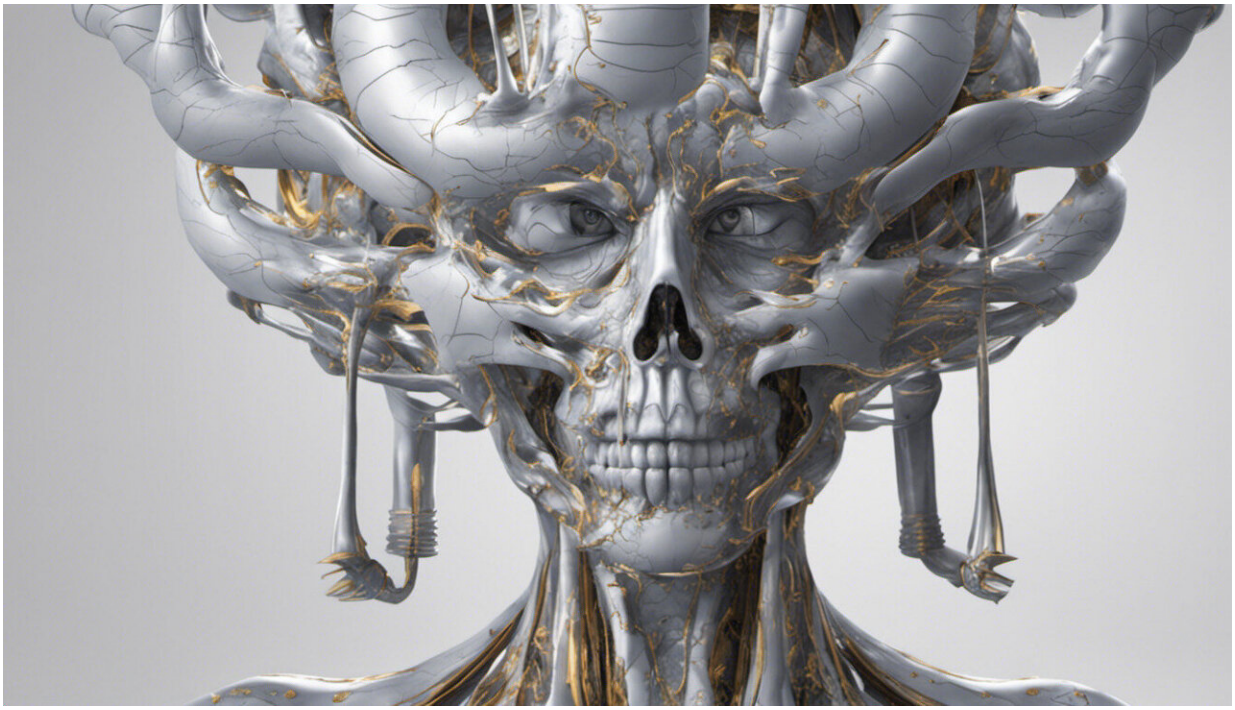
New research shows the brain can be tricked into feeling pain relief

August 31 2017, by Giuliana Mazzoni



Credit: AI-generated image (disclaimer)

Pain is never a nice things to experience, but it is one of the most useful bodily signals we have. It acts like an alarm system – sending an immediate message for highly harmful and potentially fatal conditions – so you know that when you touch that boiling hot pan, you should take your hand away very quickly.

Pain is also a highly subjective experience – people can experience different levels of pain in the same situation. So while some people tend to have a very low pain threshold – for example, needing anaesthetic when having dental cavities fixed – others seem to have no problem when they have teeth removed.

These individual differences seem to have a genetic basis, but there are also things that can help to "manipulate" the mind and change the way we feel pain – such as a sudden distraction. This could be as simple as making someone laugh, as this shifts attention away from the pain, helping to reduce its perceived intensity and unpleasantness.

And new research shows that as well as tricking the mind into feeling distracted from pain, the brain also seems to be able to be tricked into experiencing pain relief.

The power of pain

On a brain scan, the areas that light up when pain is felt are in the frontal brain regions. These are the areas of the brain that regulate the intensity and quality of the pain experience. They are also the brain areas that are responsible for setting expectations – which is no coincidence. Expectation plays a big part in how we perceive pain and the intensity with which it is felt.

So if you are waiting for an injection that you are told will be really painful, you are likely to experience it in this way. And on the flip side, if something painful happens unexpectedly – such as stubbing your toe – it might take a bit of time before you realise the actual intensity of the pain.

In this way, the now somewhat famous "rubber hand illusion" reveals the powerful connection between what we see and what we feel. Using a

fake rubber hand, psychologists found they could convince people an artificial arm was part of their body. For this to happen, the participants had to hide their real arm from view (under a piece of cloth) and then both their real arm and fake arm were simultaneously stroked.

A few studies have also suggested that pain – not just touch – can be perceived by the rubber hand illusion. And there are countless YouTube videos of people cringing as the rubber hand is threatened by a hammer or pricked with a needle.

Mind over matter

New research now shows how as well as being tricked into experiencing pain, the brain can also be fooled into experiencing pain relief. The recent study involved researchers carrying out the rubber hand illusion, and then using a thermode to deliver intense pain stimulation on selected sites of the real arm. This was done while a visible mock thermode was attached to the exact same sites of the rubber arm, which then lit up during the stimulation.

It was discovered that a large number of participants reported experiencing the pain as if it was coming from the rubber arm. The researchers then used a fake pain relieving cream – in other words a placebo – on the "painful site" of the rubber arm. This time round, people who experienced the rubber hand illusion also reported a decrease in pain intensity.

What this shows is that people's minds can be tricked into experiencing both pain and pain relief on a fake hand, where of course no pain stimulation, or any pain relief, were applied.

But the rubber hand illusion is more than just a great party trick, it also reveals one of the most important ideas in brain science. It shows how

multi-sensory perception can influence how we see our own body. It also reveals how what we know to be true can be overridden by the brain.

In the experiment, the brain is changing to accommodate the new rubber hand – which is called neuroplasticity. This is the idea that the brain can change in response to experience.

And in practical terms, these findings could present viable treatment and pain relief in conditions for people with chronic pain – such as phantom limb syndrome, where pain is experienced as if coming from an nonexistent limb. It could even be used in other chronic pain conditions such as fibromyalgia or complex regional pain syndrome, potentially offering hope to thousands of people whose lives are blighted by real pain on a daily basis.

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