How your brain likes to be treated at revision time

Interconnected neurons transfer information using electrical pulses. Photograph: Alamy

If you're a student, you rely on one brain function above all others: memory.

These days, we understand more about the structure of memory than we ever have before, so we can find the best techniques for training your brain to hang on to as much information as possible. The process depends on the brain's neuroplasticity, its ability to reorganise itself throughout your life by breaking and forming new connections between its billions of cells.

How does it work? Information is transmitted by brain cells called neurons. When you learn something new, a group of neurons activate in a part of the brain called the hippocampus. It's like a pattern of light bulbs turning on.

Your hippocampus is forced to store many new patterns every day. This increases hugely when you are revising. Provided with the right trigger, the hippocampus should be able to retrieve any pattern. But if it keeps getting new information, the overworked brain might go wrong. That's what happens when you think you've committed a new fact to memory, only to find 15 minutes later that it's disappeared again.

So what's the best way to revise? Here are seven top tips to get information into your brain and keep it there.

**Forget about initial letters**

Teachers often urge students to make up mnemonics – sentences based on the initial letters of items you're trying to remember. Trouble is, they help you remember the order, but not the names. The mnemonic Kings Prefer Cheese Over Fried Green Spinach can help you recall the order of taxonomy in biology (kingdom, phylum, class, order, family, genus, species) but that's only helpful if you're given the names of the ranks.

The mnemonic is providing you with a cue but, if you haven't memorised the names, the information you want to recall is not there. You're just giving your overflowing hippocampus yet another pattern of activity to store and retrieve.

**Repeat yourself**
Pathways between neurons can be strengthened over time. Simple repetition – practising retrieving a memory over and over again – is the best form of consolidating the pattern.

**Use science to help you retrieve info**

Science tells us the ideal time to revise what you've learned is just before you're about to forget it. And because memories get stronger the more you retrieve them, you should wait exponentially longer each time – after a few minutes, then a few hours, then a day, then a few days. This technique is known as spaced repetition.

This also explains why you forget things so quickly after a week of cramming for an exam. Because the exponential curve of memory retrieval does not continue, the process reverses and within a few weeks, you have forgotten everything.

**Take regular breaks**

Breaks are important to minimise interference. When your hippocampus is forced to store many new (and often similar) patterns in a short space of time, it can get them jumbled up.

The best example of this is when you get a new telephone number. Your old number is still so well-entrenched in your memory that remembering the new one is a nightmare. It's even worse if the new one has a few similarities to the old.

Plan your revision so you can take breaks and revise what you've just learned before moving on to anything new.

**Avoid distractions**

Attention is the key to memorising. By choosing to focus on something, you give it a personal meaning that makes it easier to remember. In fact, most of our problems when it comes to revision have very little to do with the brain's capacity for remembering things; we just struggle to devote our full attention to the task in hand.

Playing music while revising will make your task harder, because any speech-like sounds, even at low volume, will automatically use up part of the brain's attention capacity.

**Sleep is vital**

We spend approximately a third of our lives sleeping and it's never as important as during revision time. Sleep plays a critical role in memory consolidation – this is when the brain backs up short-term patterns and creates long-term memories. The process is believed to occur during deep sleep, when the hippocampal neurons pass the patterns of activity to another part of the brain called the neocortex, which is responsible for language and the generation of motor commands.

Recent research in *Nature Neuroscience* has shed new light on how memories are decluttered and irrelevant information is deleted during this process. This results in the important memories (the pathways that have been strengthened through repetition) becoming easier to access.

**Control your emotions**

We remember emotionally charged events far better than others, and this is especially the case if the emotion was a positive one. It is not always possible to have warm feelings about your revision, but if you can associate a particular fact with a visual, auditory or emotional experience from the past, then you have a better chance of remembering it, as you have created multiple pathways for retrieval.
Try to reduce anxiety, because it uses up working memory, leaving a much smaller capacity available for processing and encoding new information.