

Understanding Dyslexia

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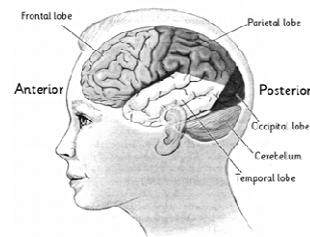
Other Specific Learning Disabilities

- ADHD (Attention Deficit Hyperactivity Disorder)
- Dyspraxia
- Dysphasia, speech/language delay or deficit
- Dyscalculia
- Autism/Aspergers Syndrome/Tourette Syndrome

“Dyslexia is a complex neurological condition which is constitutional in origin. The symptoms may affect many areas of learning and function, and may be described as a specific difficulty in reading, spelling and written language.oral language may be affected to some degree.”

British Dyslexia Association 1996

Neurological and biological basis



Brain structure

MRI scanning results

The planum temporale cortical language area, which is normally larger in the left hemisphere than in the right, is symmetrical in most dyslexics.

The corpus callosum is physically less well developed in dyslexics than in non-dyslexics.



fMRI Findings

- Electrical patterns of activity are different
- Dyslexics use different parts of their brain
- Process information differently:

Some strengths, but some weaknesses

Key phases of literacy development

Logographic phase

Alphabetic phase

Orthographic phase

(Firth, 1985) 'Beneath the surface of developmental dyslexia'

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Logographic Phase

Basic sight vocabulary – high frequency words or words with special significance

Words recognised holistically – from overall shape

Similar looking words confused

No understanding of letter/sound correspondence

Alphabetic Phase

Recognition of sound/letter correspondence

Decoding and encoding take place

Phonic knowledge used

Pupil can spell simple, regular words

Errors are phonetic (**coff**)

Lacks sophisticated understanding of word structure

Reading slow and laboured – limited fluency

Orthographic Phase

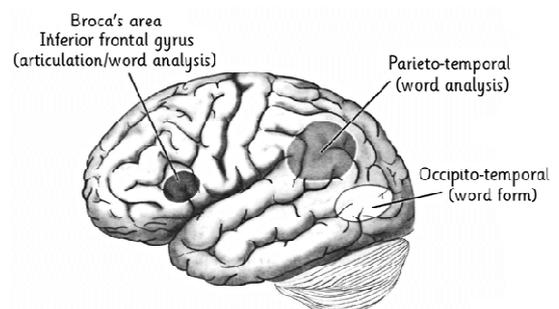
Rapid whole word recognition – holistic

Words have become sight vocabulary

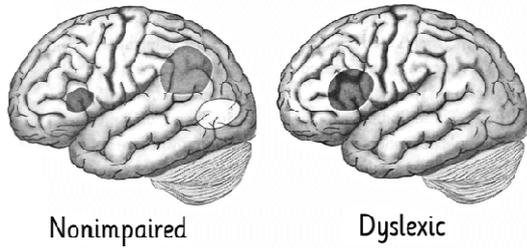
Reading fluency achieved

Understanding of sophisticated spelling patterns (-ough)

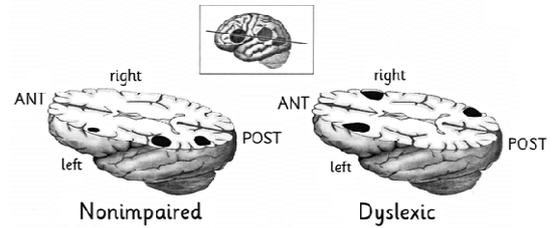
Brain Systems for Reading



A Neural Signature for Dyslexia



Compensatory Systems



Magnocellular pathways

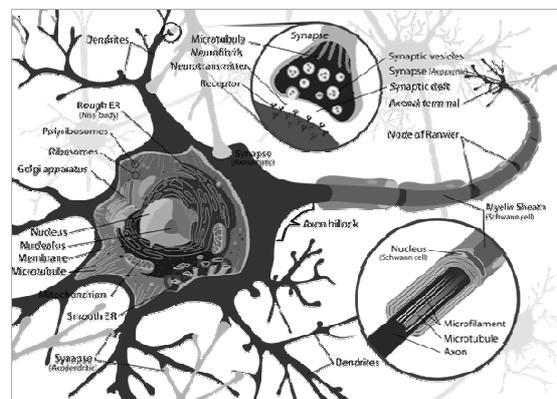
Dyslexic brains show abnormalities of the magnocellular component of the visual system, which is specialized for processing fast temporal information.

Current conclusions

“The evidence is consistent with an increasingly sophisticated account of dyslexia that does not single out either phonological or visual or motor deficits. Rather, temporal processing in all three systems seems to be impaired. Dyslexics may be unable to process fast incoming sensory information adequately in any domain.”

Nutritional aspects

Dyslexics are less able to convert EFAs to myelin in the brain



Gene links

- Chromosome 6 (DCDC2) linked with dyslexia
- Chromosome 15 (KIAA0319) also implicated
- Genetic abnormalities in Broca's and Wernicke's areas (the main language areas in the left hemisphere)

Heritability

Dyslexia runs in families!

- If a boy's father is dyslexic, he has a 40% chance of being dyslexic.
- If his mother is dyslexic, he has a 50% chance of being dyslexic.
- Boys are 4 times more likely to be dyslexic than girls.

Dyslexia and behaviour

Internationally, 60 – 80% of prison populations are dyslexic

Dyslexia causes huge anxiety and self-esteem problems, particularly with brighter pupils. This magnifies behavioural issues at school age and beyond.

Possible Indicators

- Obvious 'good' or 'bad' days with no reason
- Confusion between directional words
- Difficulties with sequences, days, months, tables
- Family history
- Discrepancy between oral and written language
- Reversals/mis-sequencing letters

- Poor concentration
- Forgets or misunderstands instructions
- Has difficulty understanding what has been read
- Takes longer to do written work
- Slow processor
- Problems copying, particularly from the board
- Problems planning essays

- Poor confidence or self-esteem
- Poor social skills
- Can appear awkward or clumsy
- Very inconsistent abilities
- Unexpected difficulties with certain tasks
- Sometimes tongue-tied
- Anxious about answering questions in class

Possible strengths

- Innovative thinkers
- Excellent trouble shooters
- Intuitive problem solving
- Creative – arts, architecture, design, engineering
- Lateral thinkers
- Often excellent with computers
- Often brilliant 'higher level' mathematicians

Famous dyslexics

Alexander Graham Bell	Nelson Rockefeller
John Britten	Henry Ford
Thomas Edison	Walt Disney
Michael Faraday	Cher
Erin Brockovich	John Lennon
George Patton	Auguste Rodin
Orlando Bloom	Nigel Kennedy
Tom Cruise	Henry Winkler

Whoopi Goldberg
Susan Hampshire
Keanu Reeves
Kiera Knightly
Oliver Reed
Robin Williams
Leonardo da Vinci
Picasso
Andy Warhol

Jackie Stewart
Muhammed Ali
Thomas Jefferson
Winston Churchill
J F Kennedy
George Washington
Agatha Christie
W B Yeats
Terry Goodkind

Patterns of difficulty

One feature of dyslexia is that there is no link between dyslexia and intelligence.

There are typical patterns, but huge variability between individual difficulties.

Processing skills (The big 5)

- Motor development (fine and gross)
- Sequencing
- Phonological awareness
- Visual perception (Visual discrimination)
- Memory (working)

Memory implications

- A non-dyslexic child takes between 4 and 10 exposures to a word to fix it in long-term memory.
- A dyslexic child can take anything between 500 and 1300 exposures.

Therefore: teaching needs to incorporate huge amounts of 'overlearning'

Longer-Term Memory Difficulties

- Retaining factual information
- Retrieving factual information

Consequently dyslexics need:

- More help to develop study skills
- To be taught mind-mapping and planning skills

Common language problems

- Interpretation – very literal, don't understand 'figures of speech'
- Language of mathematics – "70% of dyslexics experience difficulty with number language words (sum, total, odd, take away)"
Chasty 1985
- Comprehension – reading and oral

Remediation or support?

- In-class support v. withdrawal
- Reader-writer/extra time
- Scribe for homework?
- Writing or word-processing/dictating

Exam Conditions

- Extra time
- Use computer
- Reader/Writer

Need assessment report from Registered Psychologist or C Grade Tester

Homework Issues

- Tiredness
- Slow processors – need extra time
- Overload – written work
- Often inappropriate to needs – need to adapt

Assistive Technology

- Hand-held digital voice recorder
- Laptop/Computer in class and for homework
- TextHelp
- Speech Recognition software – Dragon Naturally Speaking

How you can help most

- By understanding that your learner may learn in a completely different way
- By not judging from written work
- By seeing individual needs and catering for them

Most importantly

- By judging your learner by their intellectual ability, not their written work
- By giving your learner the opportunity to shine in other fields – give them the chance to show their abilities