Fully Implanted Brain–Computer Interface in a Locked-In Patient with ALS

<https://www.nejm.org/doi/full/10.1056/NEJMoa1608085>

10.1056/NEJMoa1608085

Basically, this states that a BCI setup was used to monitor signals in cortical regions and use those signals were used to trigger a system where an individual who was incapable of physical activity beyond movement of the eyes was then able to write individual characters using a

In this study, a locked-in patient with ALS (an individual that is paralyzed to the point of only being able to move her eyes and blink) was able to use an implanted brain-computer interface (hereafter referred to as a BCI) that monitored activity in specified cortical regions in conjunction with typing software to let the patient type letters by attempting to move her hand.

Limits to human enhancement: nature, disease, therapy or betterment?

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5635529/>

[10.1186/s12910-017-0215-8](https://dx.doi.org/10.1186%2Fs12910-017-0215-8)

Speech synthesis from neural decoding of spoken sentences

<https://www.nature.com/articles/s41586-019-1119-1>

10.1038/s41586-019-1119-1

This talks about a neural decoder that translates neural activity related to speech into synthesized speech. The device designed was capable of synthesized speech well enough to be understood by listeners in closed-vocabulary tests, as well as synthesize accurate audio “when a participant silently mimed sentences”.

A benchtop system to assess the feasibility of a fully independent and implantable brain-machine interface

<https://iopscience.iop.org/article/10.1088/1741-2552/ab4b0c>

10.1088/1741-2552/ab4b0c

This discusses the creation and implementation of a minimized benchtop brain-computer interface system with the purpose of minimizing health risks and impracticalities pertaining to the current invasive BCI systems (such as the issue of glial scarring inhibiting the reading of impulses in regions of implantation). The system did successfully achieve accurate decoding of controlled cortical activity.

Single-paradigm and hybrid brain computing interfaces and their use by disabled patients.

<https://iopscience.iop.org/article/10.1088/1741-2552/ab2706>

10.1088/1741-2552/ab2706

This article discusses non-invasive and hybrid BCI systems, as well as how they’re currently being used in medical care by patients “from severe motor- and/or communication disabilities such as fully paralyzed locked-in syndrome patients”, while also noting that demonstrations of BCI systems that are based entirely on brain activity are still relatively rare.

Reconstruction of Natural Scenes from Ensemble Responses in the Lateral Geniculate Nucleus

<https://www.jneurosci.org/content/19/18/8036>

<https://doi.org/10.1523/JNEUROSCI.19-18-08036.1999>

In this 1999 study, researchers were able to reconstruct perceived visual stimuli from cell activity in cats, including moving objects, to a sufficient point as to have the contents be recognizable.

Enhancing Nervous System Recovery through Neurobiologics, Neural Interface Training, and Neurorehabilitation

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5186786/>

[10.3389/fnins.2016.00584](https://dx.doi.org/10.3389%2Ffnins.2016.00584)

BCI: Elon Musk and the Future of Human Enhancement

<http://neurosky.com/2018/04/bci-elon-musk-and-the-future-of-human-enhancement/>

What’s the point of this essay? It’s a research paper, so I suppose the purpose of it is to compile a fair amount of information regarding the topic and represent it to readers in a logical fashion so as to serve the dual-purpose of educating those readers and demonstrating a clear understanding of the information contained by the author themselves.

Due to its close relation to the principles of transhumanism, the use of BCI technology can be split between two categories (poorly-defined as the boundary between the two may be): Therapeutic, and Enhancing. Therapeutic BCI technology is used for the purpose of returning capabilities lost due to negative abnormalities of the body (such as loss of functionality resultant from disease or genetic defect), whereas enhancement/supplemental BCI technology might be used for the purposes of augmenting existing capabilities beyond what is considered to be the average functionality for humans. One example of therapeutic BCI technology would be in the usa

Three categories – enhancement, therapeutic, and supplemental. Enhancement would be for the purposes of enhancing the natural abilities of a person to a level above the human average despite the lack of existing disfunction, such as implantation of a neural lace to do something beneficial? Not sure about an example. Therapeutic would be used for the purpose of returning approximately average levels of functionality to a human where they have lost functionality or have degraded functionality below what is considered the acceptable level for human function, such as when Vansteelsan et al. implanted a BCI to allow for a locked-in ALS patient to type responses through measured cortical function. Supplemental BCI technology would be used as an assistant to standard functionality that does not serve to enhance the functionality of the individual, but rather to provide assistance, such as with a BCI that allows the individual to control a mouse cursor with a thought or to use Google to search for information using BCI technology.

Perhaps I shouldn’t draw a line between Enhancement and Supplemental? Can’t be entirely sure that the difference is large enough to actually warrant notice.