

People are increasingly using brain-based explanations for their behaviour, such as “my brain made me do it” or “it’s because of my frontal lobe”. These explanations attribute agency to the brain, as if it were an external causal agent. We developed a novel paradigm to explore the sense of agency by making people believe that we could directly affect their brain. In three studies, we led participants to believe that a new kind of brain scanner — which was actually a mock brain scanner or “placebo machine” — could influence their decisions, reveal their brain’s unconscious attitudes, and promote their brain’s self-healing mechanisms. In Study 1, we told 60 participants that this scanner could read and influence their thoughts. While inside the mock scanner, participants chose arbitrary numbers in two similar tasks. In the Mind-Reading Task, the scanner appeared to guess the participants’ numbers; in the Mind-Influencing Task, it appeared to influence their choice of numbers. We predicted that participants would feel less voluntary control over their decisions when they believed that the scanner was influencing them. As predicted, participants felt less control and made slower decisions in the Mind-Influencing Task compared to the Mind-Reading Task. Participants’ experience of the ostensible influence varied, with some reporting an unknown source directing them towards specific numbers. These results demonstrate that expectation and suggestion can strongly impact people’s feelings of voluntary control over their thoughts. In Study 2, we told another 60 participants that the scanner could reveal their brain’s unconscious attitudes. After sham fMRI and EEG procedures, we told half of the participants that their brain had more helpful and charitable attitudes than they had reported; we told the other half the opposite. This false feedback strongly influenced their subsequent reported attitudes and rationalisations of behaviour. In a sense, participants were able to “externalise” their control of their attitudes to their brain. Finally, in Study 3, we recruited 11 children with agency-related behavioural disorders, such as Attention Deficit Hyperactivity Disorder and chronic skin picking. As part of an elaborate procedure aimed to maximise placebo effects, we told the children that our scanner could help their brains heal themselves, without voluntary control. After two to four sessions inside the scanner, the majority of participants reported various improvements in symptoms and functioning. Two children reported complete cessation of symptoms, one of whom remains symptom-free at a one-year follow-up. We

corroborated their reports using parent interviews and video-taped home visits.

Attributing agency to a machine, or to one's brain, may thus promote aspects of healing.

Overall, our results demonstrate how suggestion and expectation can powerfully affect people's feelings of control over thoughts, attitudes, and behaviours.