The Brain Activity Map

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A proposed effort to map brain activity on a large scale, expected to be announced by the White House later this month, could help neuroscientists understand the origins of cognition, perception, and other phenomena. These brain activities haven't been well understood to date, in part because they arise from the interaction of large sets of neurons whose coördinated efforts scientists cannot currently track.

"There are all kinds of remarkable tools to study the microscopic world of individual cells," says John Donoghue, a neuroscientist at Brown and a participant in the project. "And on the macroscopic end, we have tools like MRI and EEG that tell us about the function of the brain and its structure, but at a low resolution. There is a gap in the middle. We need to record many, many neurons exactly as they operate with temporal precision and in large areas," he says.

An article published Thursday [1] in *Science* online expands the project's already ambitious goals beyond just recording the activity of all individual neurons in a brain circuit simultaneously. Researchers should also find ways to manipulate the neurons within those circuits and understand circuit function through new methods of data analysis and modeling, the authors write.

Understanding how neurons communicate with one another across large regions of the brain will be critical to understanding how the brain works, according to participants in the project. Other efforts to map out the physical connections in the brain are already under way (see "TR10: Connectomics [2]" and "Mapping the Brain on a Massive Scale [3]"), but these projects look at static brains or can only get a rough view of how regions of the brain communicate. The new project will probably start applying its novel and yet unknown technologies on simpler brains, such as those of flies, and will probably take decades to achieve its goals.

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