

Controlling monkey brains and behavior with light

July 26 2012

Researchers reporting online on July 26 in *Current Biology* have for the first time shown that they can control the behavior of monkeys by using pulses of blue light to very specifically activate particular brain cells. The findings represent a key advance for optogenetics, a state-of-the-art method for making causal connections between brain activity and behavior. Based on the discovery, the researchers say that similar light-based mind control could likely also be made to work in humans for therapeutic ends.

"We are the first to show that optogenetics can alter the behavior of monkeys," says Wim Vanduffel of Massachusetts General Hospital and KU Leuven Medical School. "This opens the door to use of optogenetics at a large scale in primate research and to start developing optogenetic-based therapies for humans."

In optogenetics, neurons are made to respond to light through the insertion of light-sensitive genes derived from particular microbial organisms. Earlier studies had primarily validated this method for use in invertebrates and rodents, with only a few studies showing that optogenetics can alter activity in monkey brains on a fine scale.

In the new study, the researchers focused on neurons that control particular eye movements. Using optogenetics together with [functional magnetic resonance imaging](#) (fMRI), they showed that they could use light to activate these neurons, generating [brain activity](#) and subtle changes in eye-movement behavior.

The researchers also found that optogenetic stimulation of their focal brain region produced changes in the activity of specific neural networks located at some distance from the primary site of light activation.

The findings not only pave the way for a much more detailed understanding of how different parts of the brain control behavior, but they may also have important clinical applications in treating Parkinson's disease, addiction, depression, obsessive-compulsive disorder, and other [neurological conditions](#).

"Several neurological disorders can be attributed to the malfunctioning of specific cell types in very specific [brain regions](#)," Vanduffel says. "As already suggested by one of the leading researchers in optogenetics, Karl Deisseroth from Stanford University, it is important to identify the underlying neuronal circuits and the precise nature of the aberrations that lead to the neurological disorders and potentially to manipulate those malfunctioning circuits with high precision to restore them. The beauty of optogenetics is that, unlike any other method, one can affect the activity of very specific cell types, leaving others untouched."

More information: Gerits et al.: "Optogenetically-induced behavioral and functional network changes in primates."

[DOI:10.1016/j.cub.2012.07.023](https://doi.org/10.1016/j.cub.2012.07.023)

Provided by Cell Press

Citation: Controlling monkey brains and behavior with light (2012, July 26) retrieved 20 March 2024 from <https://phys.org/news/2012-07-monkey-brains-behavior.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is

provided for information purposes only.