

KEVIN MALLIA/PLANET PICTURE



Left hand of darkness

Past is a blur if the right side of your brain is faulty

DRAW a line across a page, then write on it what you had for dinner yesterday and what you plan to eat tomorrow. If you are a native English speaker, or hail from pretty much any European country, you no doubt wrote last night's meal to the left of tomorrow night's. That's because we construct mental timelines to represent and reason about time, and most people in the West think of the past as on the left, and the future as on the right.

Arnaud Saj at the University of Geneva, Switzerland, and his colleagues wondered whether the ability to conjure up a mental timeline is a necessary part of reasoning about events in time.

To investigate, they recruited seven Europeans with what's called left hemispatial neglect. That means they have damage to parts of the right side of their brain, limiting their ability to detect, identify and interact with

objects in the left-hand side of space. They may eat from only the right side of a plate, shave just the right side of their face, and ignore numbers on the left side of a clock.

The team also recruited seven volunteers who had damage to the right side of their brain but didn't have hemispatial neglect, and seven people with undamaged brains.

All the volunteers took part in a variety of memory tests. First, they learned about a fictional man called David. They were shown pictures of what David liked to eat 10 years ago, and what he might like to eat in 10 years' time. Participants were then shown drawings of 10 of David's favourite foods, plus four food items they hadn't seen before. Participants had to say whether it was a food that David liked in the past or might like in future. The tests were repeated with items in David's apartment,

and his favourite clothes.

People with hemispatial neglect could remember just as many items as the other two groups of volunteers. However, of these items, significantly fewer were from David's past than his future. They were also more likely to make mistakes about items when they were from the past. In other words, people with hemispatial neglect have trouble imagining the left side of their timeline, and consequently assign past events to the future (*Psychological Science*, doi.org/qgd).

Together these results suggest that concepts of time and space share neural underpinnings in the brain, and that the ability to represent space in the mind's eye is vital to our ability to remember and reason about events that occur along that timeline.

It would be interesting to see whether people with neglect of the right space have trouble with events that are supposed to happen in the future, says Saj, but these kinds of symptoms are rare since the brain areas that represent space are predominantly in the right hemisphere.

"This adds nicely to the growing body of research on spatial representations of time," says Rafael Nunez, who

"They have trouble imagining the left side of their timeline, and assign past events to the future"

studies embodiment of time at the University of California in San Diego.

"It gives us an understanding of the representation of time in humans," says Saj. His team will now investigate how people with spatial neglect represent their own perception of space and time. "They get bored less than others in hospital, and the time spent in hospital seems shorter to them," he says. Raj's team will test whether these people experience a compression of "personal time".
Helen Thomson ■

How to turn back the clock on ageing

IMAGINE if we could turn back time. A team that has identified a new way in which cells age has also reversed it, giving old mice younger bodies.

One way mammalian cells produce energy is via aerobic respiration. This takes place mainly in mitochondria - the powerhouses of cells. While mitochondria carry their own genomes, some cellular components needed for respiration are produced by the nucleus, so the two must coordinate their activities. As we age, mitochondrial function declines, which can lead to disease.

To investigate why, Ana Gomes at Harvard Medical School and her colleagues compared levels of messenger RNA - molecules that convey genetic information around a cell - for the cellular components needed for respiration in the skeletal muscle of 6 and 22-month-old mice.

Levels of mRNA in the nucleus were similar in young and old mice, while levels in the mitochondria decreased with age.

Similar changes were seen in mice lacking a protein called SIRT1. These mice also had higher levels of a protein produced by the nucleus called HIF-1-alpha. This suggests that communication between the nucleus and the mitochondria depends on events involving both these proteins. As long as SIRT1 levels remain high, this type of ageing is kept at bay. But SIRT1 levels are controlled by another molecule called NAD⁺, and crucially that declines with age, leading to a breakdown in communication.

To see if they could fix this breakdown, the team injected the old mice twice daily for a week with a molecule known to increase NAD⁺.

At the end of the week, markers for muscular atrophy and inflammation had dropped and the mice developed a muscle type common in 6-month-old mice (*Cell*, doi.org/qpb). "It gives us a new pathway to target that can reverse some aspects of ageing," says Gomes. Laasya Samhita ■

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BREAKING RELATIVITY

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The fake past of an island paradise

SHARPER SURGERY
Anaesthetic and scalpels

OFF THE BOOZE

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