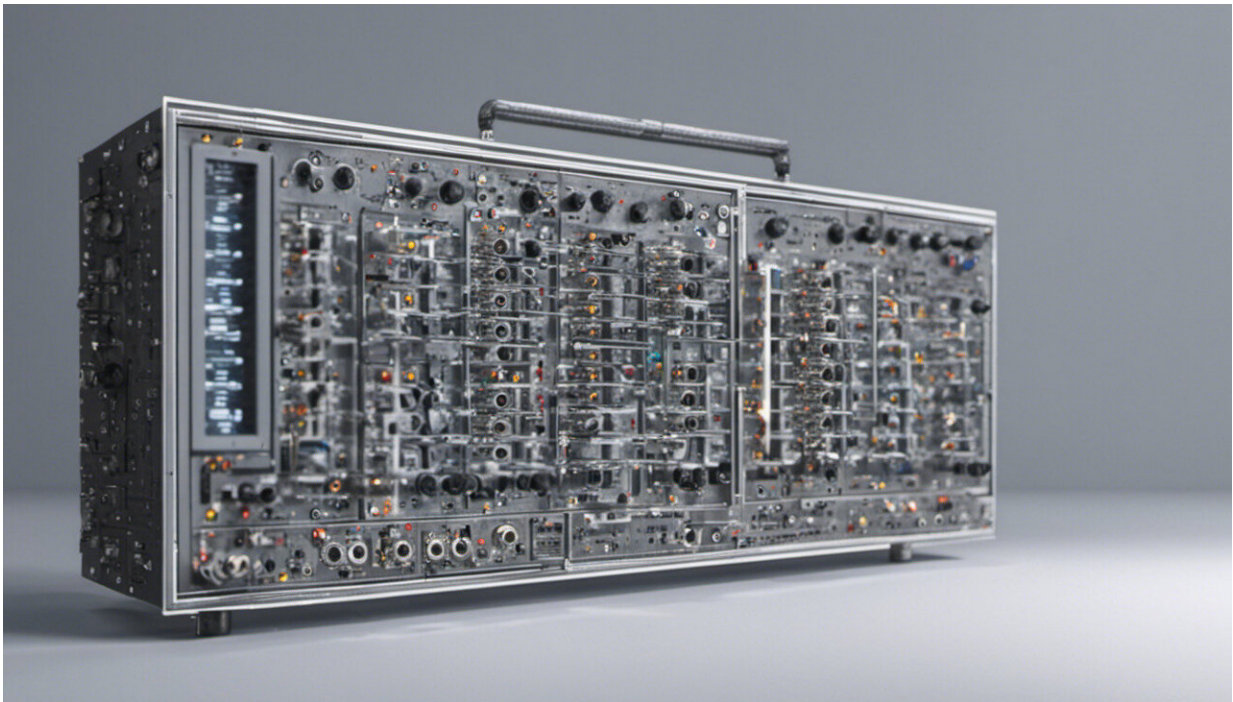


Revolutionary brain-computer interface with those in complete locked-in state

February 9 2017



Credit: AI-generated image ([disclaimer](#))

In 2009, Richard Marsh, a retired police officer suffered a massive stroke and doctors wanted to switch off his life-support. He could hear their every word but could not yell out that he was alive. The doctors simply believed he was in a permanent state of vegetative and devoid of physical feeling or mental consciousness. But Richard was very much

alive and alert to every touch. 'I had full cognitive and physical awareness but an almost complete paralysis of nearly all the voluntary muscles in my body,' says Richard.

Miraculously, thanks to the stubbornness of his wife not to quit, Richard was able to walk out of his long-term care facility four months later. And has recovered 95 % of his functionality. 'They don't know why I recovered because they don't know why I had locked-in [syndrome] in the first place or what really to do about it. Lots of the doctors and [medical experts](#) I saw didn't even know what locked-in was. No one really knew anything,' shared Richard.

Up until now, communication has remained nigh on impossible for persons suffering from complete motor paralysis but intact cognitive and emotional processing, a state referred to as complete locked-in state (CLIS).

Thanks to a brain-reading device developed by doctors, locked-in [patients](#) will now be able to hold very basic conversations. 'This is the first time we've been able to establish reliable communication with these patients. I can say that after 30 years of trying to achieve this, it was one of the most satisfying moments of my life when it worked,' shared Niels Birbaumer, the neuroscientist who led the research at the University of Tübingen, Germany.

Four patients aged 24 to 76 and diagnosed with CLIS completed over 60 sessions spread over several weeks answering personal questions with known answers and open questions all requiring a 'yes' or 'no' response. The findings shared in *PLOS Biology* demonstrate how the paralysed can indeed answer simple 'yes' or 'no' questions wearing a cap that uses infrared light to spot variations and patterns in blood flow in different regions of the brain which are ultimately deciphered by a computer.

'It's the first sign that completely locked-in syndrome may be abolished forever, because with all of these patients, we can now ask them the most critical questions in life,' underlined Birbaumer.

Such results are, potentially, the first step towards abolition of completely locked-in states, at least for patients with advanced [amyotrophic lateral sclerosis](#) (ALS). For his next project, Birbaumer now aims to create a system allowing patients to communicate more proactively, rather than merely through simple-answer questions.

The LUMINOUS project has received just under EUR 4 million to study, model, quantify, and alter observable aspects of consciousness and advance the crucial development of cognitive sciences. It will run until August 2019.

More information: Project website: www.luminous-project.eu/

Provided by CORDIS

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