

1 Look ahead, look back

READING

Power up

1 Work in pairs and discuss the questions.

1 Think of the memories you have. Which is the:
A earliest? B happiest? C scariest? D most exciting?

2 What kinds of things do you find:
A easy to remember? B difficult to remember?

2 Read the quote. What do you think it means?

Forgetfulness is one of the most important things our brains do.
"Forgetting is one of the most important things our brains do."

Read on

3 Read the article. Why is the documentary called *Memory Hackers*?

exam tip: gapped text

There will be content clues in the paragraph before and/or in the paragraph after the gap to help you.

Look at the highlighted sections in the paragraph i of the article on page 9 and the highlighted sections in paragraph G. What are the content clues?

4 e Read the article again and choose from the paragraphs (A-G) the one which fits each gap (1-6). There is one extra paragraph which you do not need to use.

5 Match the words and phrases in bold in the article with the meanings (1-8).

1 a special area or field	5 arrival
2 of today/the present	6 making something easier
3 imperfect	7 opening opportunities for
4 changing slightly	8 highly advanced, the latest

Sum up

6 Work in pairs. Read the article again and give a short summary of what it says about these topics.

1 the way memory and recall used to be perceived 2 the way they are perceived today
3 the role of forgetting

Speak up

7 Read the posts about the article. Do you agree with either of them? Why/Why not? How do you feel about the points raised in the article?

BaileyBoy Wow, mind-blowing stuff! Incredible they can do these things – loads of memories I'd really like to erase! And how this can help people with problems – really, really good use of scientific progress.

Pushko3 Don't know if anyone else agrees, but this scares me silly. Once they start, isn't it a slippery slope to mind control?

A This understanding has been crucial in enabling scientists to start manipulating memory in quite spectacular ways, yet none of this would be possible without enormous advances in technological equipment. In *Memory Hackers* we are shown how the advent of imaging tools – PET scans, TMS, fMRIs – and psychopharmacology are facilitating new ways to chart memory. On a positive note, this is paving the way for radical treatments of disorders such as addiction, phobias and PTSD.

B What is perhaps more unnerving is London South Bank professor Julia Shaw's study into false memories, in which she managed to convince her subjects to remember doing things they hadn't actually done in incidents that had never occurred. Quite amazingly, she persuaded them that they had committed crimes in the past that required police intervention.

C Three people who feature in it are Jake Hausler, Merel Kindt and Julia Shaw. Jake, at eleven years old, has near total recall of every day of his life since he was eight. In tests, Jake could recall what he had been doing at particular moments three years previously.

D It has always been thought that memory is a recording device, its purpose being to file away and later allow us to recall everything that happens in our lives, rather like a library. When we recall a memory, we go into the brain library, take out a file, look at it and then put it back in the same place. The files may get a little dusty over the years, but they are permanent and fixed.

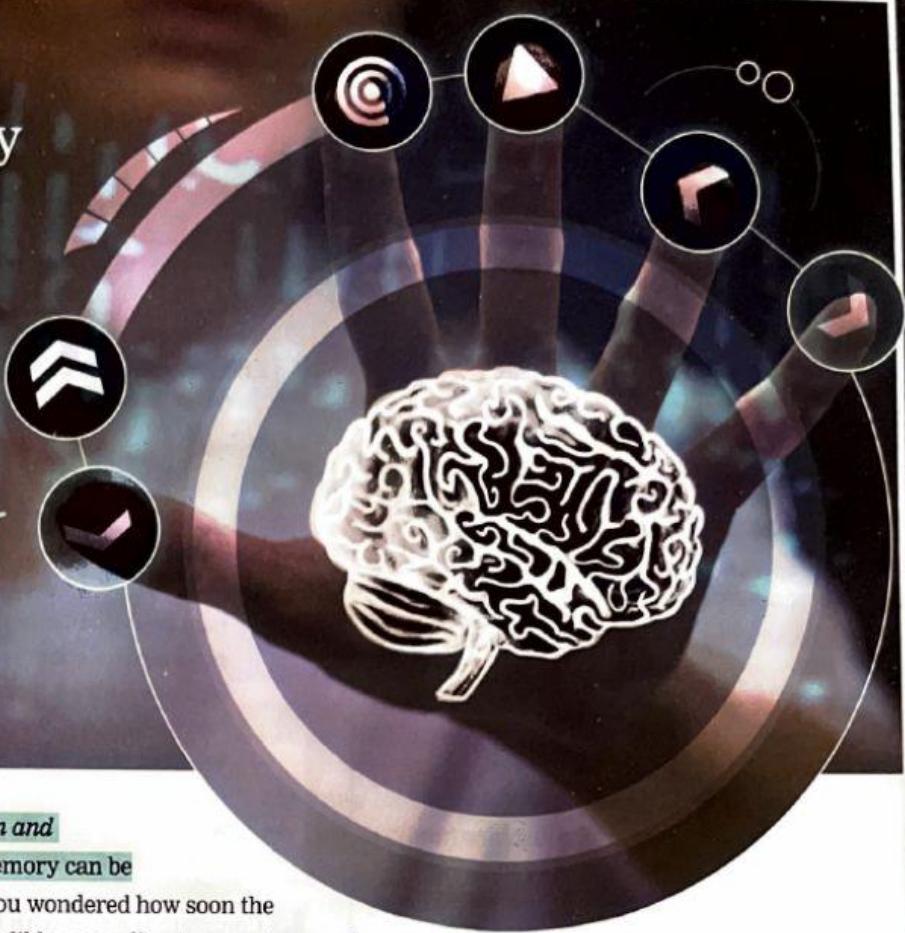
E As a result, it was discovered that the same area of the brain is used to remember the past and imagine the future, and scientists think that there is now biological proof that we use past experience to inform our future decisions. The following section of the documentary explains how.

F In one of the most fascinating moments of the documentary, a mouse is put into a totally new, barren environment where it is worried and refuses to move. A switch on a laser machine introduces a previously happy memory to the mouse and it scampers around contented, showing relaxed, normal behaviour. Science fiction? No, not at all. It's happening here and now, as *Memory Hackers* shows.

G The idea of scientists being able to erase and replace memories at will used to be considered an impossibility, exclusively in the realm of science fiction. However, sweeping advances in technology, neurochemistry and cognitive science are redefining what memory is as well as how memories can be altered. The impossible is fast becoming possible.

Implanting false memories is clearly now possible

Memory Hackers



Remember sci-fi films like *Total Recall*, *Inception* and *Eternal Sunshine of the Spotless Mind*, where memory can be manipulated at the touch of a switch? Perhaps you wondered how soon the events portrayed might ever really happen. Incredibly, according to recent research, the era of memory manipulation is not very far off at all.

1

An amazing new documentary, *Memory Hackers*, takes us through the scientific breakthroughs over the last seventy years that have led to our **current** understanding of what memory is – where and how long-term memories are formed, stored and recalled. And it's really quite scary.

2

However, new research shows that this notion of memory is **flawed**. To start with, there is no central memory bank; elements of memories are stored separately from each other so that everything associated with a particular memory – the smells, sounds, emotions, physical touch, pictures, etc. – are held in different areas of the brain, and it is only in the act of recalling that they are all brought together. It now appears that every time we recall a memory, aspects of that memory can change slightly. Memories are flexible. The parallel would be more like bringing up a file on the computer, **modifying** it slightly and then saving it to the hard drive.

3

Progress driven by such advanced and specialised devices is also helping us to glimpse the future with **cutting-edge** research such as optogenetics, which allows researchers to trace specific memories in rodents that have been genetically modified for this purpose, and manipulate them with lasers.

4

The biggest challenge to the producers was to build a narrative, and not simply present interesting facts about memory. They found the best way into the project was to focus on the people behind some of the most provocative discoveries, both researchers and subjects, and this gives the documentary a very human touch and feel.

5

Merel, a professor from the University of Amsterdam, succeeded in erasing spider phobias in patients by manipulating the fear memory the subject had associated with spiders. Since childhood, every time the man saw a spider, he would freeze and his heart would race. Within a very short time he was actually touching and stroking a tarantula. That fear had gone.

6

Implanting false memories is clearly now possible and results like these will have a wide-ranging ripple effect, from causing police to question the reliability of eyewitness testimony to opening up discussions on the ethics of memory manipulation. However, the documentary concludes that the role of forgetting is still vital to our survival. We need to be able to forget the unpleasant events in our lives in order to move forward – unlike Jake who remembers everything – from the happiest times to the worst times, the memories  **LIVE WORKSHEETS**