UNDERSTANDING CELLFIELD

The science behind the reading intervention

SIGNS OF READING DIFFICULTIES

- *Poor reading, spelling and writing skills*
- *Poor phonological awareness and decoding skills*
- *Poor comprehension*
- *Difficulties with letter, words or number sequences*
- *Difficulties in verbal expression*
- *Suspected eye tracking problems*
- *Poor retention of reading material*
- *Tiredness when reading*
- *Persistent dislike of reading*
- *Frequent loss of place on page*

UNDERSTANDING THE BRAIN

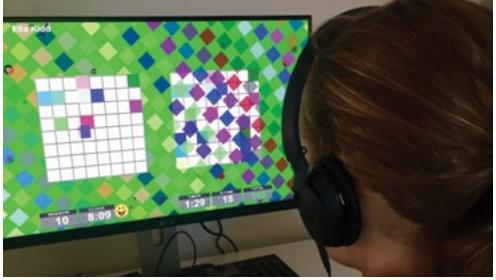
The brain changes constantly throughout our lives. Each time we learn something, a connection between neurons is made. Neurons are the 'wires' in the brain that sort through and send information from one location to another. The more we repeat tasks, the stronger the connections in the brain become.

The Cellfield intervention takes advantage of the brain's ability to make new pathways. For fluent reading and comprehension to take place, all areas of the brain as outlined below must function well together.

- *Executive function:*
  A set of mental skills that help us do things. A 'neural management committee' of cognitive processes that decides when and where to direct attention to sustain 'thinking power'.

"Neurons that fire together, wire together"

Donald Hebb, Canadian neuropsychologist



- *Working memory - the 'white-board' of the mind:*
  This is the part of the short-term memory where the processing of immediate information happens, for learning and problem solving. A deficit here often leads to difficulties with learning.
- *Cognition:*
  The 'thinking power' used in working memory with information from experience and the senses.
- *Cognitive pathways:*
  When executive function, working memory and cognition work together, 'cognitive pathways' form and are strengthened as they are used.
- *Behavioural pathways:*
  When something is learned and mastered by cognitive pathways, the sub-conscious then stores the information as an automatic skill, or piece of knowledge without it having to be processed again by the working memory. This frees working memory so more skills can be mastered.

UNDERSTANDING READING DIFFICULTIES

TYPICAL ROUTE TO READING OUT LOUD

Beginner readers match sounds to letters and identify words, reading slowly, one word at a time.

For skilled readers, after 4-12 accurate identifications, the shape and sound of words are connected in the brain. This allows reading to become fluent and frees working memory for more difficult tasks such as comprehension. Skilled readers do not need to sound out words. Their eyes see words in peripheral vision before actually looking at them, followed directly by the sound structure.

Those with persistent reading difficulties do not easily recognise the association between the speech sounds and the written letters. They do not automate the shape of the word. They over-rely on the sounds of the words without making the other connections. Reading is hard, slow and makes understanding text difficult.

> **"Neurons out of sync fail to link"**
>
> ***Donald Hebb, Canadian neuropsychologist***

HOW DOES CELLFIELD WORK?

Cellfield combines literature on reading difficulties, medical studies, neurology, psychology and the brain. It is a computer based reading intervention that:

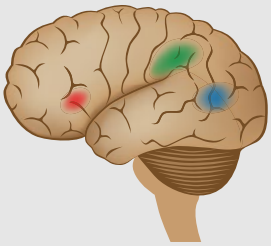
- *Improves auditory and visual processing speeds*
- *Bonds auditory and visual functions*
- *Boosts working memory capacity*
- *Encourages attention and motivation*
- *Sharpens eye movement control*
- *Simultaneously targets visual, auditory and motor functions*
- *Strengthens the left hemisphere of the brain which is used by fluent readers*
- Automatises *basic reading skills*

The intervention stimulates vision, attention and working memory. It does this through exercises that help bind the symbols of language to the sound and structure of our language.

Brain imaging research has shown consistent differences in how dyslexic brains are wired compared to typical readers.

Brain plasticity research has shown that our brains are plastic and that when stimulated appropriately, can change.

SKILLED READER



- Broca's area, inferior frontal gyrus ***(articulation/word analysis)***
- Parieto-temoporal area, ***(word analysis)***
- Occipito-temporal area, ***(word form)***

PERSISTENT DIFFICULTIES

- Broca's area, inferior frontal gyrus ***(articulation/word analysis)***

Donald Hebbs quote "Neurons that fire together, wire together" describes how each experience we encounter, becomes embedded in the network of braincells that produce that experience. This includes our thoughts, feelings, sensations and muscle action. With each repetition, the connection between neurons or set of brain cells is strengthened.

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- *access further information & testimonials*
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