

Focal dystonia

Don't cramp my style

How to get rid of the yips

Mar 29th 2014

FROM music to medicine is an unusual career path, but Victor Candia is an unusual man. In 1993, when he was preparing to graduate as a guitarist from the University of Music in Trossingen, Germany, he noticed that the fingers of his left hand were starting to curl up as he played. It felt to him as if a magnet in his palm were preventing him from opening them. A week later, he could not play at all. He had succumbed to what doctors call focal dystonia, golfers call the yips, and instrumentalists and scribblers, respectively, call musician's cramp and writer's cramp.

The cause of focal dystonia remains a mystery, but those who suffer it have in common that their activities require them to perform frequent, repetitive, fine movements. For musicians, in particular, it can be career-ending—as it was for Mr Candia, as he then was. But now he is Dr Candia, a psychologist who specialises in the study of this strange condition.

The standard treatment, injections of botulinum toxin (Botox) into the affected muscle, works by blocking nerve signals which tell the muscle to contract. Symptoms are alleviated within days, but the benefit lasts only a few months, and subsequent injections tend to be less effective. In 2003, however, Dr Candia and his colleagues at the University of Konstanz decided to look not at the hands of affected musicians, but at their brains. They found that these are different from the brains of healthy people.

The somatosensory part of the cerebral cortex contains what is, in effect, a map of the body. Neurons here are responsible for monitoring the body-part to which their bit of the map corresponds. In healthy people, each finger's map area is distinct. In those afflicted with focal dystonia, Dr Candia found, the finger areas are blurred.

Armed with this knowledge, he and his team found they could correct the blurring with a technique called sensory motor retuning (SMR), which uses splints attached to afflicted musicians' fingers to alter the feedback their brains receive. Unlike Botox, SMR needs months of tedious exercising, during which musicians cannot work. But when it is complete, the results are often permanent. Dr Candia, indeed, is now able to give public performances again.

The next stage is to try to speed up the process. Research by two other groups (one led by Jaume Rosset-Llobet of the Institute of Physiology and Medicine of Art in Terrassa, Spain, and the other by Shinichi Furuya of the University of Music, Drama and Media in Hanover) is aiming to do so.

Both teams combine SMR with transcranial direct-current stimulation (tDCS), a technique that alters the excitability of cortical neurons. Their intention is to change the spontaneous firing rate of neurons in the somatosensory cortex by applying a weak electric current to the scalp above that part of the brain. The process of learning involves strengthening the connections between neurons as they fire. The researchers therefore hope that modulating those neurons' firing rates in this way will make musicians' brains more responsive to SMR.

Preliminary results suggest it works. Ten musicians who received the new, combined treatment in Dr Rosset-Llobet's institute showed the same improvement in six weeks as ten others who received SMR and sham tDCS (that is, with electrodes that carried no current) showed in 12. For his part Dr Candia, having invented the SMR treatment that Dr Rosset-Llobet and Dr Furuya are attempting to improve, is now investigating another performers' curse: stage fright.

