

Winner of General Category – National Brain Science Writing Prize 2008
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On the tip of your tongue...



British actress. Lives in New York. Starred in Titanic.

I had one of those embarrassing forgetting-someone's-name moments the other day – the kind where you definitely know who someone is but you simply cannot summon the name.

It was while I was watching the film *The Holiday* that the name of a British actress in it eluded me. I could access various pieces of information, such as she lives in New York and was the leading lady in Titanic. I felt foolish because I really did *know* her name. Experimental psychologists call these phenomena 'tip-of-the-tongue' experiences, or TOTs, and they are providing a useful target for research into normal healthy ageing.

As we age, our brain gradually shrinks in size. Specifically, the grey matter in the brain, which contains our neural cells, degenerates. White matter regions, which connect grey matter, also decrease as we get older. Ageing is also associated with a decline in some cognitive abilities, for instance the familiar failings of short-term memory and the increasing difficulty of learning new things in old age.

But intriguingly, ageing is not all bad news for our brain's faculties. As we get older we become better at solving problems and both our general knowledge and vocabulary actually increase into very old age. It is also interesting that individuals differ greatly in how their cognitive abilities change with ageing: some people suffer extensive cognitive decline but others do not. This is not accounting for unhealthy or 'pathological' ageing, such as dementia, which is a separate area of study.

Professor Lorraine Tyler, who runs the Centre for Speech, Language and the Brain at the University of Cambridge, uses differences in language function to study ageing in healthy volunteers. Recently her research team studied the effects of TOTs in 19 to 88 year olds by displaying pictures of famous faces that were likely to generate TOTs.

They found that the number of TOTs that we experience increases with age. A Magnetic Resonance Imaging brain scan showed that an increase in TOTs correlated with reduced activity in a deep brain structure called the left insula.

Some research suggests that the insula is involved with retrieving the sound of words, or their phonology, although further studies are needed to be sure the insula is not involved in accessing information. If it does help us retrieve the phonology of words, then it seems that older people still have access to most of the information about the TOT but simply cannot access the sound of the word.

So what can we do about these distressing TOTs? The most important advice is to relax – the increase in TOTs as we get older is not a sign of impending dementia or any other problem. Professor Tyler recommends, from experience, trying to think ‘off-target’ when you are experiencing a TOT: “try expressing yourself in a different way. The word that you are looking for often comes to you.”

To reduce the chance of future TOTs, and to maintain our cognitive abilities generally, we need to eat healthily, take aerobic exercise, and keep busy with challenging work and learning new skills. Tyler believes that the secret to keeping up good cognitive performance is to think positively about the process of ageing: “I think that people who try to do something for themselves have a positive attitude, and that in itself is going to make the quality of their life better.”

Research into healthy ageing will become increasingly important with our ageing population. In 2002 the life expectancy at birth in the UK was 76 years for men and 81 years for women – in 1901 it was 45 and 49 years, respectively. We currently know surprisingly little about what normal ageing is like. Why do people of the same age differ in their cognitive abilities? How do changes in brain structure with ageing relate to changes in cognitive function? Dr Meredith Shafto, a research associate working with Tyler, points out: “People are much more aware of what is normal in children, but people do not know what to expect when you are 75.”

Tyler’s group will now begin to combine evidence from different research areas to provide a more complete picture of ageing.

And in case you are having a TOT moment – the actress is Kate Winslet.