Most prevalent non-refractive condition facing optometrists

Hinselwood, Berlin late 1800’s

Education and medicine are not currently fully addressing the problem

Learning Objectives

• knowledge of the functional neurology for written language decoding and its dysfunction in dyslexia

• knowledge of the direct testing methods for dyslexia
appreciation for the role of optometric
vision therapy in developing
fundamental processing skills for
learning to read
knowledge of treatment of dyslexia
beyond optometric vision therapy, i.e...
multisensory language therapy (DPT
program)

Prevalence of Dyslexia
(approximately 10%)
### Dyslexia in Public Elementary Schools

#### Griffin et al.
(two regular 3rd grade classrooms) N47
- Borderline or worse severity………23.0%
- Borderline-mild or worse severity….12.8%
- Mild or worse………………………8.5%
- Mild-moderate or worse……………4.2%
- Moderate or worse…………………0.0%

#### Christenson et al.
(Resource specialist Classroom) N 21
- Borderline or worse severity……71.4%
- Borderline-mild or worse severity…61.9%
- Mild or worse……………………57.1%
- Mild-moderate or worse…………52.4%
- Moderate or worse………………33.3%
- Moderate-marked or worse………28.6%
- Marked……………………………9.5%
Comments: Prevalence of dyslexia is greater in Resource Specialist classrooms.

Severity is greater in Resource Specialist classrooms.

Severe types of dyslexia, e.g., dysphonolalia are more prevalent in Resource Specialist classrooms.

Males in Regular Mid-Grouping High School Classrooms, N 39

- Borderline or worse severity .......... 18.0%
- Mild or worse............................ 2.6%
- Moderate or worse....................... 0.05

Males in Juvenile Hall, N 40

- Borderline or worse severity .......... 45.0%
- Mild or worse............................ 22.5%
- Moderate or worse....................... 17.5%
- Marked or worse......................... 7.5%
Huntington Beach Library Public Program N7

Seven of 7 consecutive adults tested on the Adult Dyslexia Test (ADT) had dyslexia

Rockwell International Private Program, N 13

- History of reading problems (6) All had dyslexia on the ADT
- No reading problems from history (7)
- No dyslexia (6)
- Borderline normal (1)

Comments:

Higher prevalence of dyslexia found in juvenile hall with greater degrees of severity of dyslexia and more severe types of dyslexia.
Comments: When cultural barriers (e.g., bilingualism and lack of education are accounted for, dyslexia is the main problem in adult literacy program).

Specific Versus Non-Specific Reading Disability

Reading Disabilities

- low intelligence
- poor motivation
- physical or sensory impairment (i.e., visual or hearing loss)
- primary emotional problems
- socio-cultural factors
- educational deprivation

Specific Reading Disabilities (Synonymous with Dyslexia)
- A deficit in an individual's ability to process the symbols of written language.
DYSLEXIA
What is It?

Ti κα’ neis
tee cah’ nees

Κα λ. α.
cah lah’

Argument against “bottom - up”

Argument against “top - down”
Once upon a ______, a boy was looking after his flock of sh____ near ______ village. He thought it _____ be great fun to play a trick _____ the villagers. “Wolf ______!” he sh____d. ______ people came running _____ save his ______. When they reached the boy, ______ once, and every _____ the villagers found that _____ had been tr_____, for there were no _____ at all.
Indirect Exclusion

Direct

Exclusion Definition

• Health
• Education
• Vision
• Audition
• Psychological and Emotional well being
• Motivation
• Cultural Opportunities
• etc...
Types of Dyslexia

- Dysnemkinesia
- Dyseidesia
- Dysphonesia
Dysnemkinesia

Letter Reversals
Number Reversals
DY$LEXIA

Dyseidesia
Characteristics of Dyseidesia

- Slow reading (painfully labored)
- Phonetic decoding (laugh “log”)
- Poor spelling (phonetic equivalent words)
- Phonetic Encoding (laf)
- (Dizlexeah)
Whole word (eidetic) vs. Syllable (phonetic)

Dysphonesia
Characteristics of dysphonesia

• Uses contextual clues (“town” for tustin)
• Can’t read words not known by “sight”
• Poor spelling of phonetic words (“fats” for fast)
• Eidetic encoding (or nothing much at all)
• (dyslexia or DSX or _____)

Mixed types e.g..., Dysphonesidesia
Primary Emotional Problems vs. Secondary Emotional Problems

Neurophysiologic Model of Dyslexic Types
Dyslexia and the term Brain Damage
No Swap
Meet every Sat/Sun

Minimum Brain Dysfunction and/or Differential Brain Function

[Brain Image]
AD  Dyseidesia

M  Other Types of Dyslexia
Case Examples

Examples of a dyseidetic patient’s poor encoding
Eidetic Challenge | Phonetic Challenge
---|---
• there - thar | • light - lite  
• snow - snow  
• father - fathr  
• store - stor  
• work - wroc  
20% | 100%

---

Example of a dysphonetic patient’s poor encoding

---

Eidetic Challenge | Phonetic Challenge
---|---
• meadow -  
• enough -  
• calf -  
• buy -  
• would -  
100% | 20%

---

• decorate - dret  
• goggles - gigs  
• spectacles - spcls  
• league - lag  
• pain - pan  

---
Example of a dysphoneidetic patient’s poor encoding

Eidetic Challenge | Phonetic Challenge
• like - like c • father - fahto
• store - stor • could - kulod
• work - wruk • know - no c
• you - uw • snow - nsow
• come - kum • animal - anuno
20% | 20%

Management of Dysphoneidetic and Dyseidetic Dyslexia
Standard Pedagogical Methods Don’t Work

• Sight (see it -say it) reading
• Companion reading
• Repetitive spelling

Dyslexia Program Teaching (DPT)

A) Motor planning
B) Alphabet knowledge
C) Physical phonics
D) Finger spelling & syllable synthesis
E-H) Multisensory Language Therapy

Transferring visual processing (reading readiness) skills into written language competencies
Selected DPT Techniques

Section B
Alphabet knowledge

DPT

Section C
Physical Phonics
Vowel Mat
Video demonstration

Vowel mat

DPT
Section D
Finger spelling
and Syllable Synthesis
(Halapin 11)
DPT
Sections E-H
Multisensory Language Therapy (MLT)
A.K.A. Orton Gillingham

1. Drill (with card packs) 10 min
2. Finger spelling with word lists appropriate to grapheme chosen for step 1 10 min
3. Sentence writing with lesson words 10 min
4. Reading selected appropriate passages 10 min
5. Introduction of new letter combinations (phonemes) 10 min

Video Example Section E

Neurophysiologic Considerations in Learning
Visual-motor experience/stimulation leads to…

1. Neuronal changes in protein synthesis and regulation, leading to…
2. Increased synaptic sites
3. Axon sprouting and associated dendrite sprouting, downstream in the cortex
These are the kinds of changes achieved in visual-perceptual-motor processing therapy, e.g., not just improved vergence ranges, accommodative amplitudes, or processing skills.

A Cortical Network for Directed Attention
Reticular Activating System
Para hippocampal Gyrus
Frontal Lobes
Retinogeniculocortical Pathway

all converge toward Posterior Parietal Lobe

Redirecting the call
Steps to Decoding competency for Dyslexia

1. Alphabet letter naming
2. Consonant sounds (primary)
3. Long/short vowel sounds
4. Syllable construction
5. Secondary consonant sounds and rules
6. Consonant blends
7. Irregular vowel sounds (schwa e, o, a, o etc.)
8. Final consonant sounds (eg, ng, nk, nt, etc.)
9. Vowel combination (regular, advanced, complex)
10. Phonetic irregularities
Conclusions

Dyslexia is currently not widely recognized or fully treated in the public schools.

Optometry is a profession which has the necessary perspective and is in a unique position to help clarify this long confused area.

What about Vision Therapy?
Visual Spatial
Visual Analysis
Visual Motor Integration
Auditory Discrimination & AVI

Pre requisite visual processing skills as antecedents for DPT
(Solan et al 85-86)
• Reading readiness K-2
• Tachistoscope
• Divided Form Board
• Grooved pegboard
• AVIT
• After grade 2 written language
  skills and “cognition” are
  predictors

Visual Spatial

Laterality

Directionality
Visual Analysis

- Form Perception
- Figure Ground
- Visual Memory
- Visual Sequencing

Visual Motor

Fine Motor - VMI
Auditory Skills
Auditory Discrimination
Auditory Visual Integration

Phonemic Awareness
Toward a Definition of VPM Therapy

Therapy procedures serve as developmentally appropriate problems which the patient must learn to solve in the context of performing them.

This requires the skill of the therapist in shaping the patient’s self awareness (of process) as to the strategy necessary to accomplish the procedures.

Vision Therapy Pyramid

...a rationale for sequential treatment of VPM disorders
Stages of visual processing on Route to Reading

**Printed Word**

1. Transmission of light energy to the cornea
2. Refraction of light wave across cornea
3. Reception of light wave at rods and cones
4. Retinal processing & transmission
5. Transmission along geniculocortical pathway

6. Perception of visual impulses and further processing in cortical areas 17, 18, 19
7. Eidetic decoding for word recognition
8. Phonetic analysis if eidetic recognition not achieved
9. Comprehension of word meaning or further analysis of context to attempt to achieve word comprehension
10. Analysis and synthesis of other content to achieve “passage” comprehension
Dyslexia and the Blue Tinted Lens
• 16 subjects with “dysphoneidesia”
• No significant difference in reading level or speed with blue verses clear lens.
• Submitted JAOA September 1999

Magnocellular Defects

An epiphenomemon in dyslexia?
Vision and Reading Research

Flax 1970’s; Solan 1980’s
Temporal Processing 1990’s
Relationship with dyslexia

Solan et. al. (mid 1980’s)
visual perceptual skills highly correlated with reading achievement in the early grades

Outcomes of Educational Therapy
Multisensory Phonetic Language therapy

- n=14 (5 also had VPM therapy, all had thorough visual evaluations)
- performed at New Visions School 93-94
- (charter school in Minneapolis School District)
- Orton-Gillingham therapy was conducted for one school year
  Decoding ability acquired pre-post treatment (grade levels per year)

<table>
<thead>
<tr>
<th>Pre-</th>
<th>Post-</th>
</tr>
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<tbody>
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<td>.61</td>
<td>1.89</td>
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Dyslexia Diagnosis Pre- and Post-Multisensory Language therapy

- n = 14 (New Visions School 93-94)
- 12 Dysphoneidesia Pre- and Post-
  - 1 switched from dysphoneidesia to dyseidesia
  - 1 switched from dysphoneidesia to dysphonesia (mild CP involvement)

Multisensory input with logical language concepts promotes written language proficiency in individual’s with dyslexia
Conclusions

The problem is not properly recognized or fully treated by the multidisciplinary team.

Optometry with education are the professions which have the necessary perspective and are in a unique position to help clarify this long confused area.


Lactate activation (LAQ) pre and post phonetic training in dyslexics and controls (phonetic task)

Fig. 1A
Lactate activation (LAQ) pre/post phonetic training (lexical task)

Normalized anterior brain (LAQ) function post DPT-type therapy