Deciphering Neural Codes

NSF Award: CAREER:Deciphering the Neural Code From Perception To Cognition   (Children's Hospital Corporation)

State: Massachusetts

**Congressional Districts:** Massachusetts District 08

Research Areas: People & Society

Neuronal circuits in the brain direct cognitive events, including our ability to see, feel and make decisions. Working with patients who have electrodes implanted in their brains for clinical reasons, Gabriel Kreiman of Boston's Children's Hospital has developed technology and machine-learning algorithms to decode the activity of neural signals. He has applied his technology to make significant strides towards deciphering how our brains integrate information to recognize objects, and how our brains make volitional decisions.

The ability to interrogate and decode the activity of neurons and neural ensembles in the human brain can have a profound impact on the development of brain-machine interfaces. Insights derived from understanding how human neural circuits perform cognitive computations can significantly enhance our ability to develop biologically-inspired algorithms to solve challenging cognitive tasks that require intelligence and robustness.

It is difficult to study the activity of neuronal ensembles in the human brain. While much progress has been made from studies in animal models, some aspects of cognition are easier to address and significantly more complex in the human mind. Understanding how neuronal circuits in the human brain solve complex cognitive challenges such as visual recognition, scene understanding, intelligent inference and decision-making will radically transform our abilities to design new biologically inspired technologies that show the robustness, speed and ingenuity of human performance.
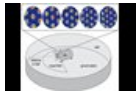
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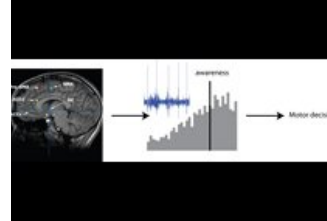
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