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Spelling bee: Bad at spelling? Could be your genes

Are you lousy with words? Well, don't blame your old teacher, says Kate Wighton, the likely source of your woe is a little closer to home

Kate Wighton

Many of us are foxed by spelling, and panic slightly at the thought of a world without a spellchecker. Is it definitely or definately? Necessary or neccessary?

This month The Times launched the UK's first national Spelling Bee to bring these issues out into the open and to fuel interest in what some would say is a forgotten art.

In the past, poor spelling was attributed to all manner of things, from bad schooling to a lack of moral fibre. But science is offering a new explanation. A difficulty with spelling could be rooted in your genes and in the way that your brain is wired. These findings stem from research into the language disorder dyslexia, but they are proving important for the wider population. Biology, it seems, not only influences those with dyslexia but also people without the syndrome. If you are a bad speller you can blame your grey matter.

Spelling and reading require a phenomenal amount of brain power. According to John Stein, Professor of Neuroscience at Oxford University Medical School, simply deciphering this sentence, and all forms of the written word, is the most complex task your brain will face. The reason for this is that the written word is a relatively recent invention.

“It was invented only 5,000 years ago. It is piggybacked on to our linguistic ability, which was invented 30,000-40,000 years ago,” he says. “The consequence is that many people fail to read or spell.”

In other words, as we developed written language, our brain had to adapt and upgrade. Unlike a man-made device, where additional requirements mean that the whole thing can be pulled apart and rebuilt, the brain has had to tack on reading and spelling circuits to meet the new demands made of it. And things can go wrong, such as in dyslexia. In the search for the genetic causes of the syndrome, scientists have stumbled across a gene that could cause some of us to be bad spellers, but not to the extent that we have a clinical disorder.

Spelling ability is rooted partly in our DNA

Tony Monaco, a scientist at the Wellcome Centre Trust for Human Genetics, Oxford University, believes that our ability to spell lies partly in our DNA. “Around 60 per cent of the variation in the ability to spell lies in our genes,” he says.

But how can our genetic make-up affect our ability to remember that “I goes before E except after C”? Professor Monaco says that our genes dictate how our brain develops. In his study, his lab tracked the development of 6,000 children born in the early Nineties. Previous studies highlighted a particular gene that might affect reading ability, which goes by the rather catchy name of KIAA0319. We all carry it, but he found that 15per cent of the population have a slightly different version than normal. According to Professor Monaco, the normal version of the gene helps to guide brain cells into the cortex, the thinking part of the brain, when a child is developing in the womb. When the gene is different, however, it is unable to properly fulfil its function; brain cells get lost on the journey and end up in the wrong place. “This may disrupt the processing of information,” he says.

But what exactly is going on in our brain when we are asked to spell a word? Considering that we've had 5,000 years to figure this out, we are still pretty much in the dark as to how it handles spelling. What we do know, says Professor Stein, is that there are two main processes at work. The brain thinks of what the word looks like - how it appears on the page - and how the word sounds - its phonology. The contributions of each of these factors to spelling is a subject of fierce debate, with some arguing that the visual component is key and others championing the sound of the word as most important.

What the experts do seem to agree on is that the visual and phonetic information are fed into our mental dictionary, our lexicon. This is in an area just above our ear, called the angular gyrus. Processing all the visual and phonetic information, it quickly tells us how to spell the word. This information then zips across to the part of the brain that controls movement and we write or say the word.

The brain's spelling circuitry is located in its left side, probably because it is more efficient to have our mental dictionary in close proximity to the areas that control speech and writing. However, in left-handed people, these areas are usually on the right, as these tasks are performed on this side. But why do some words prove harder to spell than others? After all, who hasn't at some point tripped over the spellings of accommodation or embarrassed? These words are difficult because they have illogical spellings, and simply don't follow the rules, says Stein.

Irregular spellings use more brain power

In a study last year at Dartmouth University, New Hampshire, researchers found that irregular spellings, such as yacht, use more brain power than words that sound as they are spelt, such as blink. But all our brains are wired differently. Some people have a stronger visual area and can easily see in their mind's eye how a word is spelt, whereas others have a stronger phonological area; they are better at breaking down the word into its composite sounds.

The former group tend to be better spellers. But how do you know which group you fall into? Professor Stein says: “Take the word Tegwop. It's a non-word, but if you use phonology more than visual factors, you can spell it by translating the word into sounds. If you are a visual person, and have never seen that word written on the page, then you'd have problems spelling it.”

The realisation that everyone's brain is slightly different is influencing how children are taught to spell. Professor Stein says that traditionally children were either taught to memorise how a word

looks on the page, or to learn the various sounds that make up the word. For example, cat is pronounced k/ah/t. However, teaching only one method isolates some children, making it difficult for them to learn how to spell. “The best teachers know that you have to teach both methods and adapt to the skills of the individual child. If you only use one method - for example, the visual ‘look and say' technique - it can be a disaster for children with a poor visual area, and a stronger phonetic area,” he says.

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