

Dyslexia in Regular Orthographies: Re-balancing Anglo-centric Research

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Dominant Dyslexia Explanation

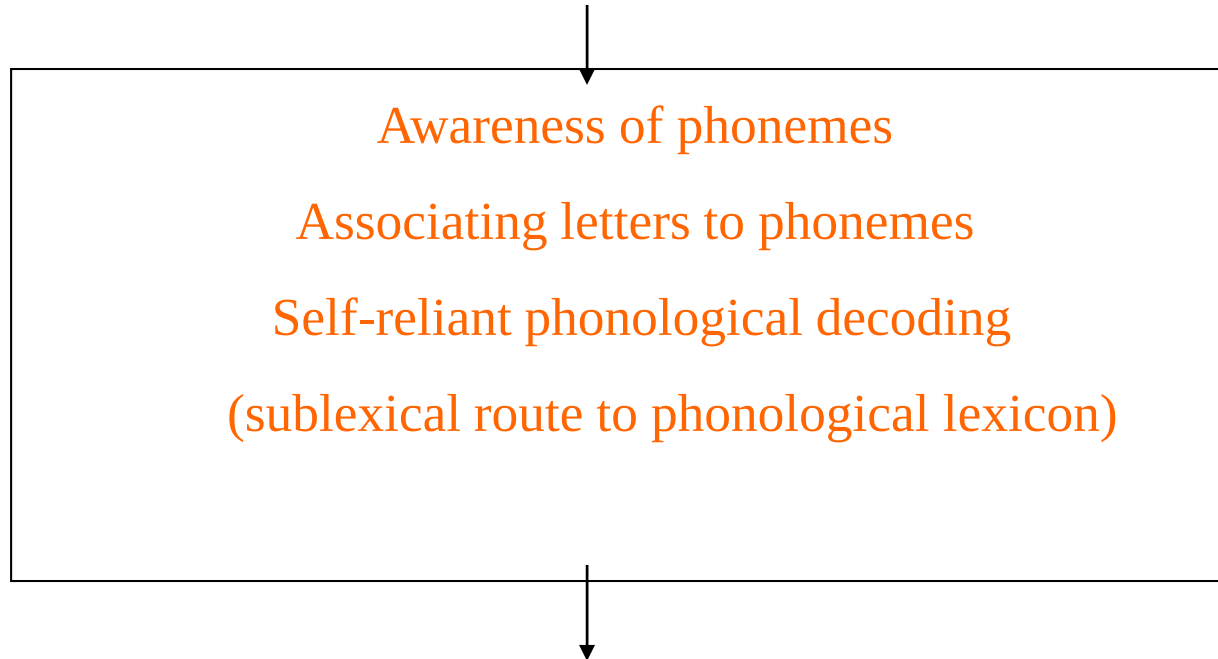
WHO (1993) – ICD 10

Children with specific reading and spelling problems often exhibit a preceding specific developmental disorder of speech and language. In other cases, normal language development, but difficulties with processing of auditory stimuli... The spelling difficulties reveal errors of phonetic accuracy, and apparently both reading and spelling disorders result in part from difficulties with phonological analysis

Original version (Liberman, Shankweiler ...)

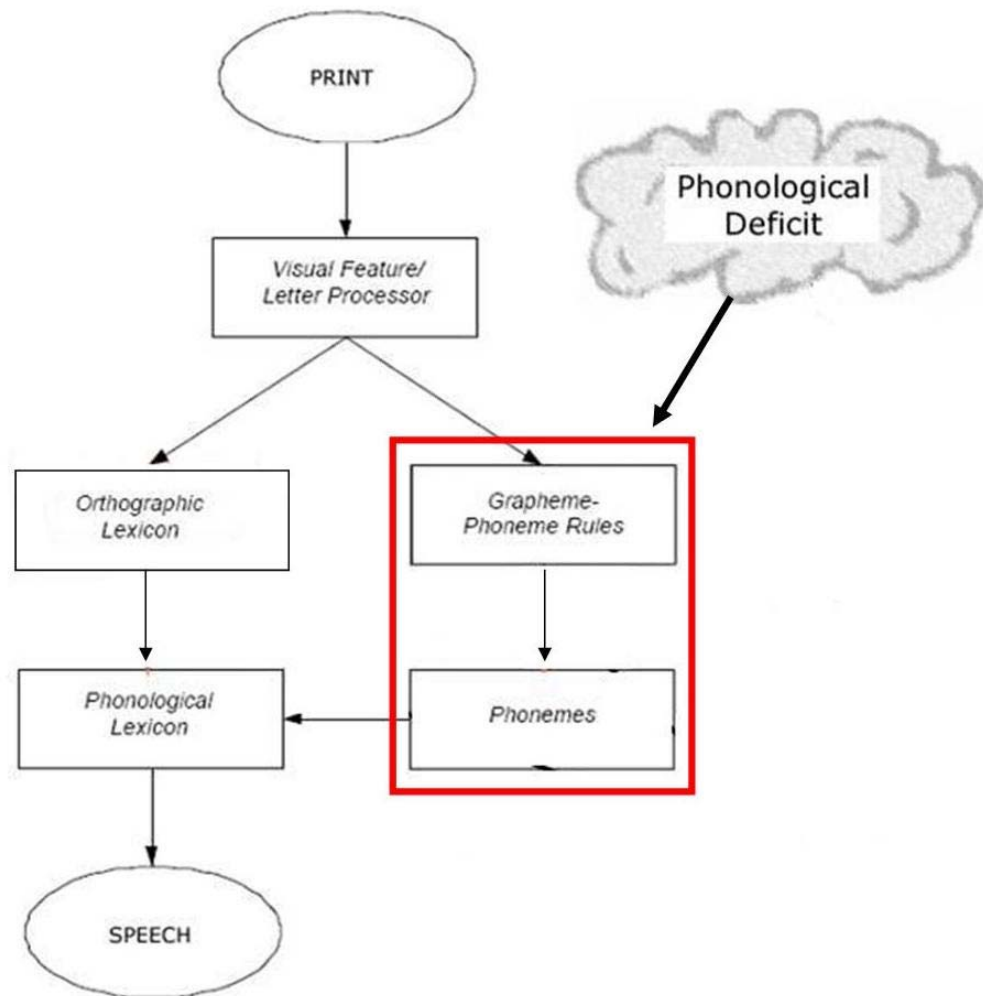
Learning an alphabetic writing system requires conscious access to phonemes of spoken language

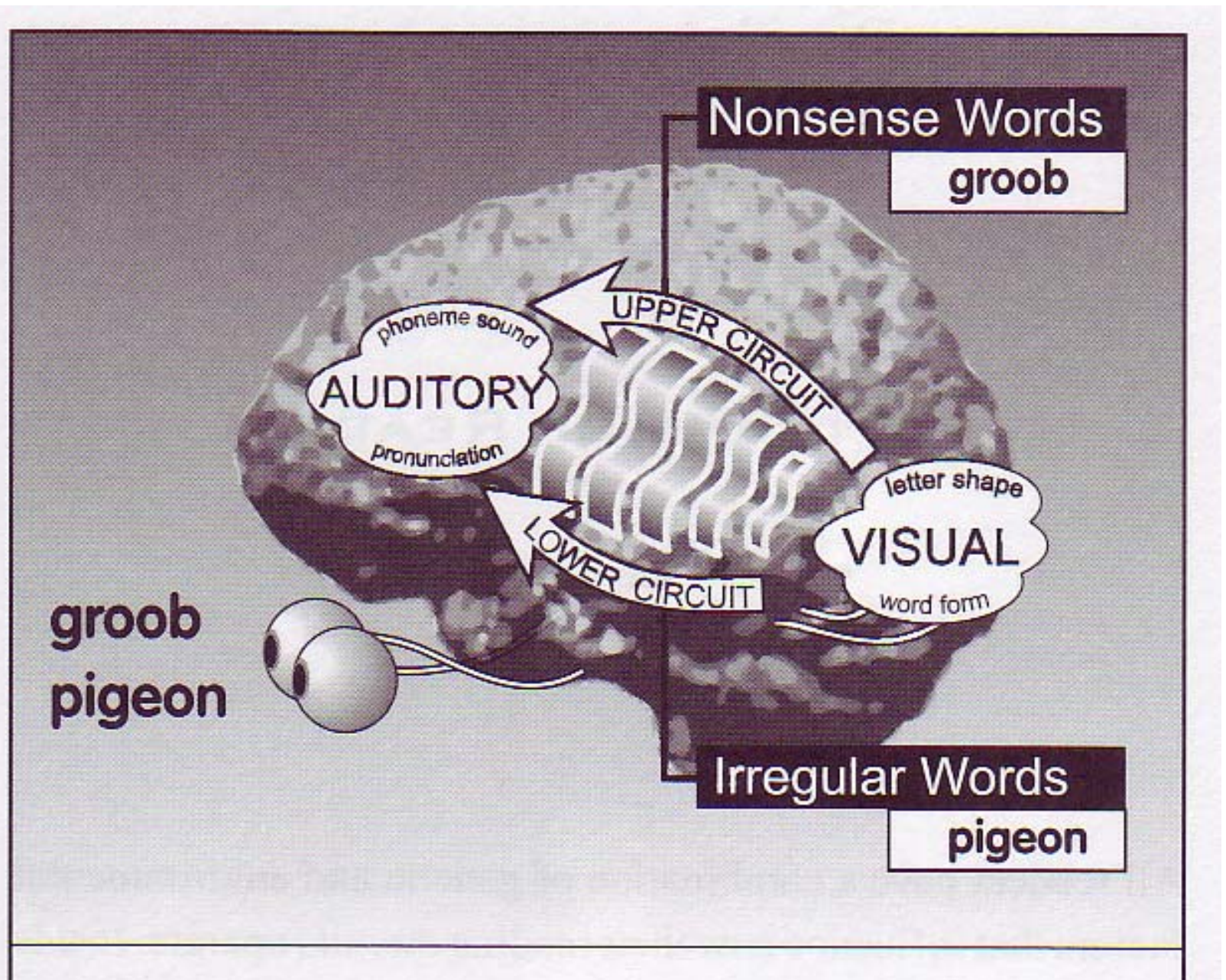
Underspecified phonological word representations



Whole-word recognition

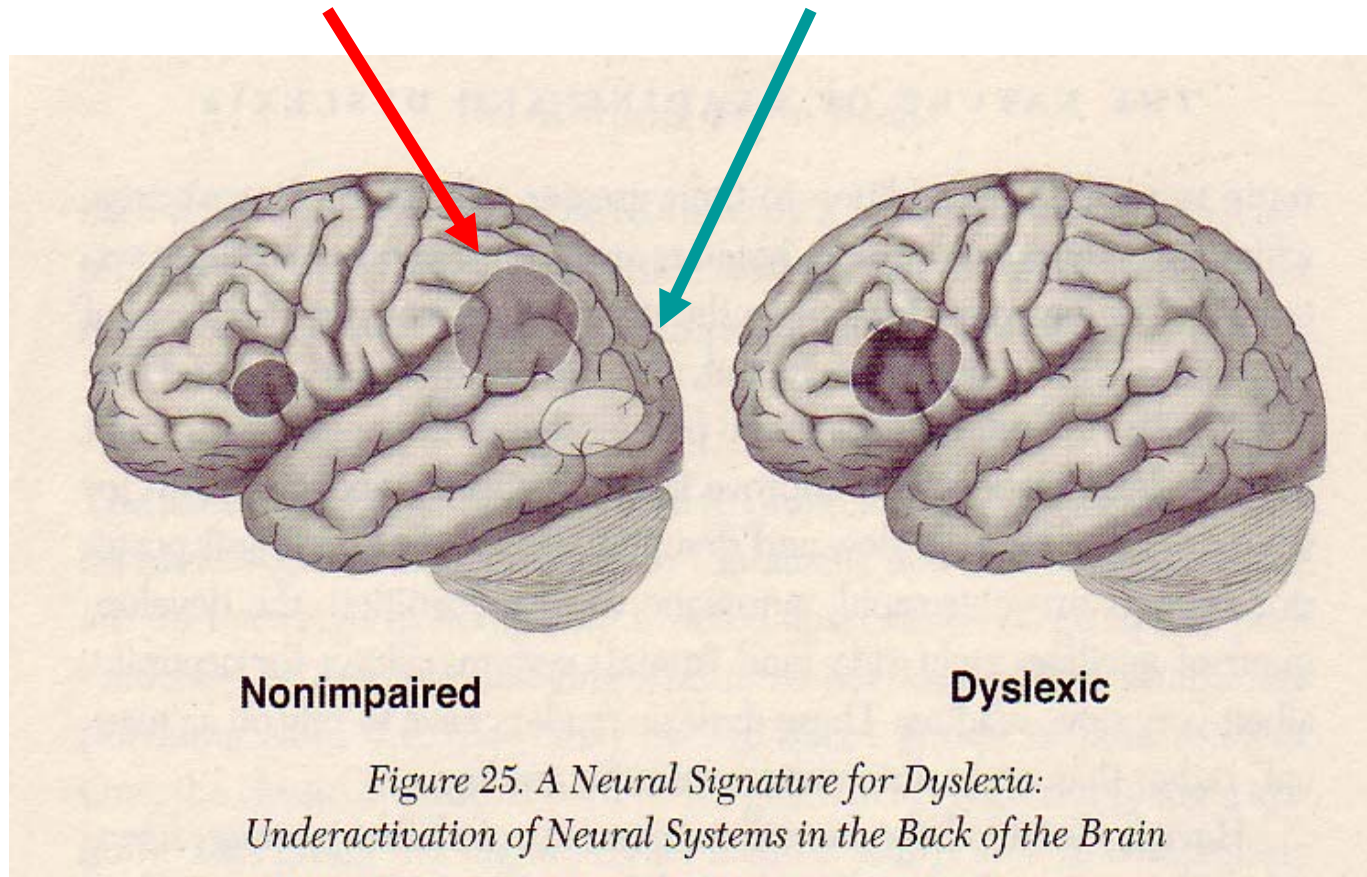
(lexical route to word-phononology via orthographic word representations)





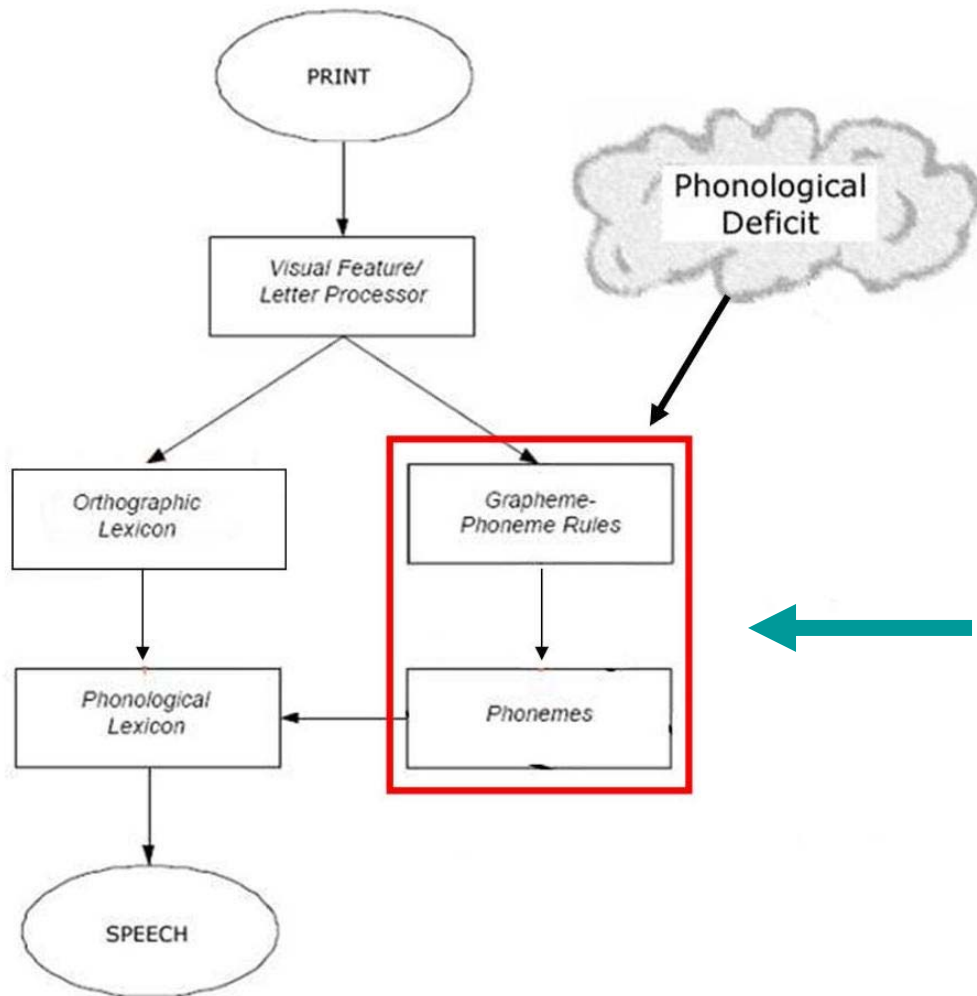
Primary „phonological“
dysfunction - temporoparietal

Secondary „visual“ dysfunction -
occipitotemporal



Shaywitz, S. (2004). *Overcoming dyslexia. A new and complete science-based program for reading problems at any level.* New York: Alfred A. Knopf.

Anglocentric



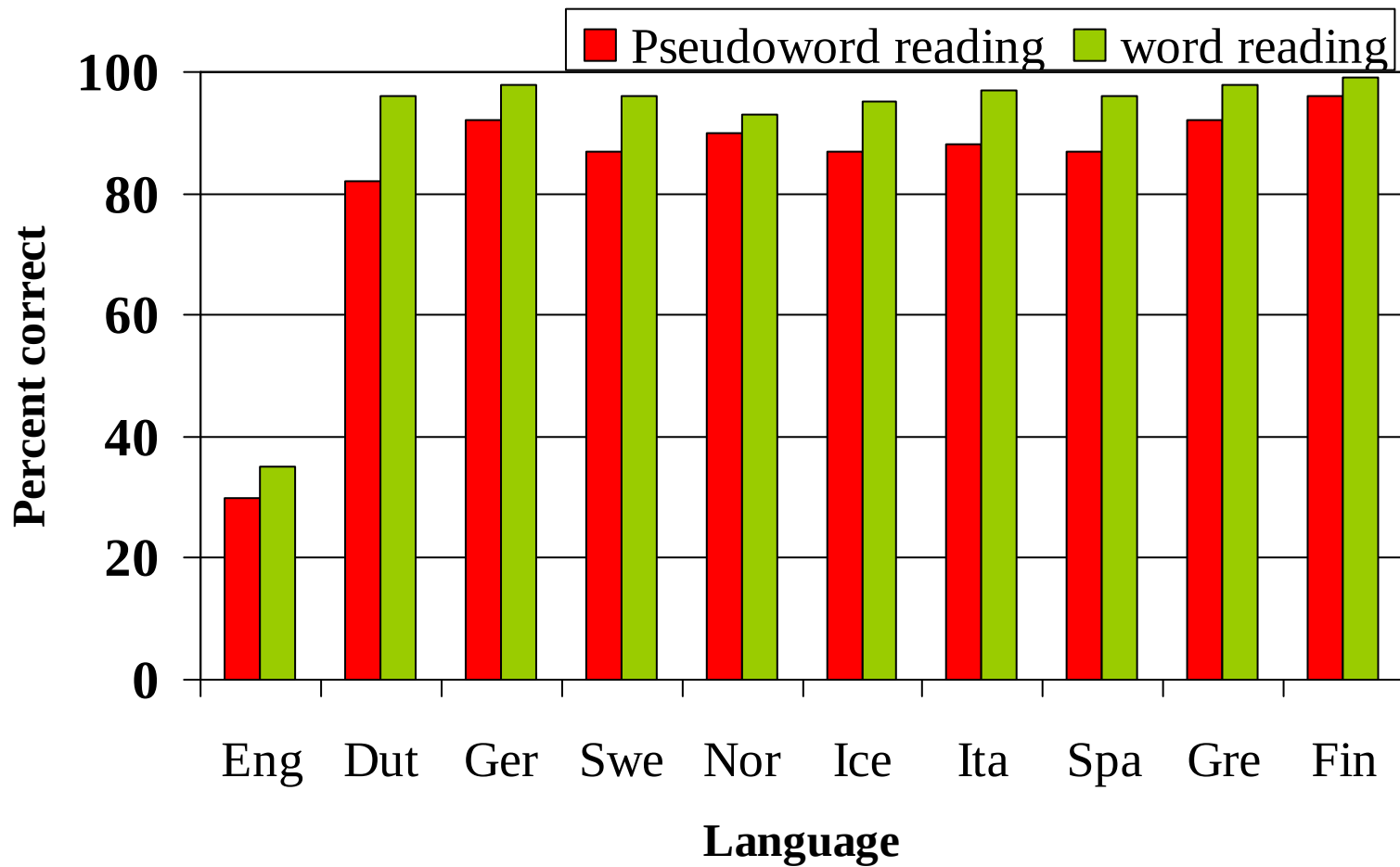
Regular orthographies

Little difficulty even for
poor readers

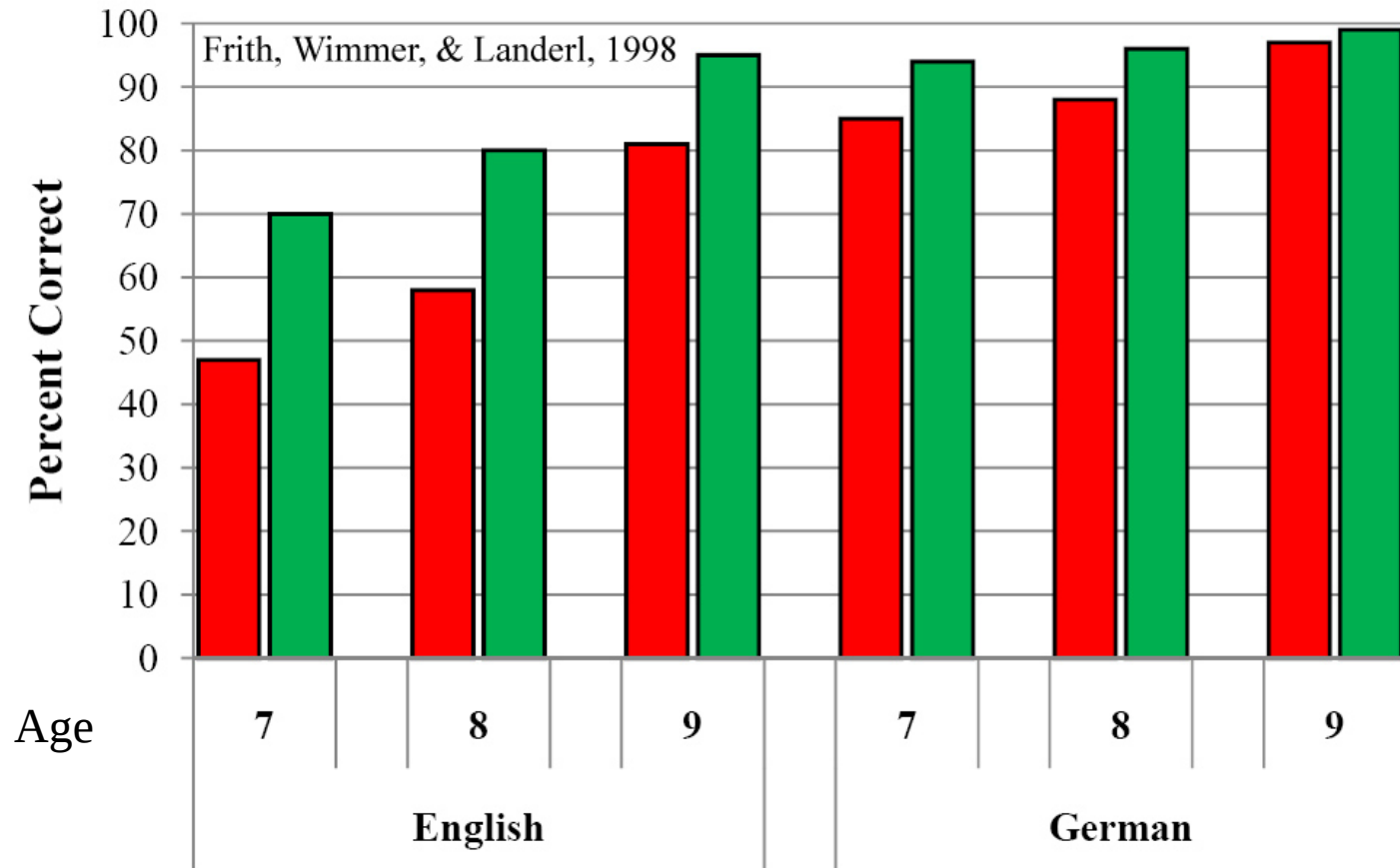
(about 1% serious „blending“
problem)

European Grade 1 Study: Reading Accuracy

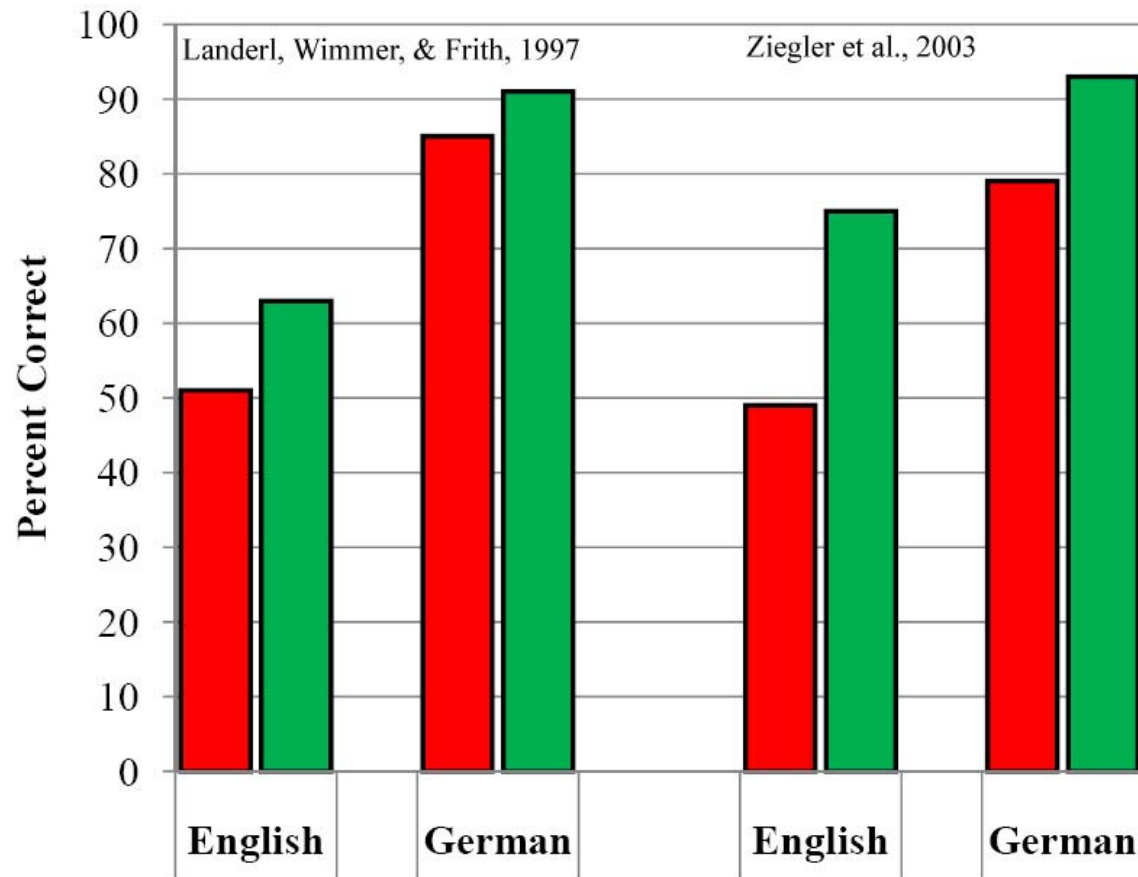
(Seymour, Aro & Erskine, 2003)



English-German Age 7-9 Comparisons: Reading Accuracy



English-German Dyslexia Comparisons: Reading Accuracy



Landerl, Wimmer & Frith (1997, Cognition)

Charakter

character

/kerakteð/

calendar

/karateð/ (2x)

calculator

/karatoð/

charger

/katð/

chancelor

tractor

no response (3x)

/tʃræktð/

/tʃætʃkan/

/tʃamætra

/tʃa:ltɒn/

Speed (s/w): 1.8 (controls: 0.7)

What is the dyslexic problem in regular orthographies?

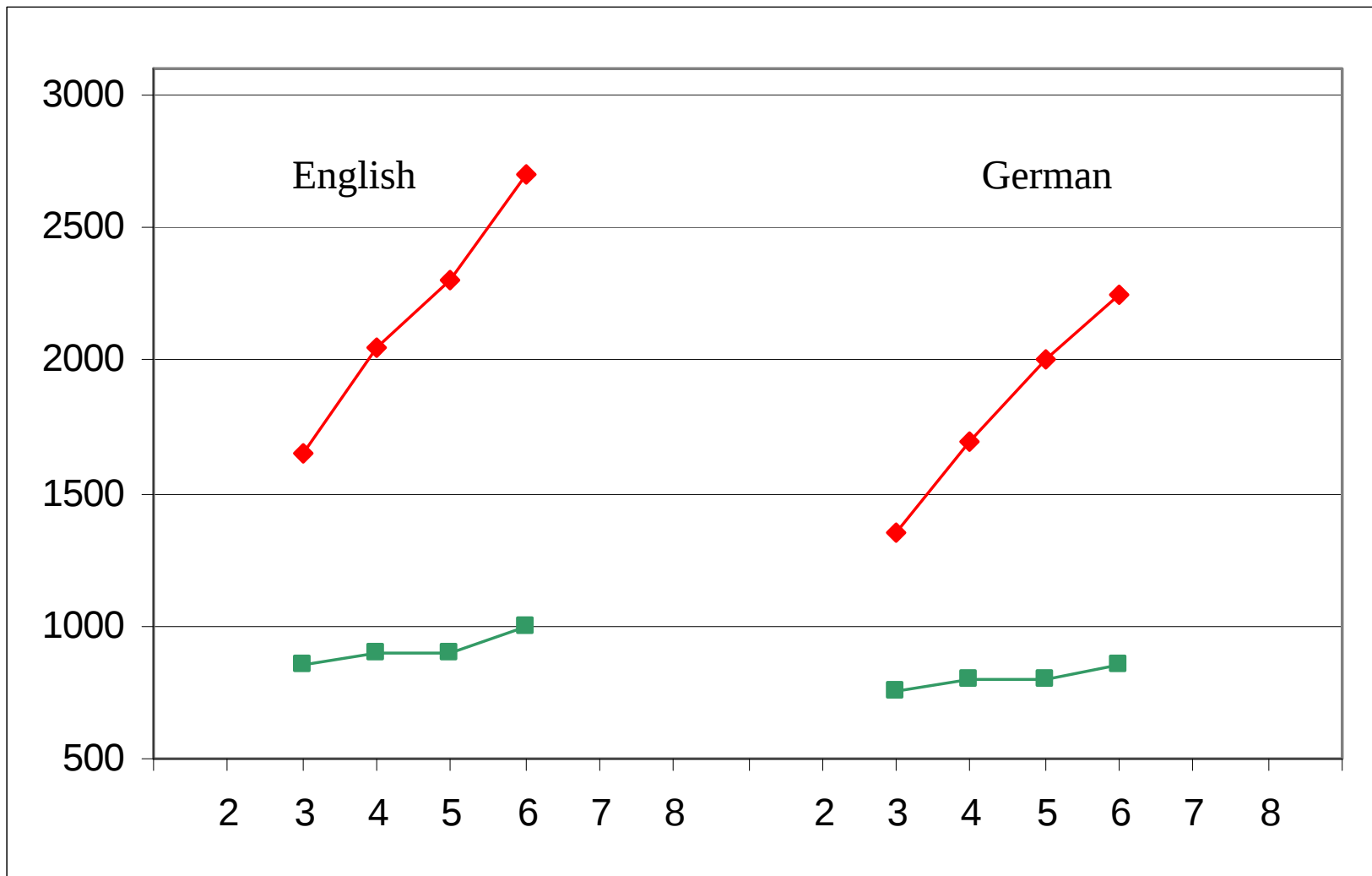
Dutch Health Council (1995)

Automatization of word identification
and/or orthographic word spelling does
not develop or does so with great difficulty

In the following: A closer look on the reading problem in regular orthographies

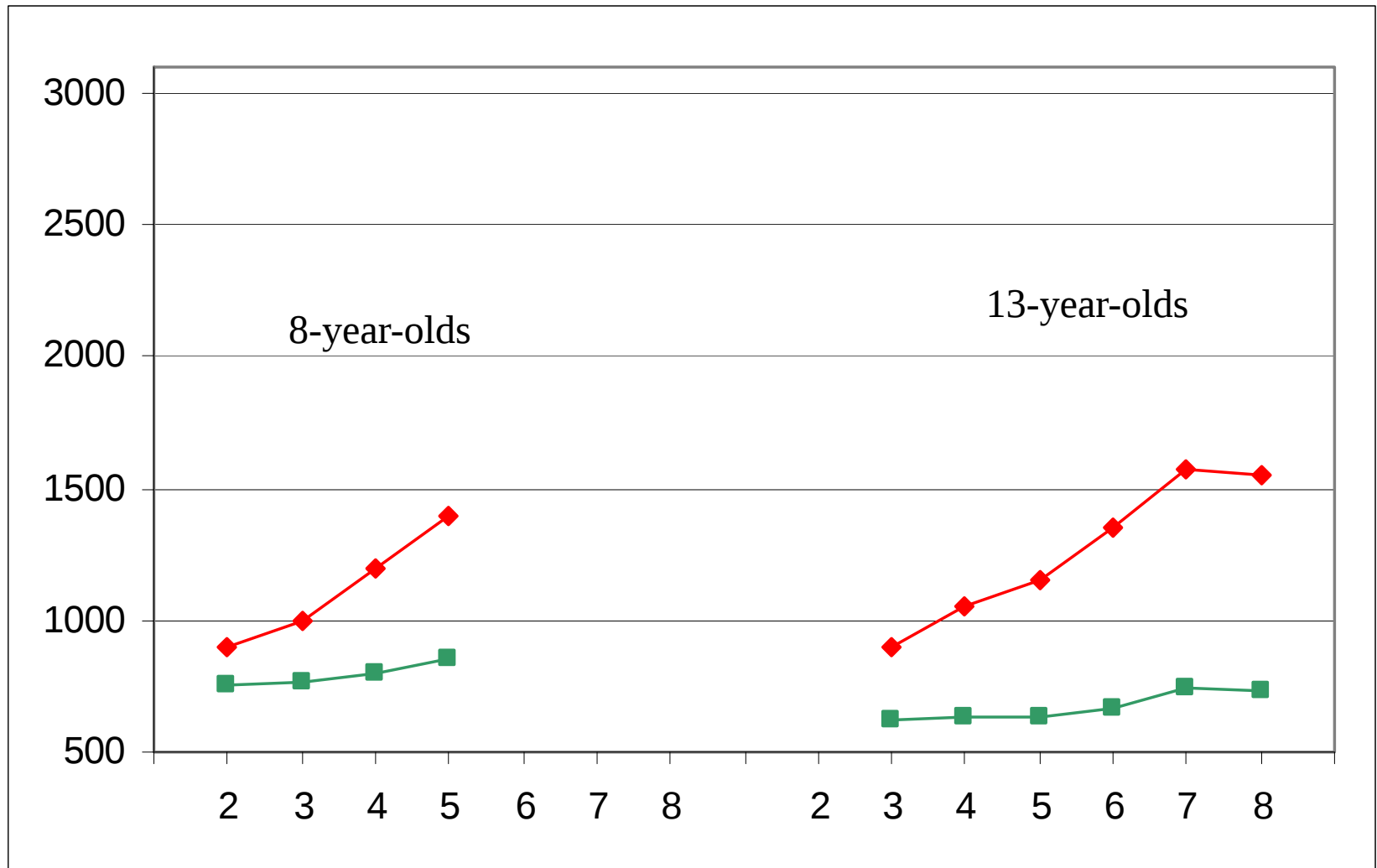
A closer look at dysfluent reading

(Ziegler et al., 2003)



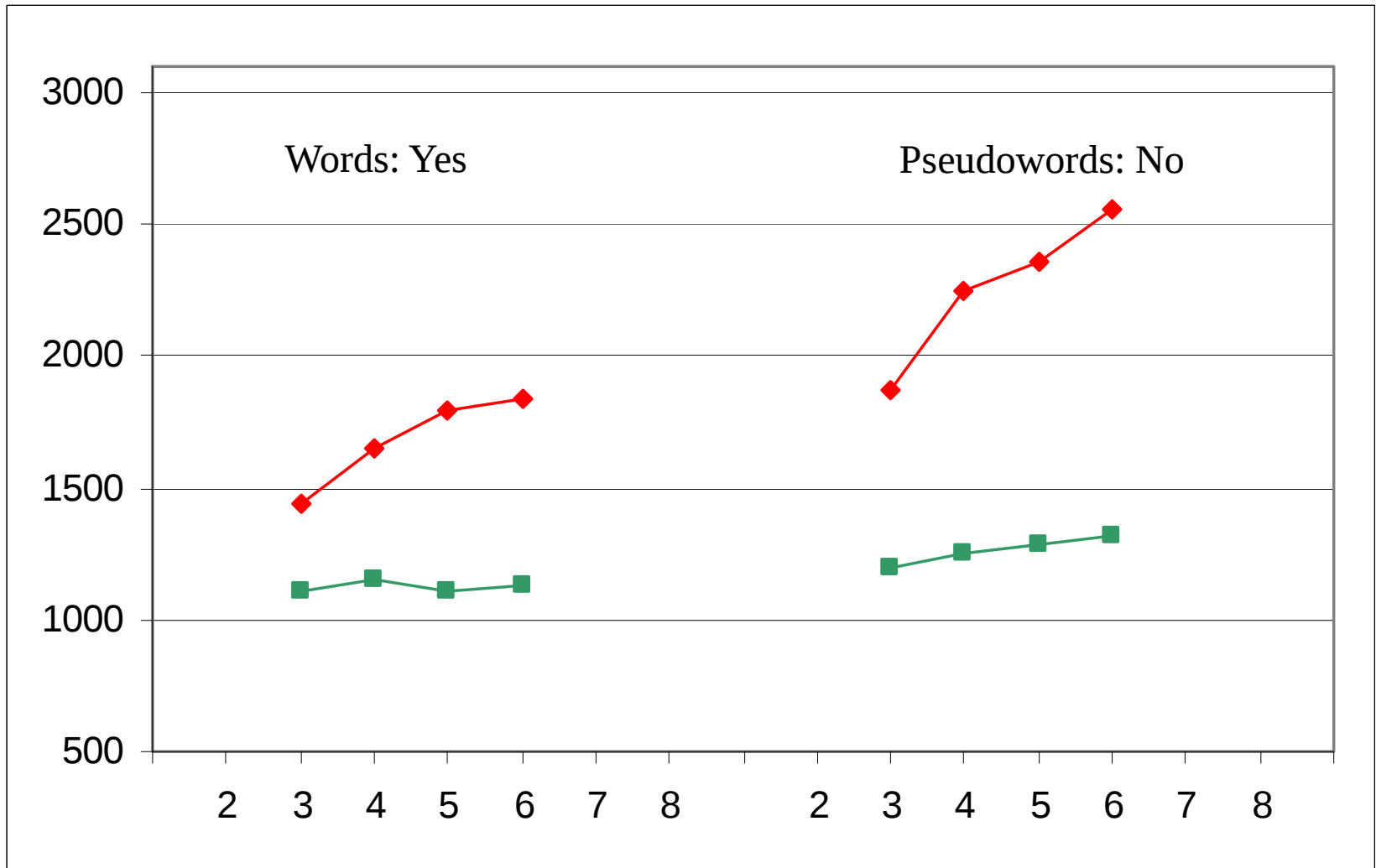
Italian dyslexia

Spinelli et al. 2005; Zoccolotti et al. 2005



Dutch dyslexia

(Martens & de Jong, 2006)



Unregistered
9999990 ms



Unregistered
6555500 ms



Am Besten stellen wir das Klavier nicht direkt ans Fenster.

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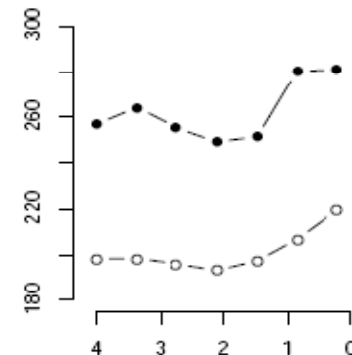
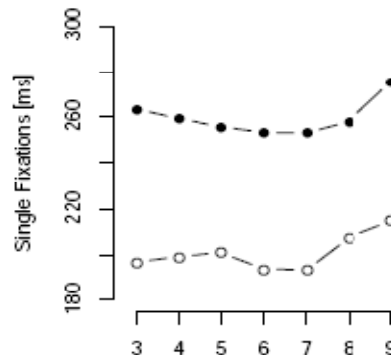
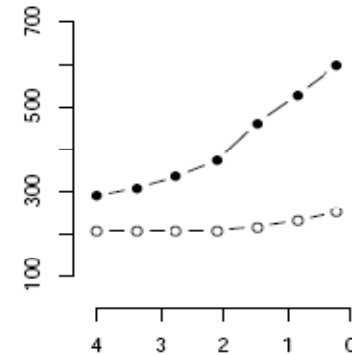
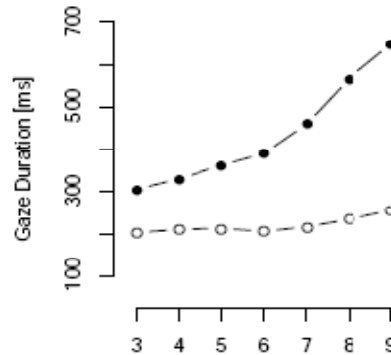
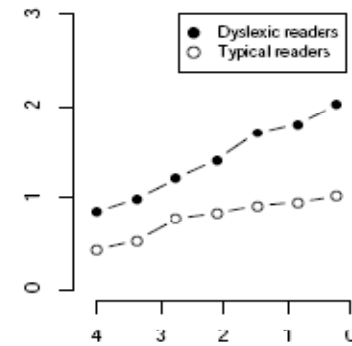
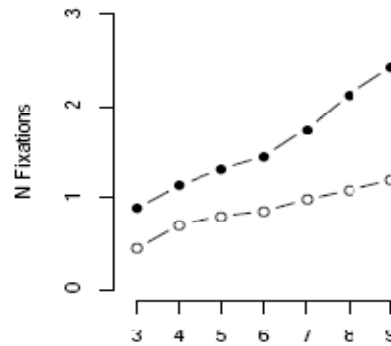
Eye movements

Hawelka, Gagl & Wimmer

(Cognition, in press)

Poor orthographic
word lexicon (requires
reliance on serial sublexical
processing)

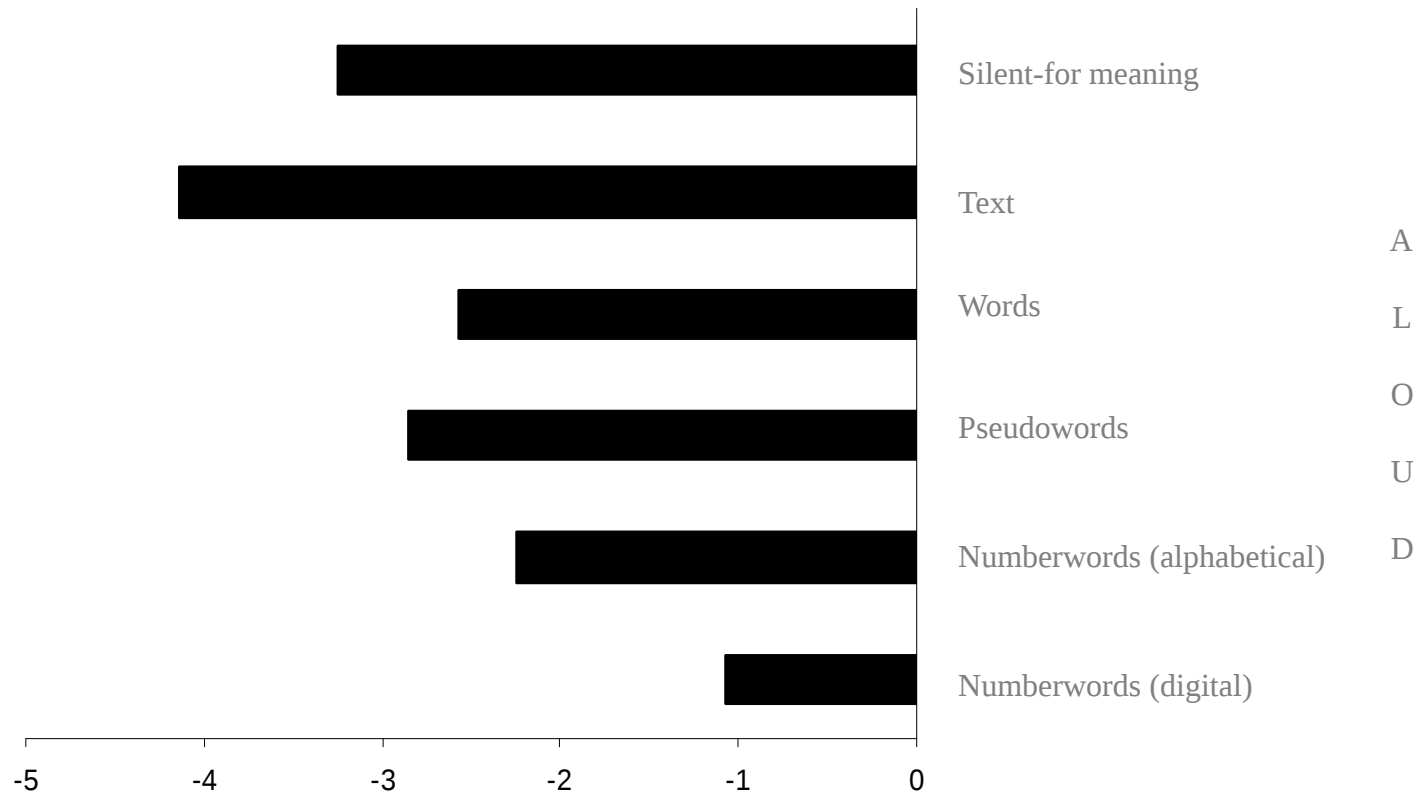
Slow lexical route





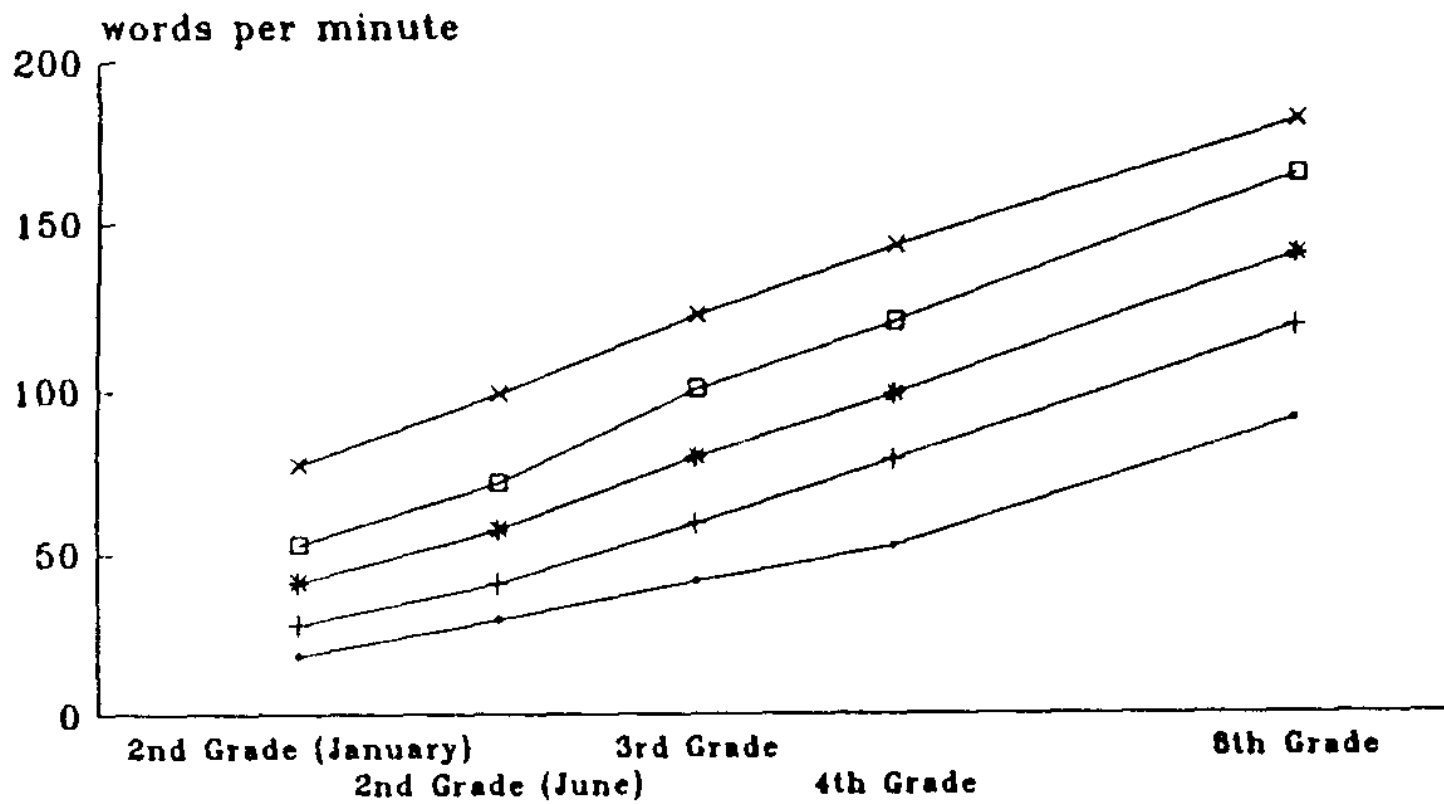
Pervasive

(Kronbichler, Hutzler & Wimmer 2002: 13-year-old dyslexic boys)



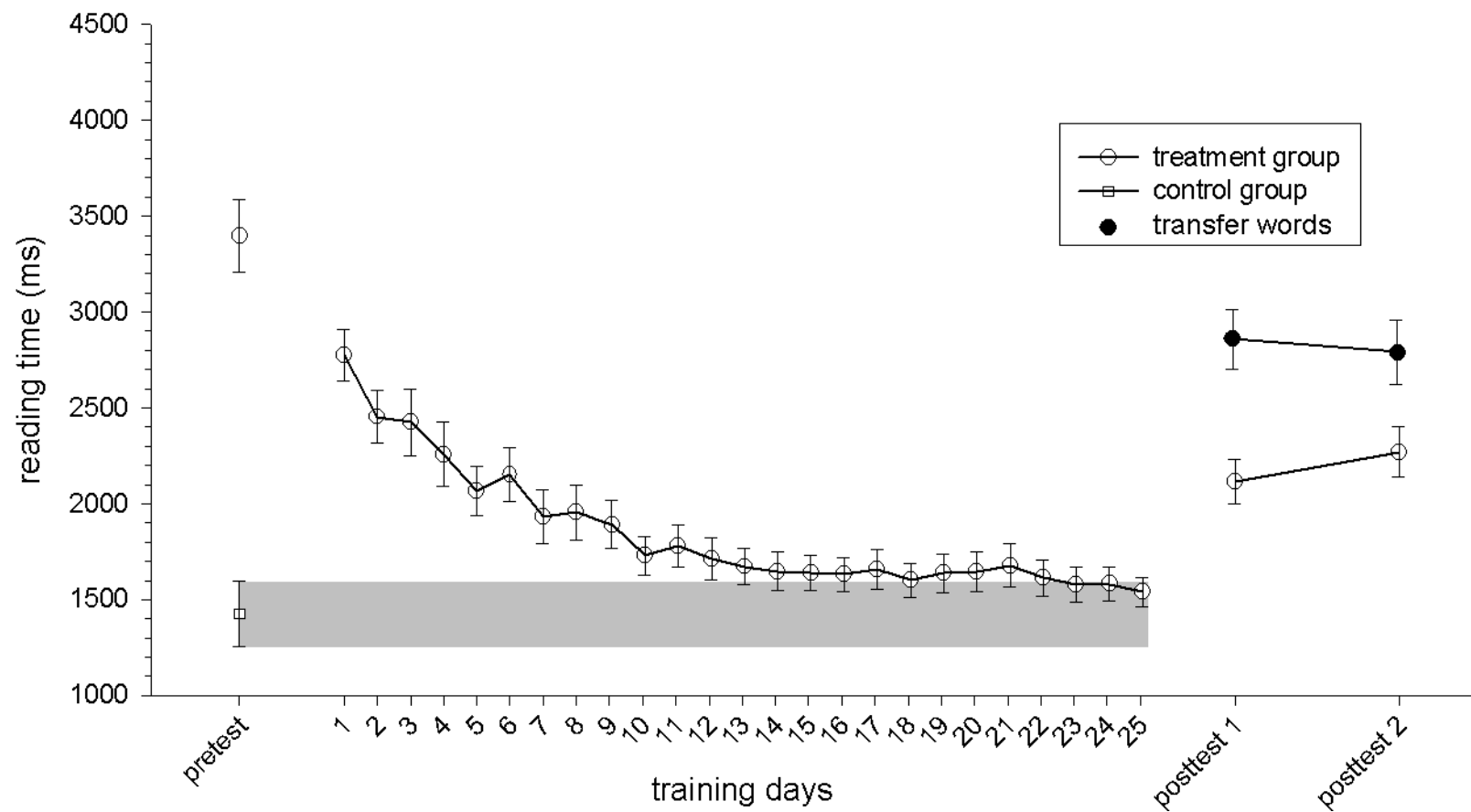
Persistent

(Klicpera & Schabmann 1993)



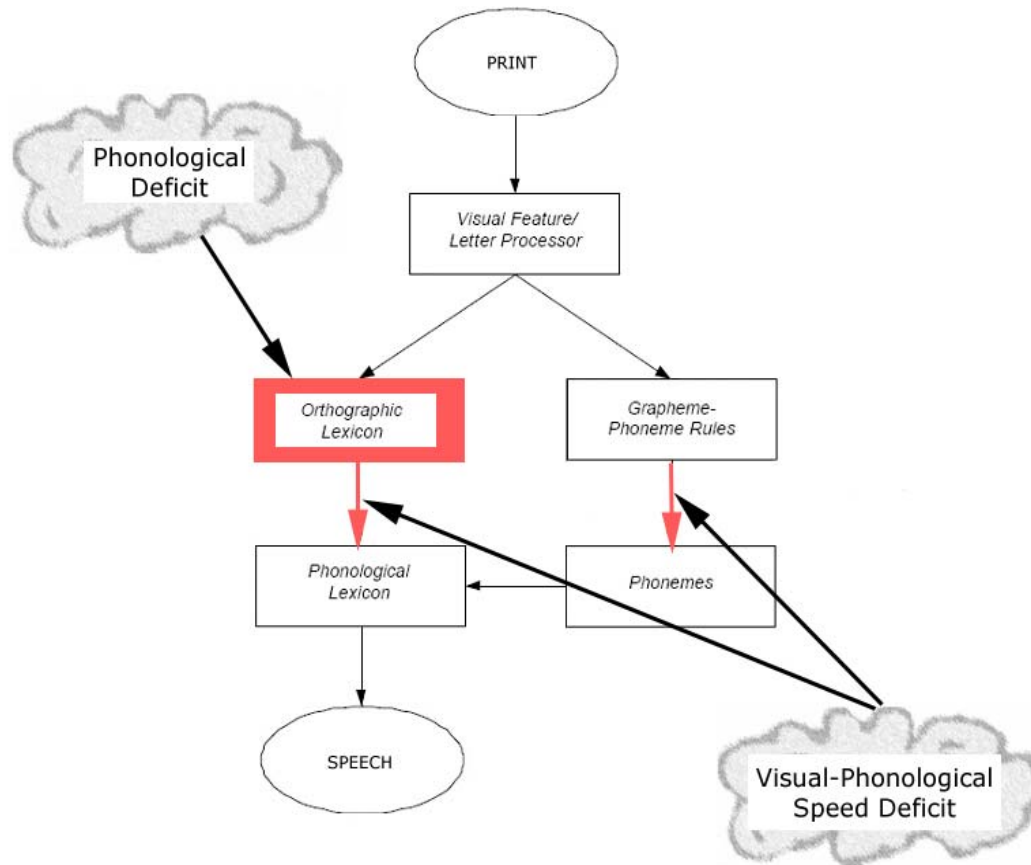
Hard to remediate

Thaler, Ebner, Wimmer, & Landerl (2004)



Neurocognition of regular orthography dyslexia

Bergmann & Wimmer (Cognitive Neuropsychology, 2008)



No deficits

Magnocellular visual and auditory functions

coherent motion detection

Kronbichler, Hutzler & Wimmer (2002)

proneness to sound movement

visual precedence detection

Hawelka & Wimmer (2005)

Speech perception in noise

Wimmer et al. (1998)

Phonetic (pseudoword) writing

Wimmer (1993), Landerl & Wimmer (2000)

Visual string processing

Wimmer & Mayringer (2001), Hutzler et al. (2006),
Hawelka & Wimmer (2008)

Dual-task balancing

Raberger & Wimmer (2003)

Deficits

Visual rapid naming

Wimmer (1993)

Visual-verbal associations

Mayringer & Wimmer (2000)

Visual strings-verbal response

Hawelka & Wimmer (2005, 2006)

Standard PA (implicit reading/writing)

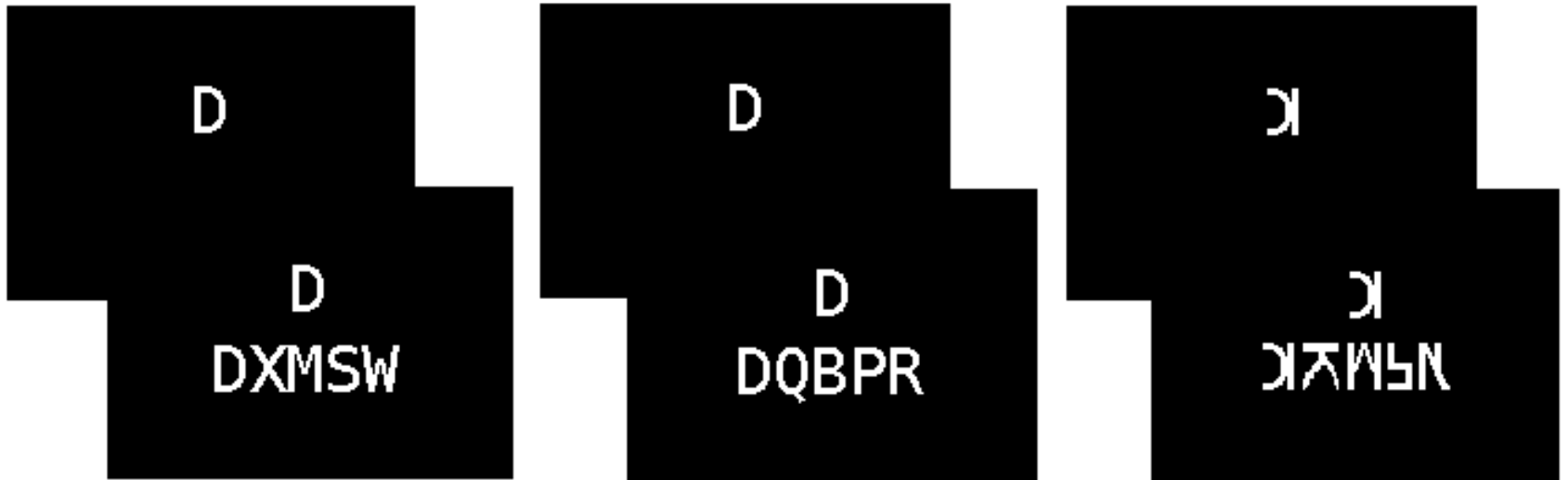
Landerl et al. (1997); Wimmer (1993)

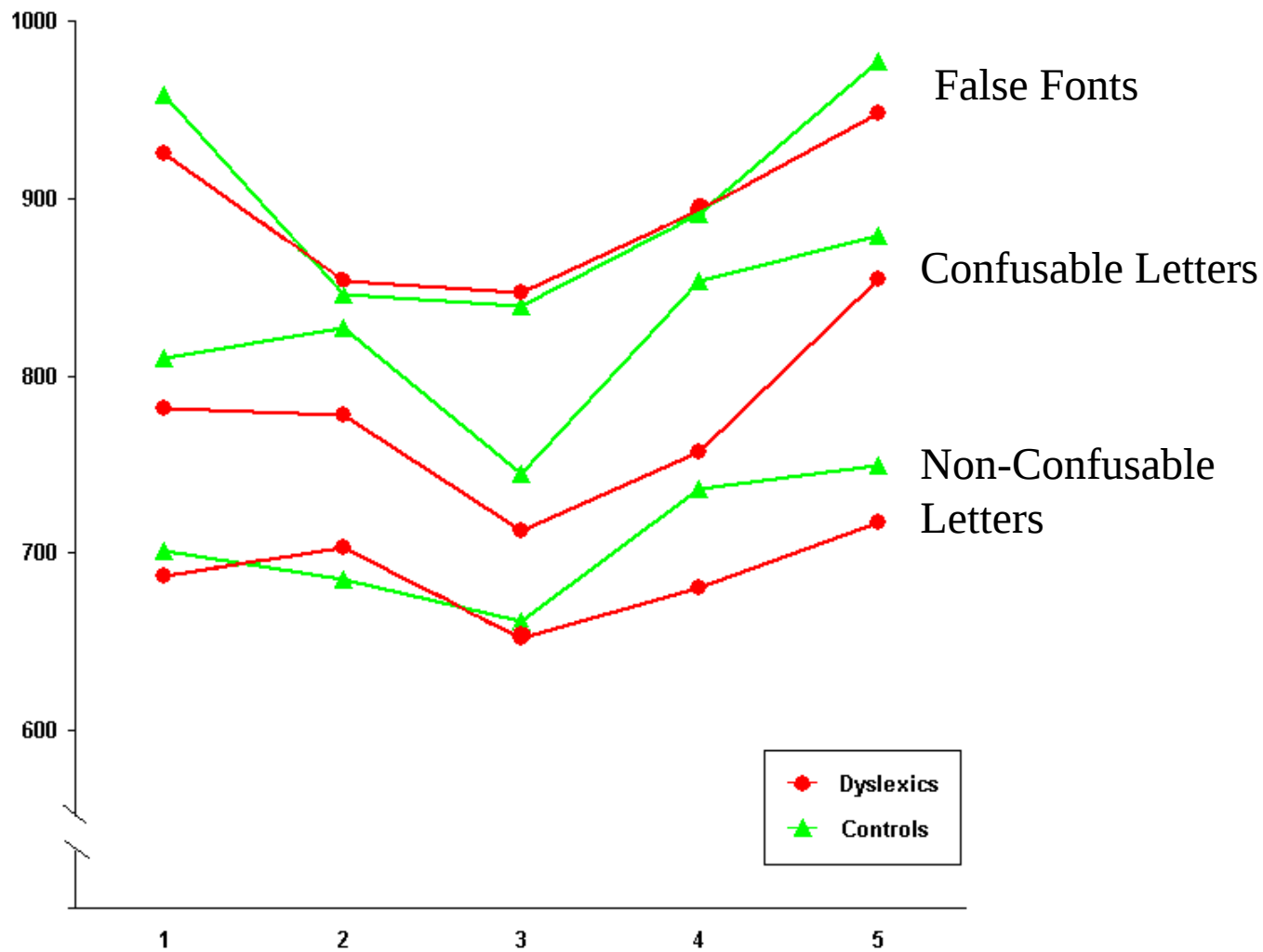
Verbal STM

Positive: Wimmer et al., 1998; Negative: Wimmer, 1993

No string processing deficit when no verbal response

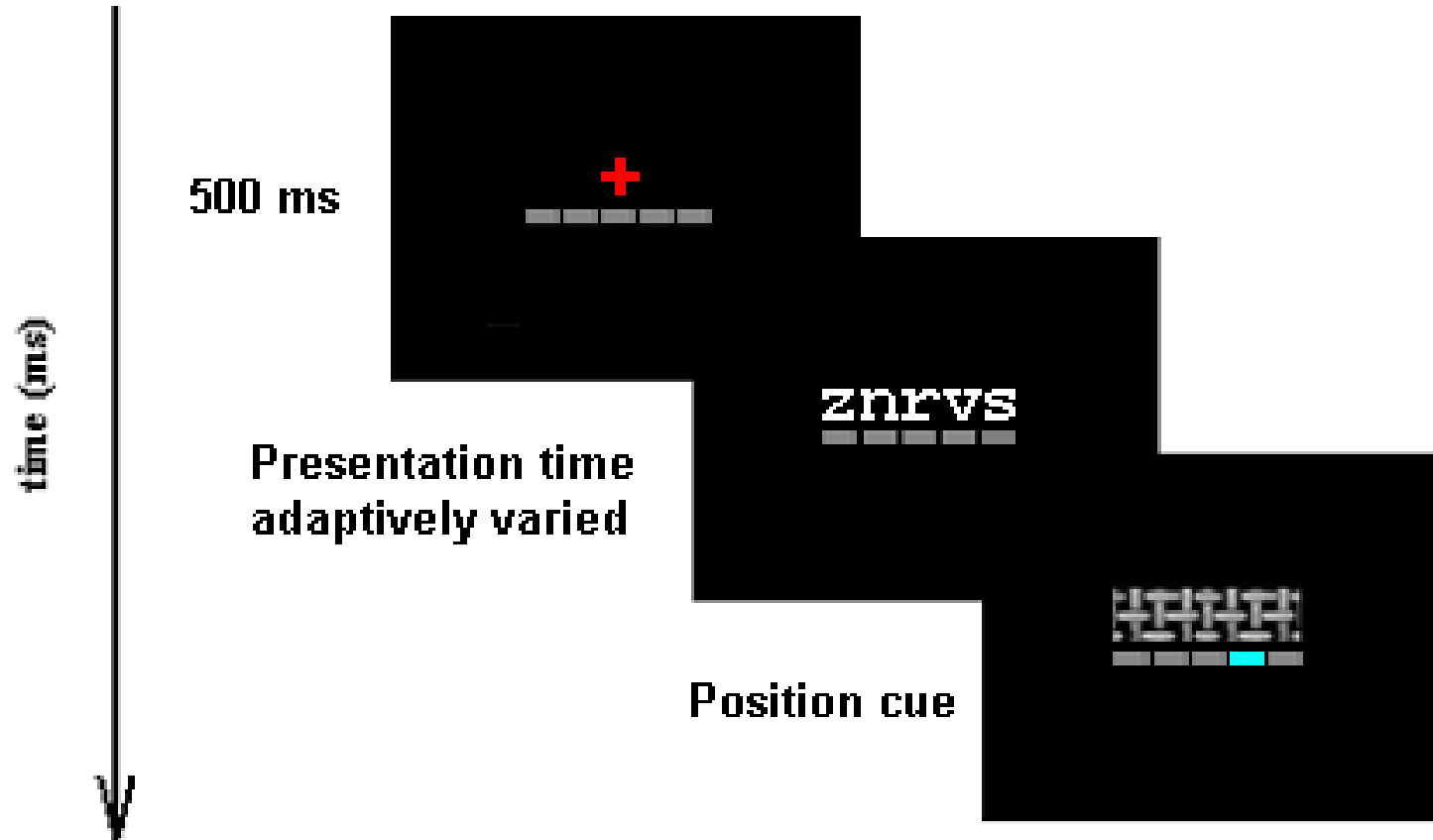
Hawelka & Wimmer (Vision Research, 2008)

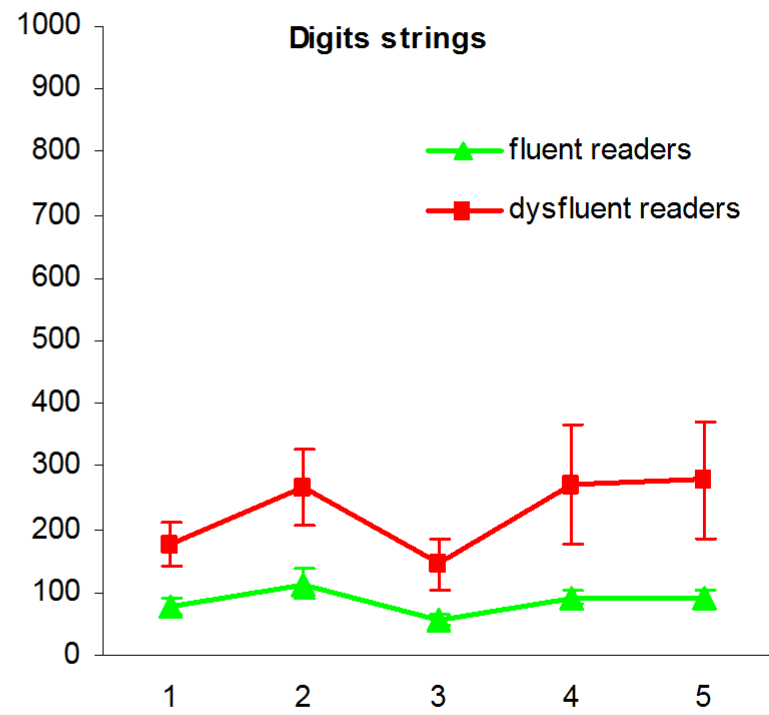
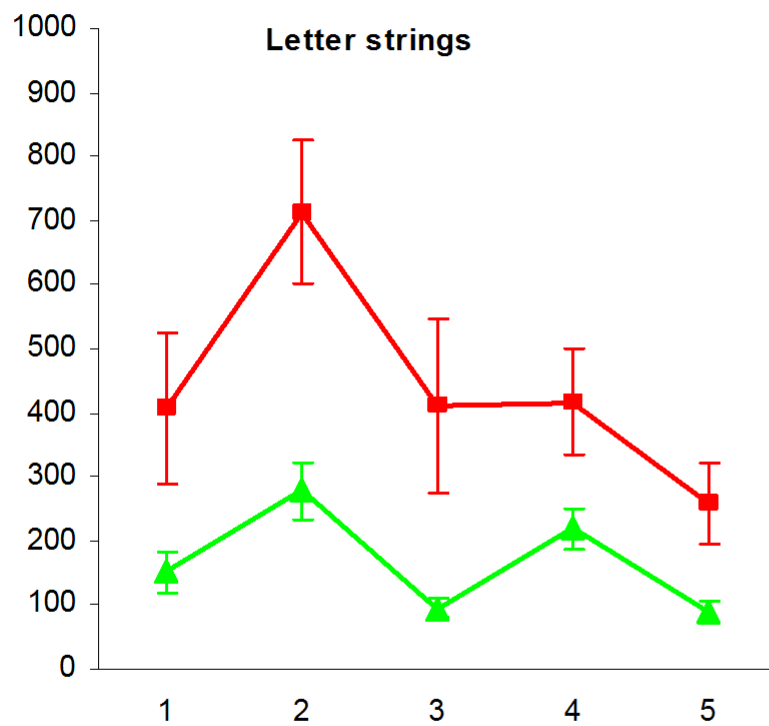




Slow visual string processing with verbal response

Hawelka & Wimmer (Vision Research, 2006)

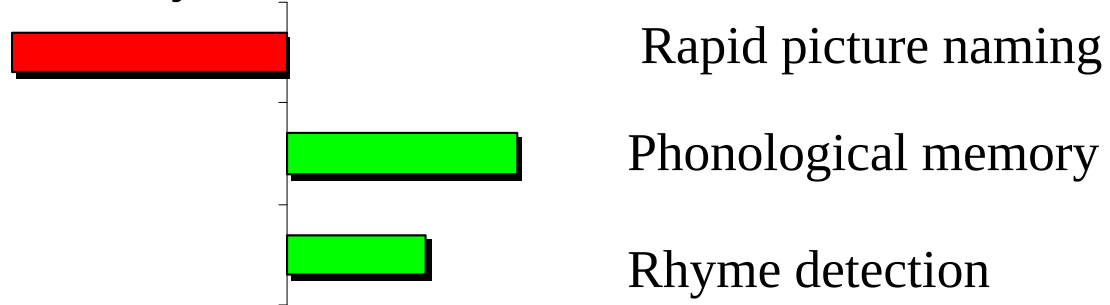




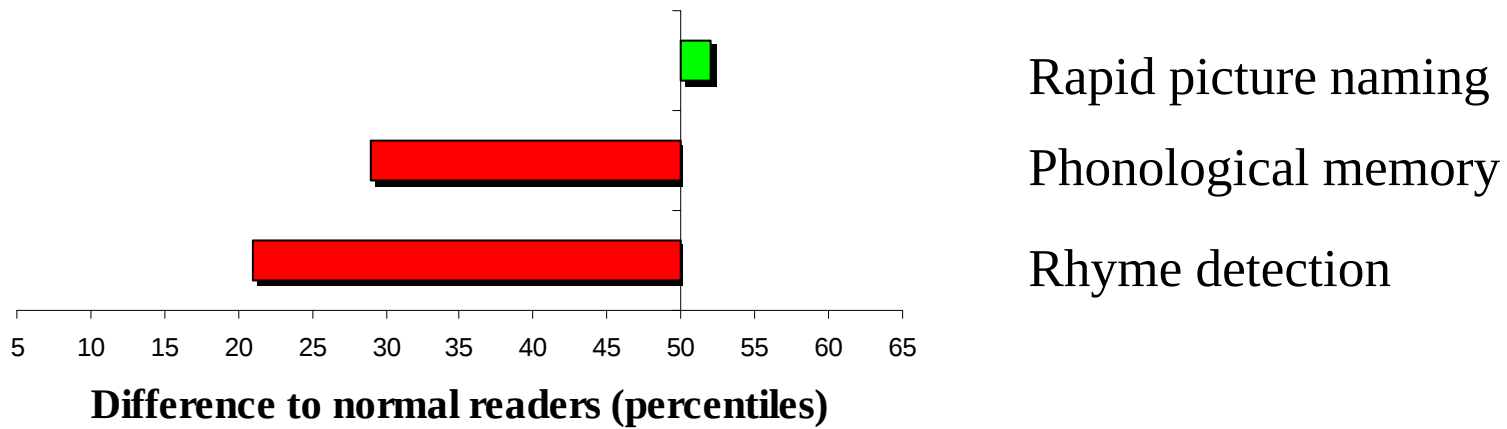
Different precursors/associates of isolated reading speed and spelling deficits

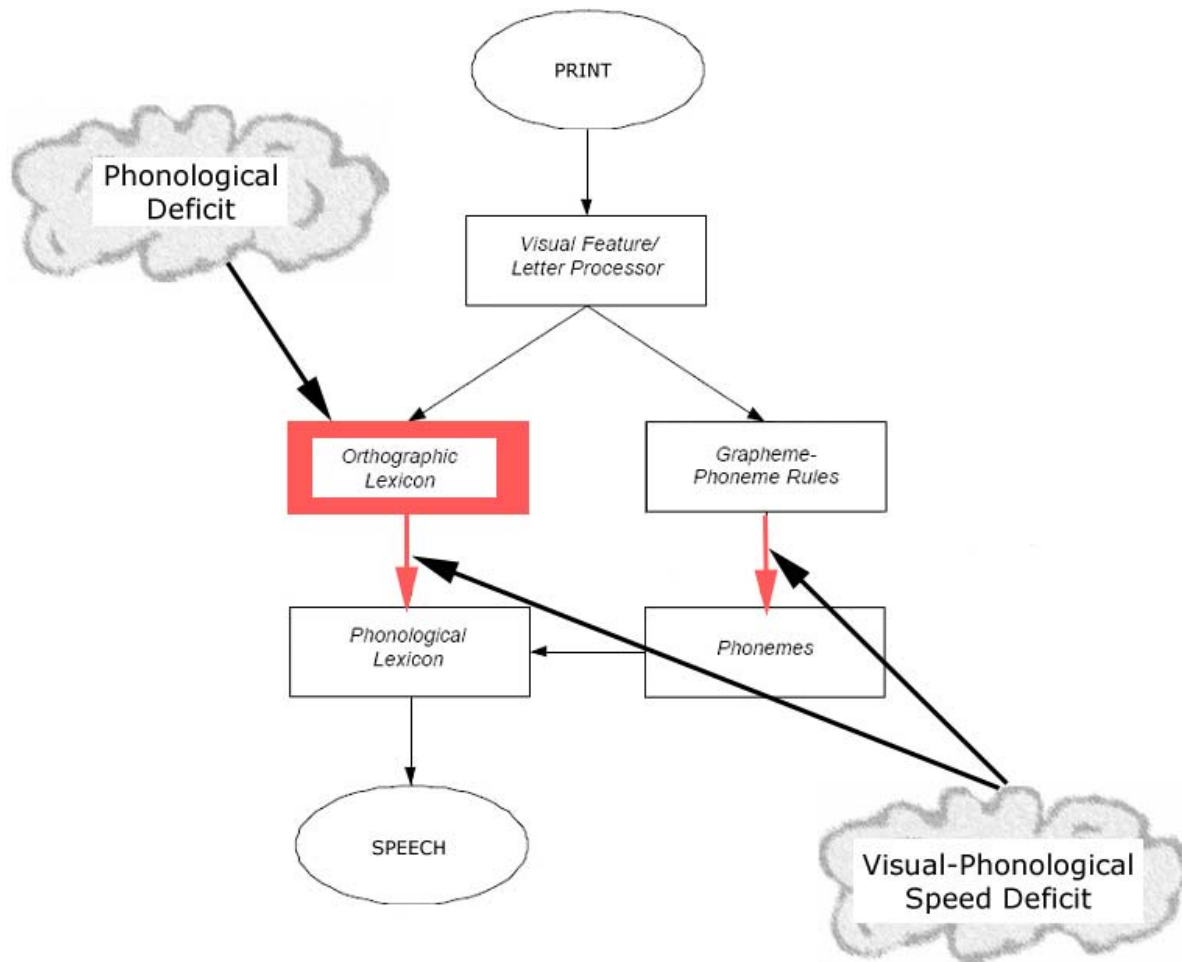
(Wimmer & Mayringer, 2002; Moll & Landerl, in press)

Only Fluency-disabled



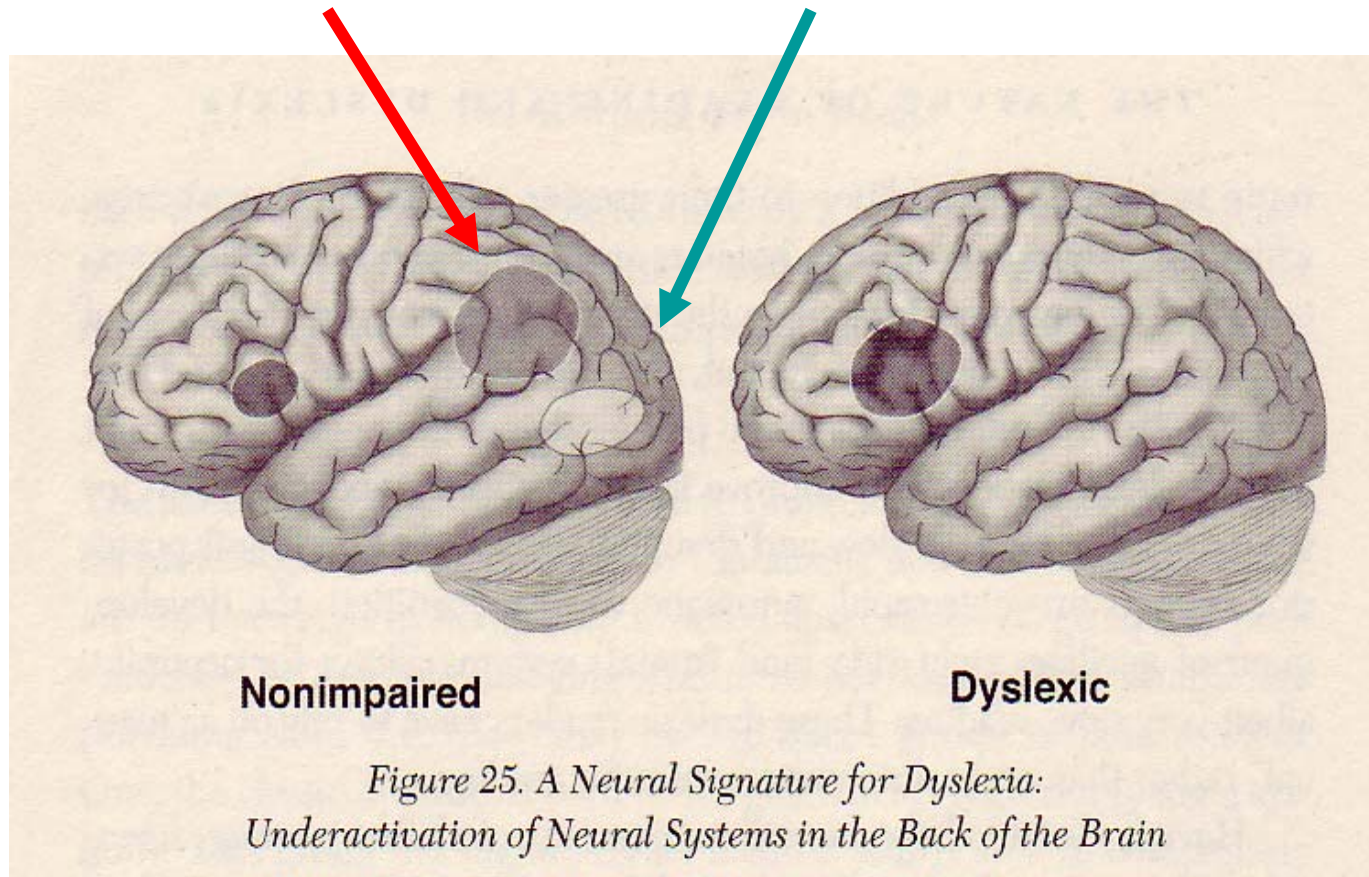
Only Spelling-disabled





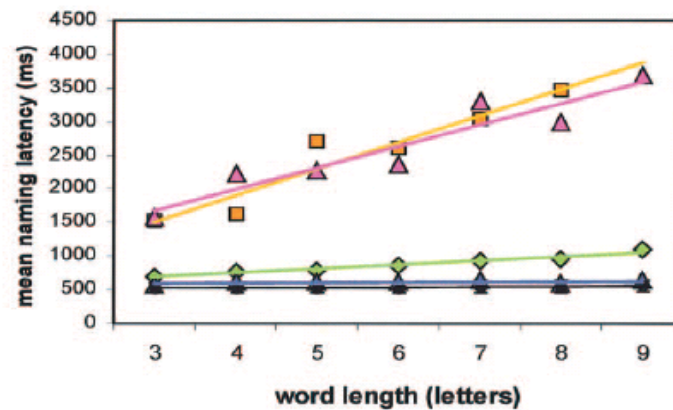
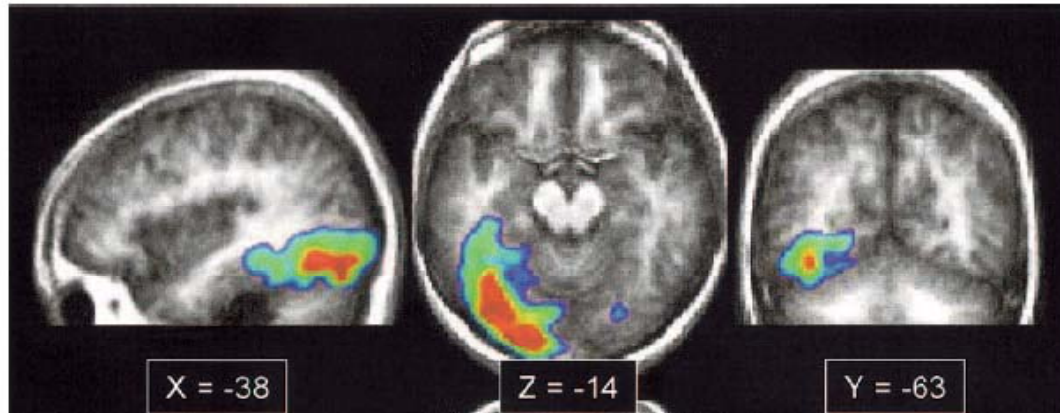
Primary „phonological“
dysfunction - temporoparietal

Secondary „visual“ dysfunction
(occipitotemporal)



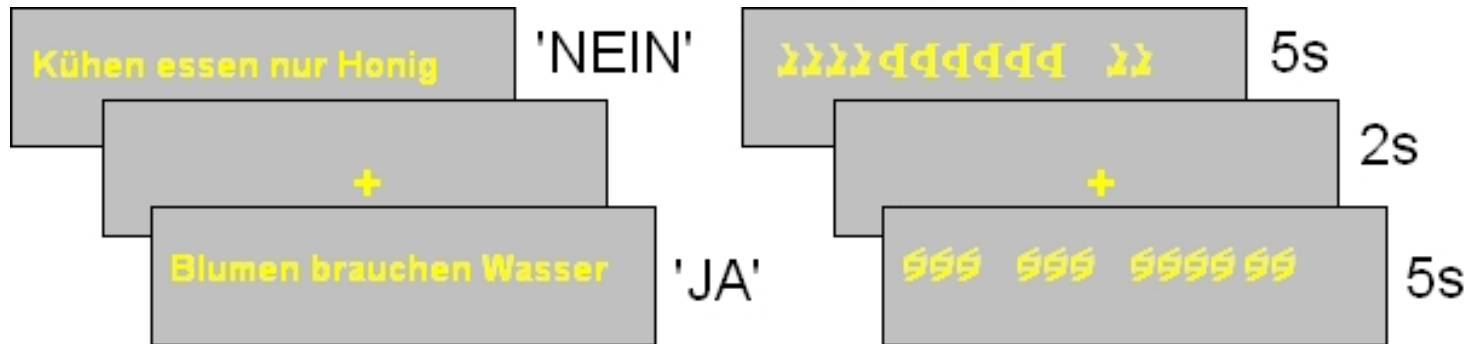
Shaywitz, S. (2004). *Overcoming dyslexia. A new and complete science-based program for reading problems at any level.* New York: Alfred A. Knopf.

Lesions resulting in acquired dyslexia (Cohen et al., 2003; Cerebral Cortex)

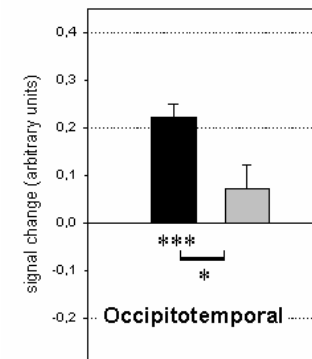
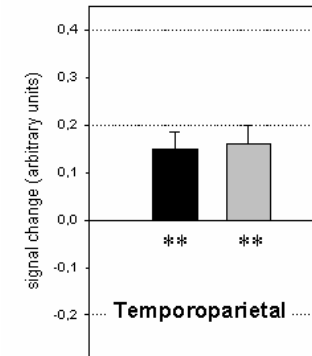
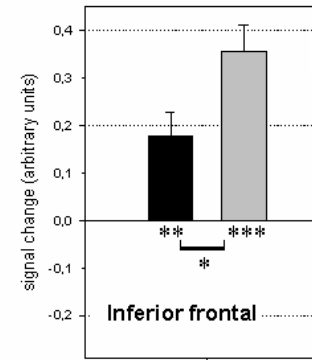
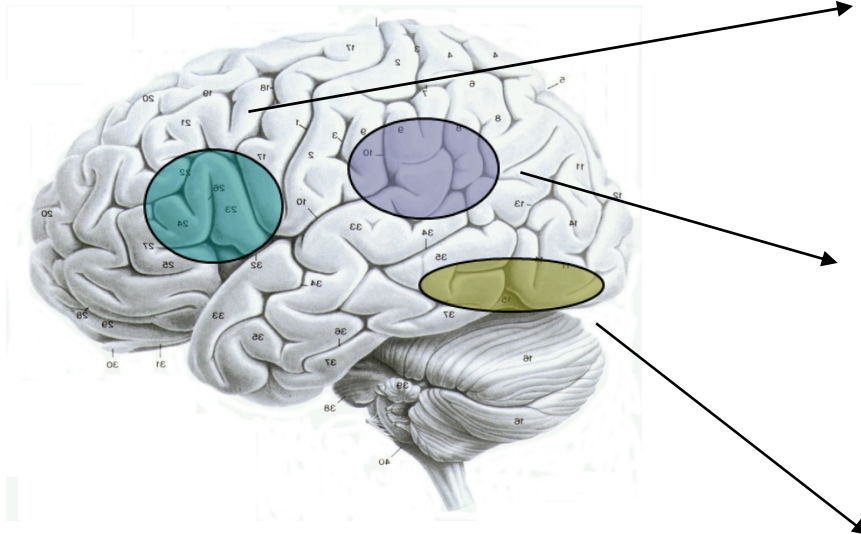


Brain dysfunctions: Sentence Reading vs. String Processing

(Kronbichler, Hutzler et al., Neuropsychologia, 2006)



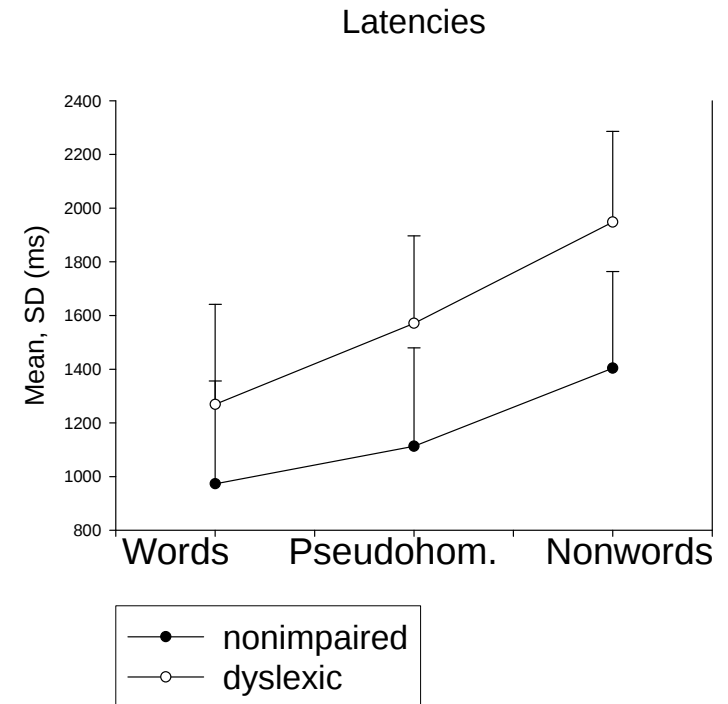
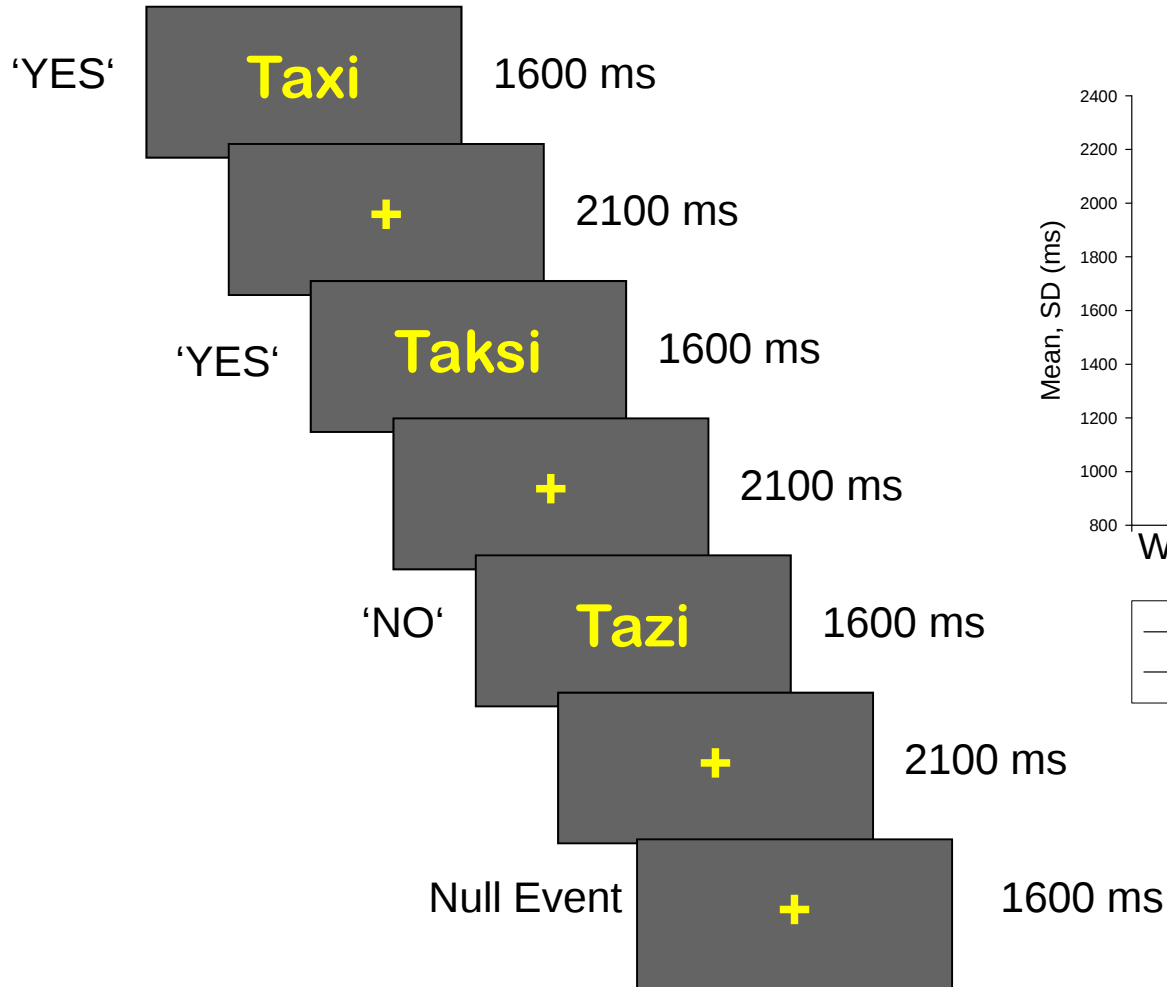
Left occipitotemporal underactivation – no temporoparietal abnormality - left frontal overactivation -



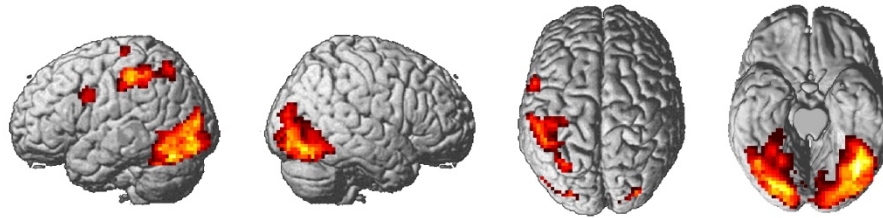
Left Hemisphere

Brain dysfunctions: Word processing vs. rest

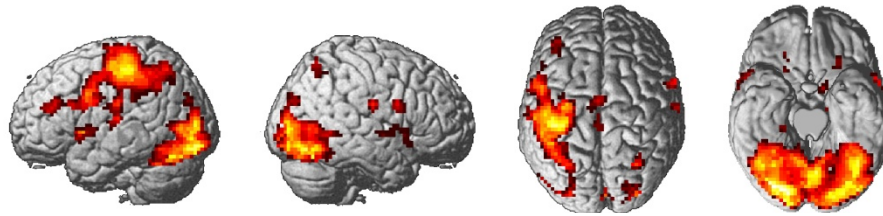
(Wimmer et al., Cortex, in press)



Words > Fixation

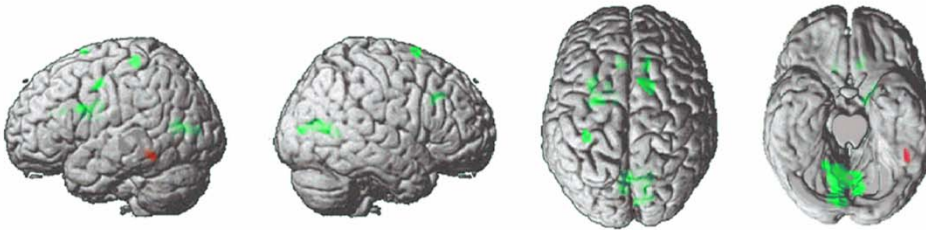


Nonimpaired
Readers

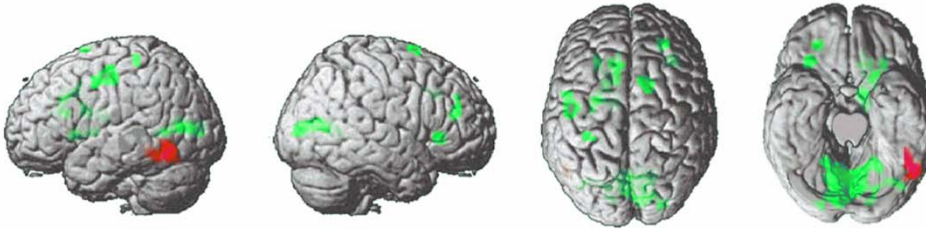


Dyslexic
Readers

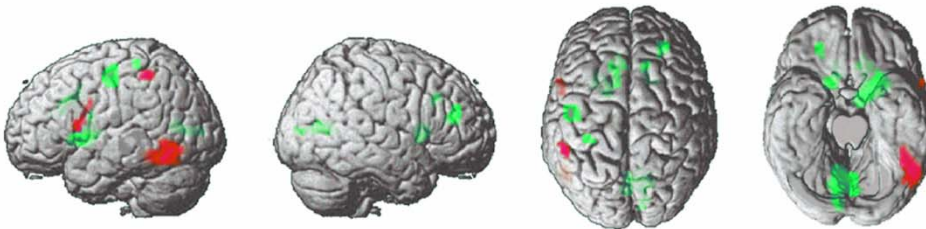
Group Differences



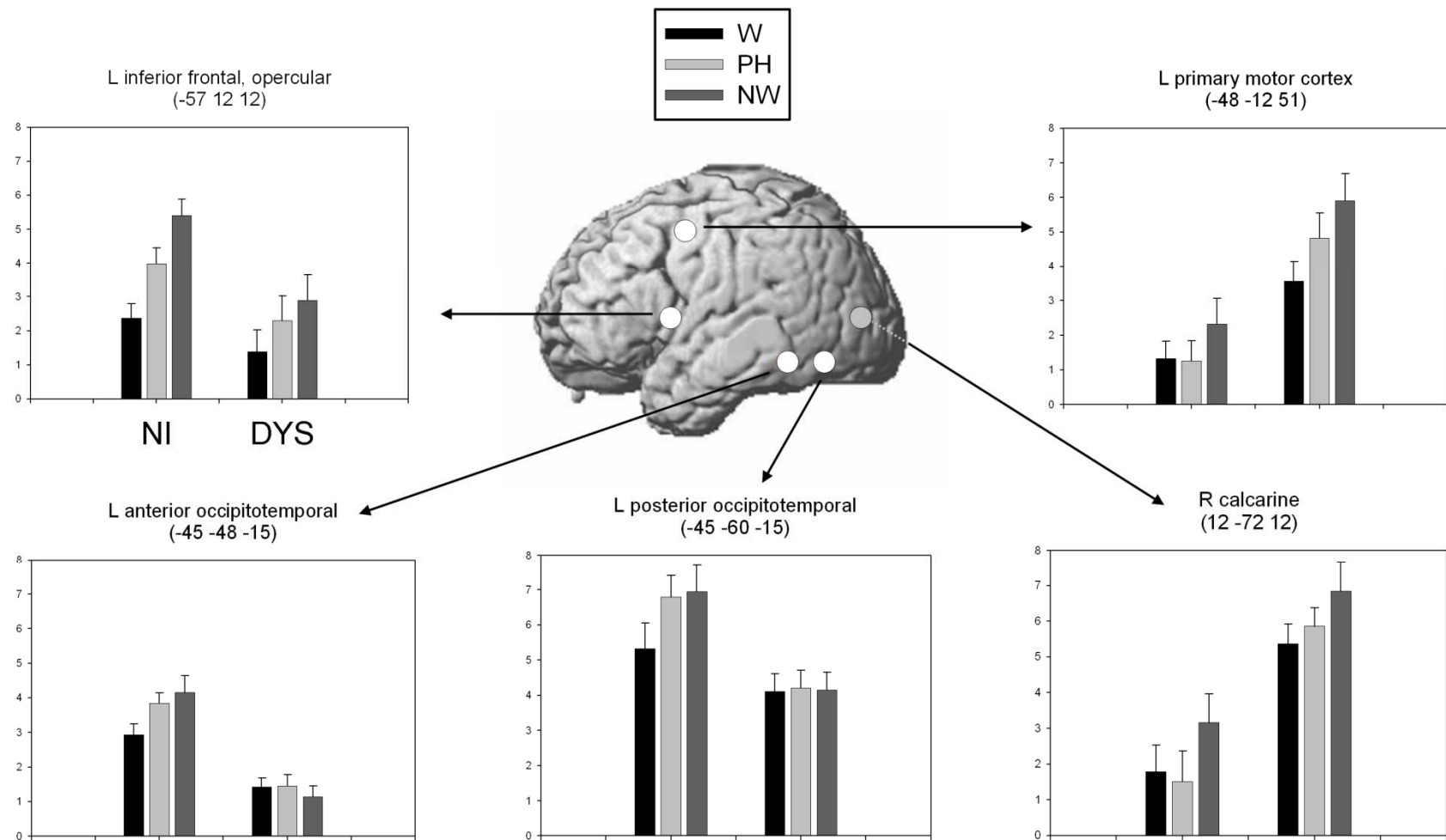
Words > Fixation



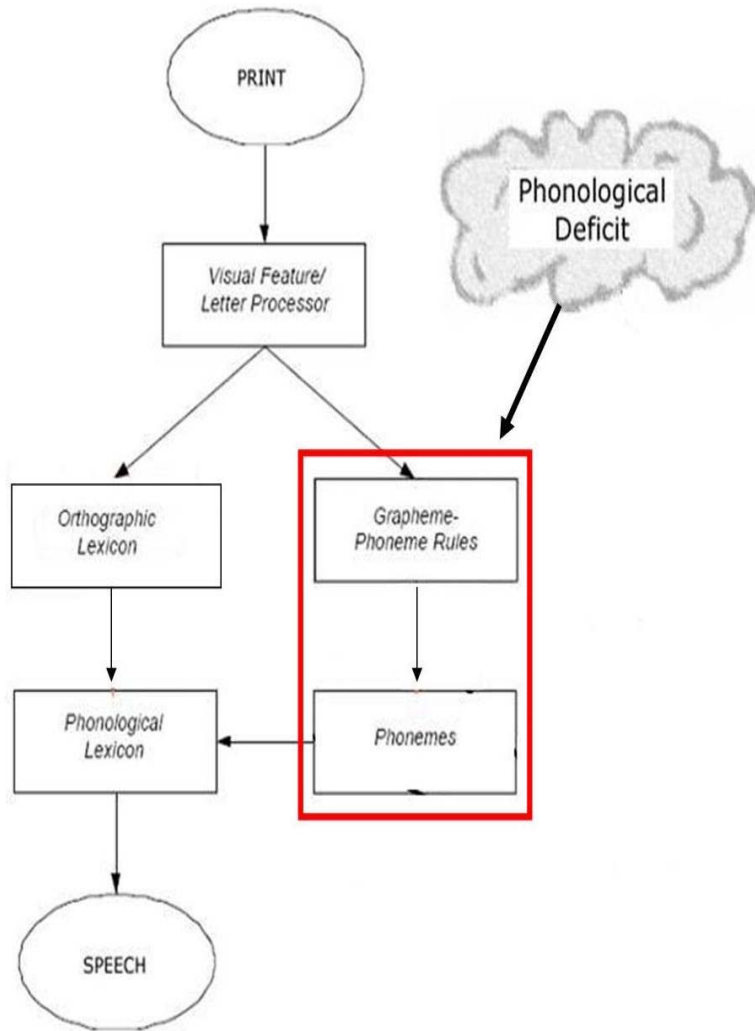
Pseudohomophones >
Fixation



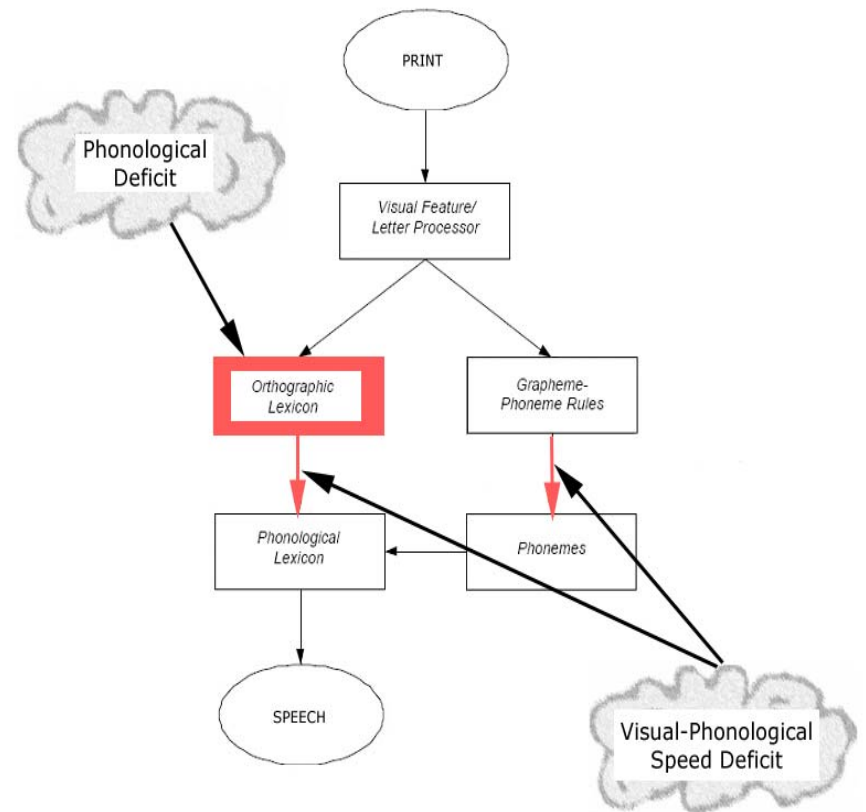
Pseudowords > Fixation



Anglocentric Version

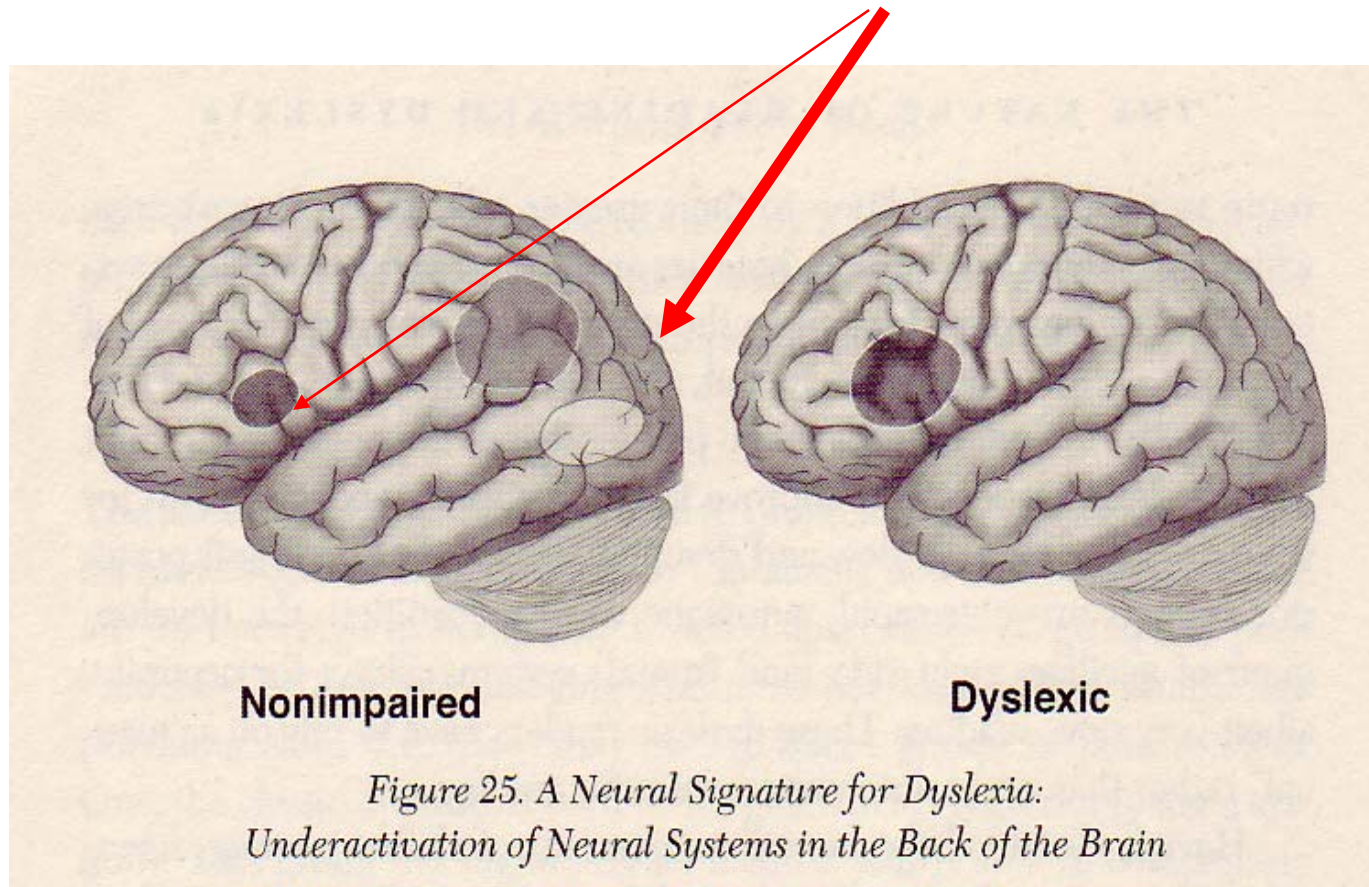


Regular Orth. Version



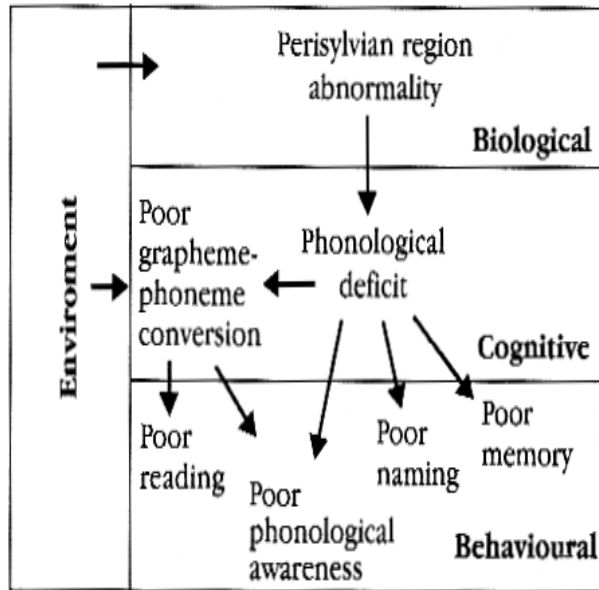
Anglo: Primary „phonological“
dysfunction - temporoparietal

Regular: Primary interface
dysfunction - occipitotemporal)



Shaywitz, S. (2004). *Overcoming dyslexia. A new and complete science-based program for reading problems at any level.* New York: Alfred A. Knopf.

Brain, Mind and Behaviour in Dyslexia



Dysfunction of left OT visual-verbal interface area (of cerebellum?)

Visual-verbal connection deficit (slow access to lexical and sublexical phonology)

Poor orthographic lexicon – slow lexical and sublexic route

Slow word reading – even when singly fixated - slow sublexical reading

Figure 1.2 Example of causal modelling of dyslexia as a phonological deficit
Note: The specific cognitive deficit affects reading through its interaction with the demands of an alphabetic writing system. Learning this system requires the acquisition and internalisation of grapheme to phoneme decoding rules. The tests at the behavioural level are phoneme awareness, naming speed and auditory short-term memory. Other phonological tests could also have been included.



Thank you for attention

Martin Kronbichler
Stefan Hawelka
Jürgen Bergmann
Florian Hutzler

Karin Landerl
Heinz Mayringer