

Recent Research on Dyslexia

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Overview

- Basics of Reading Acquisition
- Background on Dyslexia
- Key Areas of the Brain
- Current Model of Reading
- Current Research
 - Phonological
 - Auditory
 - Visual
 - Genetic

Introduction

- Reading acquisition
 - *phonological awareness* - awareness that words are made up of individual sounds (phonemes)
 - *alphabetic principle* - understanding that letters or groups of letters (graphemes) are associated with certain phonemes
 - examples
 - cat → /k/ /a/ /t/
 - cheat → /ch/ /ee/ /t/

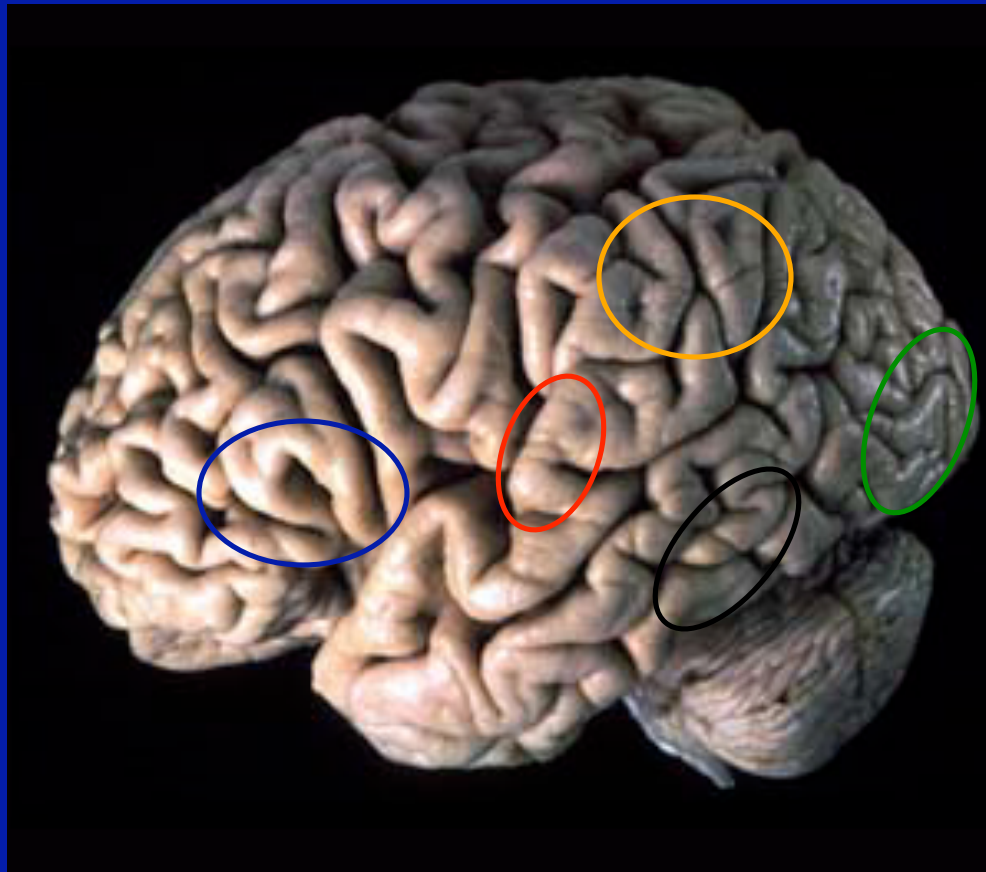
Introduction

- Developmental Dyslexia
 - current definition (Lyon, 2003)
 - *neurobiological* in origin
 - difficulties with accurate/*fluent* word recognition
 - typically a result of *phonological* deficit
 - *unexpected* in relation to other abilities
 - prevalence depends on definition

Introduction

- Developmental Dyslexia (cont'd)
 - history of study
 - “word blindness”
 - poor phonological awareness
 - auditory perceptual deficits
 - visual perceptual deficits
 - genetic component

Key Brain Areas



Model of Reading



- Two reading routes:
Lexical and *Sublexical*
- *Sublexical* route
 - requires grapheme to phoneme conversion (GPC)
 - needed for reading nonwords and unfamiliar words
 - examples: **choorph**, **encephalomyelitis**

Model of Reading



- Two reading routes:
Lexical and *Sublexical*
- *Lexical* route
 - involves direct access to meaning and pronunciation from print (orthography)
 - used to read familiar words and exception words
 - examples: **stop**, **yacht**

Current Research



- Phonological Awareness (PA)
 - appears to be core deficit in majority of cases
 - improving PA improves reading
 - develops as a product of reading instruction
 - affects reading *accuracy*

Current Research



- Auditory
 - rapid auditory processing deficit
 - could lead to PA deficit
 - not found consistently across subjects
 - temporal processing deficit still under debate

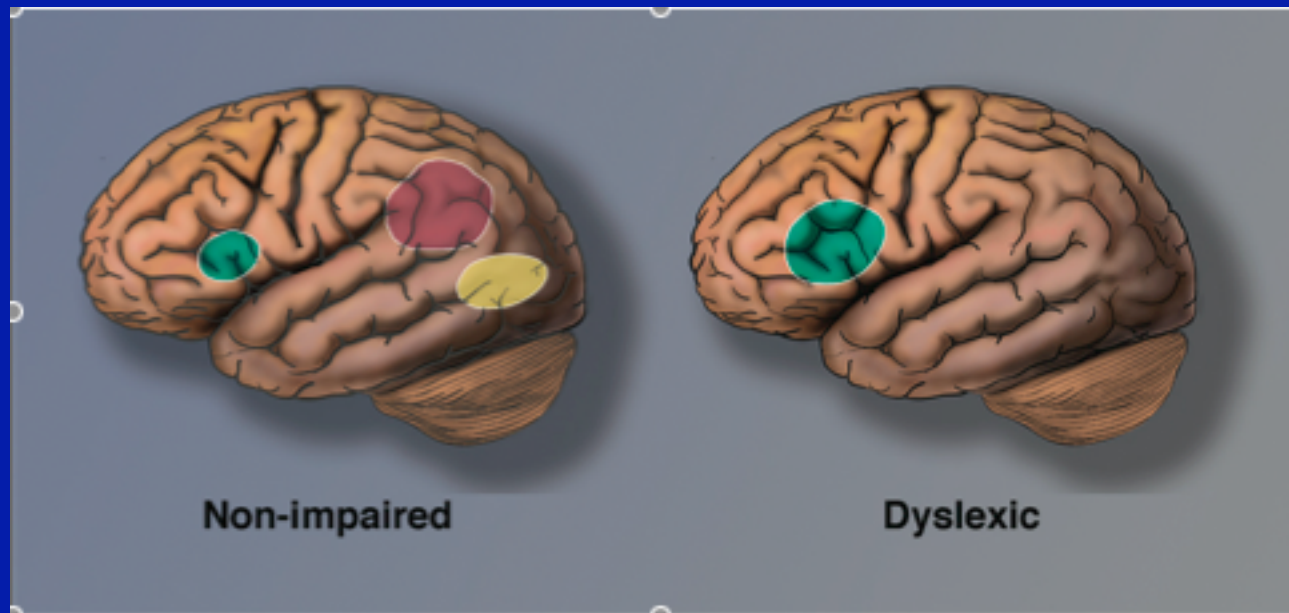
Current Research



- Visual
 - “magnocellular deficit”
 - deficit in allocation of visual attention
 - not found consistently across subjects
 - still under debate, much less popular now
 - may be related to *fluency* rather than accuracy

Current Research

- Neuroimaging Findings



Shaywitz, 2003

Current Research

- Genetic Findings
 - dyslexia is both *familial* and *heritable*
 - at least 50% of variance explained by *genes*
 - remaining variance explained by *environment*
 - genes on *4 chromosomes* have been implicated
 - helps identify children who are “at risk”



Summary

- Research Findings
 - core deficit is *phonological*
 - may be underlying *auditory* or *visual* deficits
 - *brain circuits* are different, but can be changed
 - “at risk” children should be checked early

Conclusions

- Implications
 - *heterogeneity* means no one solution works
 - *phonological awareness* is necessary but may not be sufficient for reading success
 - *intervention* does make a difference