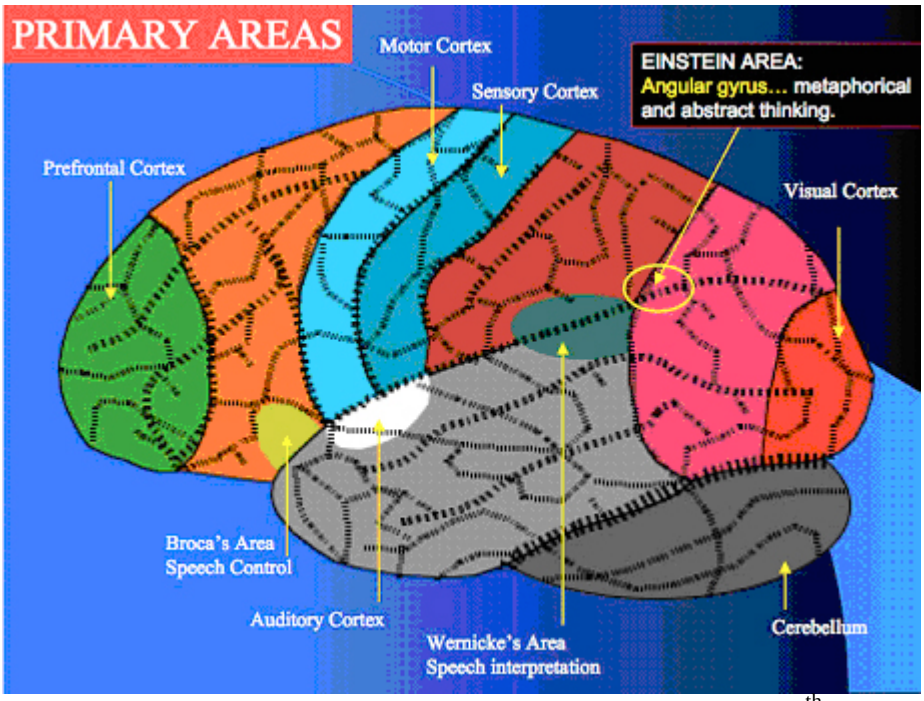
Neuroplasticity, 3D Puzzles and Literacy

What is neuroplasticity?

The layman's explanation:
Until fairly recently, the brain was thought to be rigid in many respects. 'You can't teach an old dog new tricks' is a folk wisdom example of this thinking. Specific functions were attributed to specific brain locations. Brain 'deficits'from injury or other causes were thought to be constant



http://www.memoryzine.com/neuroplasticity.htm retrieved 26th September 2009

Our folk-wisdom saying perhaps now should be 'use it or lose it'!

Neuroplasticity, the idea that the brain is capable of change even into maturity and old age, has huge implications for teaching, as well as for rehabilitative medicine, psychology and psychiatry. To 'rewire' the brain of a dyslexic student or a student with ADHD, is lifechanging. For an older student with specific learning difficulties, to know that correct spelling is possible, gives hope

In short, the theory is that carrying out certain activities changes neural pathways, strengthening them.

For a complete, scientifically based explanation and discussion of these theories, please consult these references:

1. Begley, S (2009). Training faulty brains to work better: new treatment may help schizophrenics. Newseek, August 18th 2009. retrieved from http://www.newsweek.com/id/212454 on September 26th 2009

2. Doidge, N (2007), The Brain that Changes Itself. Scribe Publications, North Melbourne.

3. http://www.memoryzine.com/neuroplasticity.htm retrieved 26th September 2009

4. http://faculty.washington.edu/chudler/plast.html retrieved 26th September 2009

5. http://bfc.positscience.com/about/neurogenesis.php

6. . Valeo, T Dyslexia Studies Catch Neuroplasticity at Work November 01, 2008 http://www.dana.org/news/brainwork/detail.aspx?id=13662 retrieved on 26th September 2009

References on brain fitness with reference to the 'mature brain'

www.lumosity.com - retrieved on 26th September 2009

http://www.braintraininggames.net/sitemap-page-order.html retrieved on 26th September 2009

You will find many more1

What I do: I have various 3D puzzles. I ask my students to practise putting together one puzzle, until they master it. Either: I show them how to construct the puzzle or they have a diagram to follow. I don't ask them to solve the puzzle from 'scratch'.

Students practise daily, for about half an hour. Perfecting the puzzle could take a week or a couple of weeks. Once one puzzle has been perfected, I ask them to work on another puzzle. I explain why we are doing this: to strengthen the brain's pattern matching skills, which is an important part of spelling.

Some students do become frustrated by struggling to solve the puzzle. I direct them to the solution, or I demonstrate the puzzle for them. As I demonstrate, I say, "Practise putting two pieces together, so you can do them. Then, move on to another piece. You are teaching yourself how to do the puzzle". I am trying to move the control from myself to the student and to develop metacognitive awareness – the student's awareness of his own learning style.

Once students have experienced frustration and consequent success with a couple of puzzles, I will suggest that we can learn spelling this way. For instance, my students have quite quickly learnt how to spell these words: student, Australia, Portugal, single. *These words are needed for filling in forma, and thus have immediate relevance.* I break the words into syllables, which then become the pattern.

Stu dent or stu den t

Port u gal

Aus tra lia

Sing le

Li ke

De fac to

If the student finds his own syllable breakdown, it's important to go with that, even if it might not match what you think is correct.

My students include a man in his late fifties who is working at a very basic literacy level –he struggles with recognition of three-letter words and blends. He has very poor hearing and wears a hearing aid and he has poor eyesight. He has, however, very

strong powers of focus and concentration and he is determined to conquer this reading and writing thing! He has had success with three quite difficult puzzles and has within a week taught himself these words: student and like. When he first started learning to spell *student* he would write *sut den*. He then progressed to *sut dent*. He then only had to remember *stu* instead of *sut*. His original misspellings indicate the severity of his dyslexia; he couldn't translate the sound *stu* into the spelling of s-t-u. He can now do this, spelling *student* correctly each time he is asked.

Another of my students is Portuguese. His schooling in Portugal was minimal and when he came to Australia at about sixteen years of age, he was sent straight to work on a plantation. At about eighteen, he suffered a serious car accident, which left him with depression, brain damage and short-term memory problems. Although he becomes frustrated easily, he has had success with the 3D puzzles. They give quick feedback in that when he remains calm and perseveres, he is able to solve them. Whilst he maintains that he *can't* spell, he can now confidently spell Portugal, Australia, single, student and crescent

Most important: students need concentration and focus to be successful with this approach. A half-hearted approach just won't cut it! .

> Engaging neuroplasticity in adulthood requires intensive, repetitive brain exercise. - http://bfc.positscience.com/about/healthy.php retrieved 22nd September 2009.

Where my interest in dementia fits into 3D puzzles:
I am a modest 'fitness freak'. Can we exercise the brain to increase its fitness, just as we do the body? Since my mother developed dementia and was formally diagnosed a year ago, I have naturally been researching this topic. As you get older, the idea that you can exercise the brain to keep it fit is very alluring. This is the essence of neuroplasticity – the brain changes as we exercise it in specific ways. The 3D puzzles are a very specific form of brain exercise.

Here is a scientific explanation of neuroplasticity

Neuroplasticity: The brain's ability to reorganize itself by forming new neural connections throughout life. Neuroplasticity allows the neurons (nerve cells) in the brain to compensate for injury and disease and to adjust their activities in response to new situations or to changes in their environment.

Brain reorganization takes place by mechanisms such as "axonal sprouting" in which undamaged axons grow new nerve endings to reconnect neurons whose links were injured or severed. Undamaged axons can also sprout nerve endings and connect with other undamaged nerve cells, forming new neural pathways to accomplish a needed function.

For example, if one hemisphere of the brain is damaged, the intact hemisphere may take over some of its functions. The brain compensates for damage in effect by reorganizing and forming new connections between intact neurons. In order to reconnect, the neurons need to be stimulated through activity.

Neuroplasticity sometimes may also contribute to impairment. For example, people who are deaf may suffer from a continual ringing in their ears (tinnitus), the result of the rewiring of brain cells starved for sound. For neurons to form beneficial connections, they must be correctly stimulated.

Neuroplasticity is also called brain plasticity or brain malleability.

http://www.medterms.com/script/main/art.asp?articlekey=40362 retrieved 26th September 2009