KNOW WHEN TO LEARN

Older adults have morning brains. A study on a group of people aged between 60 and 82 at the Rotman Research Institute at Baycrest Health Sciences in Toronto, Canada, found they were better able to focus and ignore distractions, and did better at memory tests, between 8.30 am and 10.30 am than between 1 pm and 5 pm. In fact, fMRI scans revealed that in the afternoon, these people’s brains were “idling” – they had switched to the so-called default mode, associated with daydreaming. In younger adults, by contrast, areas related to the control of attention were still very active right into the afternoon.

However, to get the most from their efforts, younger people can time their learning, too. Another study found that 16 and 17-year-old girls performed better on tests of factual memory if they studied the material at 3 pm rather than at 9 pm, but acquired skills involving movements faster if they practised in the evening. “The results suggest it might be better to use the afternoon for studying languages, and the late evening for playing piano or another musical instrument,” says Christoph Nissen at the University of Freiburg in Germany.

Why should timing matter? We know that sleeping after learning a new fact or skill helps consolidate memories. Nissen suspects that the “critical window” between learning and sleep is shorter for movement-related learning than for other types of memory. Whether adults can benefit as much as teenagers from these windows isn’t clear. “There is evidence that adolescents have a higher capacity to learn – and they sleep better,” he says.

KNOW IT ALL

It’s never too late to learn something new, but what’s the best way to go about it, wonders Emma Young.

Even when school exams are just a distant memory, our thirst for knowledge goes on. Whether we are after a new skill or fluency in another language, want to play a musical instrument or explore a new passion, we are lifelong learners. Even if we simply need to bone up on trivia to win the pub quiz or impress someone we fancy, our need to know is never-ending. So you would think we’d have learning down to a fine art. In fact, some of the most common techniques are pretty useless (see “What doesn’t work”, page 31). But the good news is we can share some of the secrets of successful learning, and no matter what your age or ability, they can work for you.
LEARN WITHOUT LEARNING

It sounds too good to be true, but learning needn’t be hard work. You can even do it when your mind is on something else. Beverly Wright at Northwestern University in Evanston, Illinois, asked one group of volunteers to practise distinguishing between sounds of a very similar frequency. Another group spent half the time in active practice, and the other half just hearing the sounds in the background while they performed a written task. Both groups scored about the same on a final test – but only if the passive learning happened within 15 minutes of the active session, the effect vanished entirely if the delay was longer than 4 hours.

What might be happening? Wright thinks active training taps the neural circuitry involved in a particular task, and that this state continues for some time after the training ends. While it lasts, similar stimulations to those that were being learned will be processed by the brain “as though they are occurring during active training”, she says.

So far, Wright and her team have investigated only the learning of a skill rather than facts or events. But Lynn Hasher at the University of Toronto, Canada, and colleagues have found that a spell of passive learning following active study can also help older adults learn a list of words. The volunteers in her study reported that during the passive phase, they didn’t even notice that the words were being repeated. If you want to give it a try, take note: passive learning is more effective while you are doing something relatively undemanding. So you might want to listen to foreign vocab as you get the dinner ready, rather than while writing emails.

USE DISTRACTIONS

Find your attention wandering? Use this to your advantage. “People have an underlying assumption that divided attention is bad,” says Jo Hyun Song at Brown University in Providence, Rhode Island. It’s true that if you frequently break off from studying to send a text message or to focus on a tune on your headphones, odds are you won’t learn as well as you would in uninterrupted silence. “But learning has a later, skill-retrieval part,” she adds. “People hadn’t studied the role of divided attention in memory recall later!” Doing just that, Song found that distraction while learning can be beneficial – if you are also going to be distracted when you have to use what you have learned.

It is common knowledge that context can boost learning. If you study a list of words while smelling vanilla, for example, you will probably remember more of them if the scent of vanilla is in the air during recall. Song found that divided attention can itself act as a powerful context. In her studies, people who were distracted during learning and recall performed just as well as those who weren’t distracted on either occasion, and better than people who were distracted in only one situation. It didn’t matter whether or not the distractions were the same on both occasions, but the degree of distraction had to be similar. Intriguingly, Song also found that divided attention was among powerful learning aid than environmental contexts such as a smell.

There are important implications, she says. “In training, people should consider where they are going to have to remember what you have learned in an environment where they are likely to feel distracted – in a packed foreign city or a noisy pub on quiz night – you would actually do better to have distractions while you are learning.

WHAT DOESN’T WORK

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CHILL OUT

If sleep consolidates memories, would taking a break from studying have a similar effect? To find out, Lila Davachi at New York University scanned people’s brains while they looked at a series of images, then asked them to think about whatever they wanted. During this rest period, there was increased activity in the hippocampus (involved in memory) and “thinking” regions in the cortex. What’s more, the greater the activity in both regions, the better an individual remembered the images they had seen when tested later. Davachi thinks her work shows the consolidation of memories during rest.

If you have just studied a list of vocabulary or perhaps tried to memorise some key historical dates, then taking a proper break afterwards should help you to remember this information, she says. “This is something we don’t appreciate much, especially when today’s information technologies keep us working round the clock.”

But what counts as a “proper break”? Davachi has been working on this too. What she has found, but not yet published, is that a rest can help consolidate memories as long as it activates different populations of neurons in the brain, or whole brain regions, from those that were active during the learning period. So if you have just put in some hard mental study, going off to practise your tennis backhand should do the trick. Having said that, a little lie-down might seem more tempting and may be even more productive. We still don’t know the relative benefits of chilling versus taking a nap, when it comes to learning.

PRETEND TO TEACH

You are likely to remember something better if you think you might have to teach it later. Kornell discovered this when he gave students at Williams College 10 minutes to study a 1500-word passage about The Charge of the Light Brigade. Those who were told beforehand that they would have to pass on what they had learned to someone else later remembered more points from the text, and their memories were better organised, than those who thought they were simply going to be tested on the text. Better yet, independent learners can trick themselves into reaping the benefits of this insight. “Our research shows that pretending that you’ll have to teach will help you learn in the same way,” says Kornell. And if you actually do the teaching, all the better. There are many well-known cognitive benefits to asking yourself whether you can recall what you are learning in your own words, he adds. “It leads to active retrieval from memory, and helps with organising one’s thoughts as well as identifying knowledge gaps that one needs to fill.” Kornell and his team note that teachers often instruct their students to prepare for a test, but this doesn’t encourage them to pick the learning strategy that should ultimately lead to a better score.