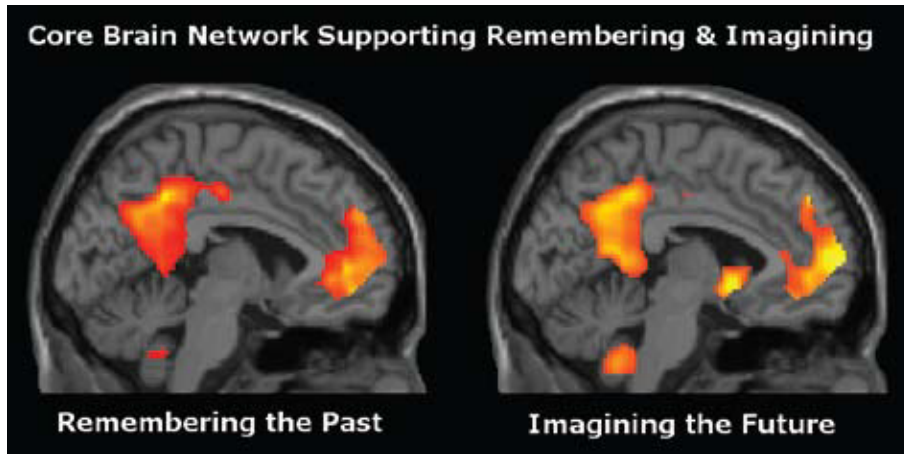


# Remembering the future



Memory lies at the base of our identity. What we remember is a powerful determinant of who we are. Judy Wilford speaks to two researchers who are gaining exciting new insights into the meaning and purpose of memories.

What do we do when we plan a party?

We think of other parties we have given or attended. We think of food, of flowers, of colour and music and lighting; perhaps we experiment mentally with the best arrangement of furniture or imagine a convivial flow of people to and fro through doors to a deck.

And of course we consider the friends we might invite, their personalities and their compatibilities. Will they argue, flirt or fight? Will they love or hate one another?

What we are doing here is drawing from a variety of personal memories to create an imagined scenario of a future event.

And this habit, according to two researchers from the Department of Psychology at The University of Auckland, might well be at the heart of what it means to be human.

Dr Donna Rose Addis completed her BA in Psychology and her MA in cognitive neuroscience at Auckland, following this with a PhD at the University of Toronto and three

years as a postdoctoral fellow at Harvard.

Since returning to take up a lectureship at the University, she has joined her expertise with that of Professor Michael Corballis (University of Auckland) and Professor Daniel Schacter (Harvard University) for a three-year, Marsden-funded study of the links between memory and imagination and the peculiarly human facility for the mind to move between them.

The human mind, says Michael, flows constantly on a continuum between the remembered past and the imagined future. In that sense all of us are “mental time travellers”.

Could it be that the function of personal memory is in fact to help us plan and create our lives?

Basically humans have two kinds of memories, Michael explains. “There’s remembering, which is your actual memories of what you’ve seen and done – often called episodic or autobiographical memory. The other is a form of memory that we like to call ‘knowing’, so you may know for example that Paris is in France, that Christmas is in December and Shakespeare wrote *Macbeth*.”

This kind of knowledge also encompasses skills, Michael adds, like the memory of how to read, ski or play the violin.

But one question Michael, Donna and other psychologists find intriguing is why autobiographical memory is so much more fragile than the “knowing” kind, with people brain-damaged through accidents or dementia retaining knowledge (sometimes called semantic memory) long after personal memories are gone. (There are even

documented cases of brain-injured children who attended school without any memory of being there, but retained the skills and facts they were taught from day to day).

Even in healthy people, episodic memory tends to be much less accurate than “knowledge”, which is evident to anyone speaking to witnesses of an accident or a crime – and which presents a puzzle if the function of memory is seen as autobiographical.

However, if the purpose of personal memory is not about reproducing the past but about using it to construct the future, then flexibility becomes essential, even if it comes at a cost of accuracy and results in greater vulnerability.

As Donna explains, when she thinks with pleasure of introducing her cat – (still in quarantine in Boston at the time when she was speaking) to her grandmother who lives in Auckland – she conjures up an imaginary picture by bringing together memories from two different countries and from widely varying times. She also incorporates some information she “knows”, such as the date the cat is arriving and what the temperature is likely to be at that time.

What we need therefore is not a memory like a videotape, which plays back a recorded and immutable experience, but a mind which gathers information from a myriad of memories to create new scenarios of possible futures.

To investigate the mental activities of remembering and imagining, Donna uses magnetic resonance imaging (MRI), which uses colour coding to show the areas of greatest neural activity, measured by the increased flow of blood to support it.

Through studies of this kind she has already confirmed that memories of a single event are not stored together but are “compiled” through an “act” of memory that brings together information from different parts of the brain.

She has also shown that the hippocampal region of the brain (traditionally seen as the seat of memory) activates in a very similar way for a person remembering the past or imagining the future. The colour-coded record of brain activity maps very closely from one to the other, with differences arising mainly in the detail.



For the Marsden study Donna (who is principal investigator) and Michael will continue to explore the nature of brain activity in remembering and imagining, and the overlap between them.

This type of research offers insights not only into conditions such as Alzheimer’s disease, which causes memory loss, or temporal lobe epilepsy, which often results in damage to the hippocampus, but also into the processes of healthy ageing as they relate both to memory and imagination.

“We know the hippocampus atrophies with age and is no longer fully functional,” says Donna. “These changes which are specific to the hippocampus make it harder to bring together the fragments stored in different parts of the brain.”

And in fact Donna, with colleagues Daniel Schacter and Alana Wong from Harvard, has found that when younger and older adults are asked to describe their experiences, older people tend to rely more on facts and events than on painting a vivid picture with context, dialogue and colours. In other words, as the autobiographical memory fails, they draw in more “knowledge” to augment their descriptions.

“This is a qualitative change, affecting the imagination as well as the memory. Past and future events are more richly detailed in the accounts of young adults,” says Donna.

“Though this may not necessarily be to the detriment of older people,” the 30-year-old adds. “Perhaps they don’t have the same need to look to the future.”

Michael Corballis believes the links between the memory and imagination are unique to human beings and are fundamental to human culture.

“Mental time travel causes trouble,” he says with a smile, “because it makes us understand we’re going to die. It can also be seen as underlying the development of religion, since religious beliefs offer us ways of imagining that our mental life may continue forever.”

In addition he believes it underlies our passion for storytelling and our enjoyment of gossip.

“That’s why we’re obsessed with fiction,” says Michael. “It’s why we watch soap operas, go to plays and read novels – because they give us information about how people behave and how the world is.

“And I think all those stories are very adaptive. They allow us to plan our lives.”

From left: Professor Michael Corballis and Dr Donna Rose Addis