIDENCE-BASED TREATMENT TO SCHOOLS

A TIERED APPROACH

- TIER 1: CLASSROOM
- TIER 2: PULL OUT SUPPORT
- TIER 3: TOTAL PULL OUT
ID BY CLASSROOM TEACHER

SPALDING INSTRUCTION IN CLASSROOM

READING / PA ASSESSMENT BELOW GRADE LEVEL OR, AT GRADE LEVEL, BUT STRUGGLING

NOT QUALIFIED FOR SLD

EXPLICIT, MULTISENSORY PROGRAM (LiPS) 40 MINS DAILY, 120 DAYS, 80-100 HRS

GROUPS:
6-8:1 (YOUNGER)
8-12:1 (OLDER)
LSD RESULTS 1st GRADE

WORD ATTACK
113

WORD ID
96

PASSAGE COMP.
101

N = 63
*p = <.05

30th percentile

STANDARD SCORE
LSD RESULTS 2nd GRADE

- **WORD ATTACK**: Standard Score 108
- **WORD ID**: Standard Score 98
- **PASSAGE COMP.**: Standard Score 101

30th percentile

N = 64

* p = <.05
LSD RESULTS 3\textsuperscript{rd} – 5\textsuperscript{th} GRADES

<table>
<thead>
<tr>
<th>Test</th>
<th>Standard Score</th>
<th>N = 126</th>
<th>p = &lt;.05</th>
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</thead>
<tbody>
<tr>
<td>Word Attack</td>
<td>100 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word ID</td>
<td>96 *</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passage Comp.</td>
<td>101 *</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

30\textsuperscript{th} percentile
PRINCIPLES OF LEARNING

- WHAT FIRES TOGETHER, WIRES TOGETHER – MULTIPLE SENSES STRENGTHEN PATHWAYS

- OPTIMAL ATTENTION

- CONSISTENT INPUT

- INTENSITY
  - SALIENT
  - FREQUENT
  - REPETITION, REPETITION, REPETITION

Alexander, 2003
TIER THREE

EINSTEIN MONTESSORI CHARTER SCHOOL

FLORIDA
Welcome to Einstein Montessori School. Zach Osbrach, founded this school to better educate children with reading and spelling delays. Our dyslexic students have achieved the highest reading gains among their peers in the state of Florida. Our extensive testing has shown a 285% increase in reading gains. For that reason and others, we feel that it is important to share with you our instructional model and how to reproduce these gains in your school.
EINSTEIN MONTESSORI SCHOOL, INC (EMS)

- CHARTER SCHOOL (1999)
- REMEDIATE LITERACY SKILLS
  - LANGUAGE-BASED LEARNING DIFFICULTIES
- 2ND - 8TH GRADE
- LITERACY SKILLS FOUR CLASS PERIODS/DAY
  1. PHONOLOGICAL AWARENESS (LIPS)
  2. READING
  3. READING
  4. WRITING
- TEACHER TRAINING ACROSS ALL CLASSES
EMS GAINS 2004-2005 (GRADES 3-5)

- SIGNIFICANT IMPROVEMENT (P <0.001)
  - WORD ATTACK
  - PASSAGE COMPREHENSION
  - PHONOLOGICAL PROCESSING
  - WORD & NONWORD READING EFFICIENCY
  - STATE ACHIEVEMENT TESTING

- NON-SIGNIFICANT IMPROVEMENT
  - WORD IDENTIFICATION
EINTSTEIN MONTESSORI RESULTS

HOWEVER....MANY MEASURES, WHILE SIGNIFICANT, DID NOT REACH 30TH%ILE BENCHMARK

THEREFORE....INSTITUTING AN INTENSIVE FOUNDATIONAL INTERVENTION (LiPS)
3 HOURS/DAY X 6 WEEKS
SMALL GROUP
FCAT 2005

AVERAGE CHANGE IN READING DEVELOPMENT

(Improvement from 2004 to 2005)

DEVELOPMENTAL SCALE SCORE

[Bar chart showing improvement in reading development across grades for Einstein Montessori, Alachua County average, and Florida State average.]
“TIER FOUR”
1:1

FOR THE TREATMENT RESISTERS

- THE RESEARCH MODEL
- THOROUGH BRAIN TEAM ASSESSMENT
- TREAT OTHER FACTORS THAT MAY BE OBSTACLES
  ATTENTION
  BEHAVIOR
  SENSORIMOTOR
RESEARCH RESULTS 3rd – 5th GRADES

N = 50
* p = <.05
CONCLUSION

- TREATMENT IS MOST EFFECTIVE IF:
  - YOUNGER AGE
  - INTENSIVE
  - EXPLICIT PHONOLOGICAL/PHONICS
  - ATTENTION IS OPTIMAL

- “BOTTOM-UP” MORE EXPLICIT PHONICS APPROACH: PREVENTION
  MILD TO SEVERE DYSLEXIA
  AUDITORY WORKING MEMORY WEAKNESS

- “TOP-DOWN” PHONICS APPROACH:
  AFTER 3RD GRADE
  MILD TO MODERATE DYSLEXIA
NEUROBIOLOGY REVIEW
WHY DOES INTERVENTION WORK?
WHY
“OUT OF LINE NEURONS” (ECTOPIAS)
LAYERS OF BRAIN CORTEX
NEURAL MIGRATION

GENETICALLY PROGRAMMED

http://www.thebrain.mcgill.ca/flash/a/a_09/a_09_cl/a_09_cl_dev/a_09_cl_dev.htm
NEURAL MIGRATION

GONE AWRY IN DEVELOPMENTAL DYSLEXIA

http://www.thebrain.mcgill.ca/flash/a/a_09/a_09_cl/a_09_cl_dev/a_09_cl_dev.htm
ECTOPIC CELLS
NEURONAL CONNECTIONS
“OUT OF LINE NEURONS” (ECTOPIAS)
TYPICAL LANGUAGE ACTIVATION AREAS

- SPEECH PRODUCTION AREA
- AUDITORY PROCESSING AREA
- VISUAL / VERBAL AREA
- VISUAL-LANGUAGE ASSOCIATION AREA

LEFT HEMISPHERE
TYPICAL READING ACTIVATION AREAS

LEFT HEMISPHERE

WORD ANALYSIS

WORD ANALYSIS

AUTOMATIC
(SIGHT WORD)
BRAIN ACTIVATION WITH READING

"SIGNATURE" BRAIN, Shaywitz, 2005

Simos, Fletcher, Bergman, et al 2002
PRINCIPLES OF LEARNING

- WHAT FIRES TOGETHER, WIRES TOGETHER – MULTIPLE SENSES STRENGTHEN PATHWAYS

- OPTIMAL ATTENTION

- CONSISTENT INPUT

- INTENSITY
  - SALIENT
  - FREQUENT
  - REPETITION, REPETITION, REPETITION

Alexander, 2003
WHAT HAVE WE LEARNED FROM RESEARCH?

- GOOD SCIENCE BEHIND INSTRUCTION AND MATERIALS.
- INFORMED CONSUMERS OF MATERIALS.
- FOLLOW PRINCIPLES OF LEARNING.
- PREVENTION IS THE MOST EFFECTIVE TREATMENT APPROACH.
FUTURE DIRECTIONS

- SHOULD WE ACCEPT THE PERSISTENCE OF A "GAP" AND ONLY FOCUS ON THE STRENGTHS?
  - HAVE WE LEARNED ALL THERE IS TO KNOW ABOUT IMPROVING LANGUAGE AND LEARNING SKILLS?

- IS "CLOSING THE GAP" AN ACHIEVABLE GOAL?
  - PREVENTION RESEARCH CLOSED THE GAP IN FLUENCY AND READING ACCURACY.
  - REMEDIATION RESEARCH CLOSED THE GAP IN READING ACCURACY AND IMPROVED FLUENCY.
NCLB – THE LEGISLATURE’S RESPONSIBILITY.

NCLB – OUR RESPONSIBILITY IS TO PREVENT AND REMEDIATE LANGUAGE/LEARNING DISABILITIES; GIVING THE TAX PAINTER THEIR MONEY’S WORTH.
AVAILABLE SCIENCE

- JOE TORGESEN, Ph.D.
  WWW.FCRR.ORG

- RICHARD WAGNER, Ph.D.
  NICHD – FSU LEARNING DISABILITIES RESEARCH CENTER
  - GENETICS / DYSLEXIA REGISTRY
  - FOLLOW SEVERE DYSLEXICS
  - WEBSITE – CLEARING HOUSE FOR TREATMENT RESEARCH
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