# Orthographic Mapping

## Ros Lugg

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## What is it, exactly?

"Orthographic mapping is a permanent storage system for written words that builds gradually and involves developing phonological awareness and word level reading skills.

Simply put, when you can read a word instantly without putting any effort into decoding it, you know that word has been orthographically mapped into your brain's storage system.

This way, the ability to store words makes reading seem magical because it means we can listen to the story with our eyes and escape into the world of a great book."

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## What is it, exactly?

"The mental process we use to permanently store words for immediate, effortless retrieval.

It is the process we use to take an unfamiliar printed word and turn it into an immediately recognisable word."

*D.Kilpatrick, 2015*

**Key Point:** This is not the same as learning words as purely visual patterns. It relies on understanding the phoneme-grapheme connections and word structure.

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## So what's a sight word, then?

~~Sight word is one which has been learned purely from its visual pattern.~~

A sight word is a word which has initially been decoded

- or its phonic structure has been explained.

### *said*    *s  ai  d*

Then it's repeatedly seen until it becomes a sight word – which can be recognised automatically without decoding.

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## What is Orthographic Mapping?

**Orthographic Mapping in the Acquisition of Sight Word Reading, Spelling Memory and Vocabulary Learning**
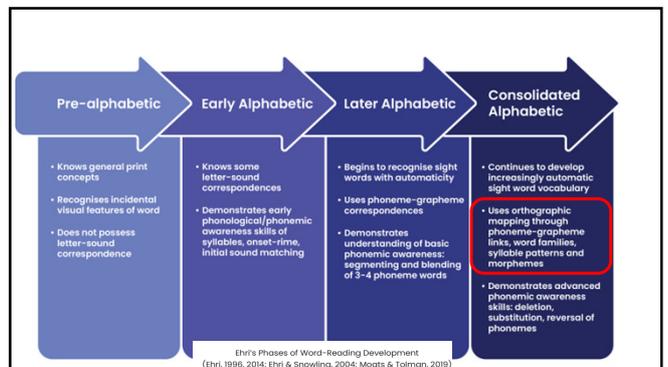
*Linnea C. Ehri, 2013*

"Orthographic mapping involves the formation of letter-sound connections to bond the spellings, pronunciations, and meanings of specific words in memory.

It explains how children learn to read words by sight, to spell words from memory, and to acquire vocabulary words from print."

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| Pre-alphabetic | Early Alphabetic | Later Alphabetic | Consolidated Alphabetic |
|---|---|---|---|
| • Knows general print concepts | • Knows some letter-sound correspondences | • Begins to recognise sight words with automaticity | • Continues to develop increasingly automatic sight word vocabulary |
| • Recognises incidental visual features of word | • Demonstrates early phonological/phonemic awareness skills of syllables, onset-rime, initial sound matching | • Uses phoneme-grapheme correspondences | • Uses orthographic mapping through phoneme-grapheme links, word families, syllable patterns and morphemes |
| • Does not possess letter-sound correspondence | | • Demonstrates understanding of basic phonemic awareness: segmenting and blending of 3-4 phoneme words | • Demonstrates advanced phonemic awareness skills: deletion, substitution, reversal of phonemes |

Ehri's Phases of Word-Reading Development
(Ehri, 1996, 2014; Ehri & Snowling, 2004; Moats & Tolman, 2019)

## Key phases of literacy development

*Frith, U. 1985*

| Logographic Phase | Alphabetic Phase | Orthographic Phase |
|---|---|---|
| Visual recognition – tiny number of words. | Ability to decode regular words. | Visual recognition of words without conscious decoding. |

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## Orthographic Phase

**Key points:**

Orthographic Mapping is essential for reading fluency.

*Dehaene & Cohen 2011*

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## Orthographic Phase

**Key points:**

Orthographic Mapping is essential for reading fluency.

If you're still reading by a mainly decoding strategy, you can't effectively follow the sense of the passage.

**Decoding is not fun!!!!!**

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## Scarborough's Reading Rope

language comprehension

increasingly strategic→→
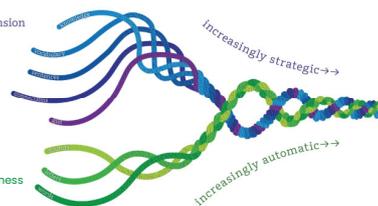
Phonological Awareness
Decoding
Sight Recognition

increasingly automatic→→

*Dr Hollis Scarborough, 2001*
*Gough & Tunmer's Simple View of Reading, 1986*

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A key model developed by the USA National Reading Panel in 2000

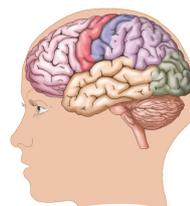Describes the progression of skills as reading develops.
- **Sequential**
- **Cumulative**

### The 5 Big Ideas in Beginning Reading

5 Comprehension
4 Vocabulary
3 Reading Fluency
2 Phonic Knowledge
1 Phonological Awareness

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## Neurological Aspects

Overcoming Dyslexia (2005)
Sally Shaywitz

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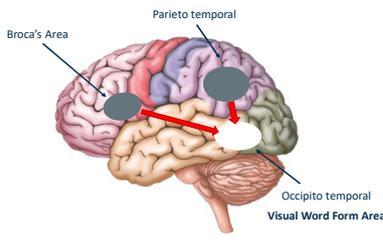**Left hemisphere brain activation**

**Left inferior frontal gyrus (Broca's area)** – articulation and phonological processing

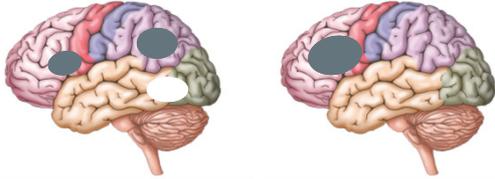**Parieto-temporal**
- grapheme-phoneme conversion

**Occipito-temporal**
– visual and orthographic encoding (whole word recognition).
**Visual Word Form Area**

Broca's Area

Parieto temporal

Occipito temporal
**Visual Word Form Area**

Overcoming Dyslexia (2005)
*Sally Shaywitz*

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## Neural Signature for Dyslexia



Overcoming Dyslexia (2005)
*Sally Shaywitz*

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## Conclusion

**Dyslexic Learners have:**

An impaired occipito-temporal (**Visual Word Form Area**)

**They therefore over-rely on the wrong areas:**

Broca's area and parieto-temporal in left hemisphere
Right hemisphere areas

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## Consequences

• Decoding areas (over)develop as instruction progresses.

• Wrong reading strategies being employed for fluency.

• Wrong areas of the brain being activated and developed.

*Reading fluency never develops!*

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## Correct process

• Learner analyses and reads the word the first few times
    - *using the decoding areas of the brain.*

• Neural model of the word is formed
    - *stored in the Visual Word Form Area.*

• Now that the word has been 'orthographically mapped',
  it can be recognised automatically – *without decoding!*

*Fluency achieved!*

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## Understandable Question

*"How do I know when my student starts to use the **Visual Word Form Area** for Orthographic Mapping?"*

Supporting research suggests that the **Visual Word Form Area** operates at around 150ms or faster.

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## Slide 1

**Understandable Question**

*"How do I know when my student starts to use the Visual Word Form Area for Orthographic Mapping?"*

Research studies suggest that the **Visual Word Form Area** operates at around 150ms or faster.

It is now possible to measure this speed.

## Slide 2

**Visual Recognition Speeds by Age**

| Age | Low 0 - 19% | Low Average 20 - 35% | Average range 36 - 65% | High Average 66 - 80% | High 81 - 100% |
|---|---|---|---|---|---|
| 5:00 - 5:11 yrs | 700 - 800 | 600 - 700 | 450 - 600 | 350 - 400 | 50 - 300 |
| 6:00 - 6:11 yrs | 600 - 800 | 450 - 550 | 300 - 400 | 200 - 250 | 50 - 150 |
| 7:00 - 7:11 yrs | 550 - 800 | 400 - 500 | 250 - 350 | 150 - 200 | 50 - 100 |
| 8:00 - 8:11 yrs | 450 - 800 | 250 - 400 | 150 - 200 | 100 | 50 |
| 9:00 - 9:11 yrs | 350 - 800 | 200 - 300 | 100 - 150 | 50 | - |
| 10:00 + | 300 - 800 | 150 - 250 | 50 - 100 | - | - |

Exploring the relation between visual recognition speed, teacher literacy assessment and age.  Analysis of the StepsWeb Visual Recognition Speed Test for ages 5.0 – 8.9

Cowie S., Plimmer B., & Lugg R., 2017

## Slide 3

**Visual Recognition Test Results**

| Visual Recognition Test | | |
|---|---|---|
| **Date Taken** | **Result** | **Summary** |
| 16 Nov 2022 | 50ms | Age Appropriate |
| 17 Jun 2020 | 150ms | Low Average |
| 29 May 2019 | 750ms | Low |

*Note: For this test, a lower score is better. It represents the amount of time a student needed to look at an item to visually recognise it.  Test results range between 50ms and 800ms.*

## Slide 4

| Word-Reading Development | | |
|---|---|---|
| **Ages** | **Phonological Skill** | **Word-Reading** |
| 4–6 | **Early phonological awareness:** rhyming, alliteration, first sounds | **Letters and Sounds:** requires simple phonology to learn sounds that correspond to letters |
| 6–7 | **Basic phonemic awareness:** blending, segmenting | **Phonic Decoding:** requires letter sound knowledge and blending; a gateway to orthographic mapping |
| 8+ | **Advanced phonemic awareness:** phonemic proficiency including phoneme manipulation | **Orthographic Mapping:** requires letter-sound skills and advanced phonemic awareness |

Also requires visual memory - and visual recognition and retrieval skills

## Slide 5

**Three Stages of Orthographic Mapping**

**Stage 1 – information in**
Primarily phonological process

## Slide 6
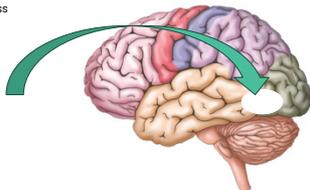
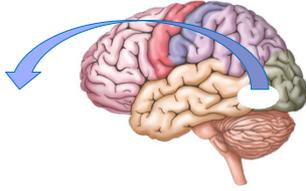**Three Stages of Orthographic Mapping**

**Stage 2 – Information stored**
Primarily visual memory

## Three Stages of Orthographic Mapping

**Stage 3 – Information out**
Primarily visual process

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## Automatic Analysis



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## Developing Orthographic Mapping

Most adults have a store of 30,000 – 70,000 words
in their Visual Word Form Area

*D. Kilpatrick, 2015*



Orthographic Mapping → Reading Fluency / Phonic Knowledge / Phonological Awareness

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## Other key facts

Most readers need 1 – 4 exposures to a word to map
that word effectively

Some dyslexic learners can take up to 1300
exposures to add a word to their visual memory!

*B. Bateman, 1991*

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## Developing Visual Recognition Speed

Not complicated – plenty of exposure to words!

Creating and reinforcing the neural images of those
words.

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## Developing Visual Recognition Speed

### So how do we do it?

Developing the process of orthographic mapping
– putting words into the VWFA.

Reading
Re-reading!
Word games
Writing

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## Developing Visual Recognition Speed

**Reading stories**

Decodables

But also plenty of other mileage!

Re-reading familiar texts.

Reading

Re-reading!

Writing

Word games

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## Developing Visual Recognition Speed

**Other activities**

Word games - Stargame

Word walls!

Reading

Re-reading!

Writing

Word games

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## Developing Visual Recognition Speed

Speedreading

| Tuesday | main | month | said | wait | Sunday | stain |
| again | Monday | week | old | Thursday | chain | sail |
| paid | Friday | train | snail | rain | mail | Wednesday |
| Saturday | nail | year | waited | stain | weekend | again |

Times:

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## Developing Visual Recognition Speed

Word Flash

Specifically develops instant recognition and retrieval

Reading

Re-reading!

Writing

Word games

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**Word Flash**

Caitlyn Shore - 1-2 Tricky words

Help   Back

their
all
for
have
they
him
want
said
but
with
goes
new

Pass

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## Visual Recognition Speed Test

**Significant benefits to educators:**

Identify when a learner is over-reliant on the decoding areas of the brain

Track progress and identify when they make the transition to using the Visual Word Form Area

In other words, when they start using orthographic mapping

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**Would you like to trial this test?**

**This is how you do it (if you don't already have a StepsWeb account):**

Go to **www.stepsweb.com**.

Sign up for an account using the 14-day free trial.

Email me at **ros@stepsweb.com** and we will extend your free trial.

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