Allen Brain Observatory launched

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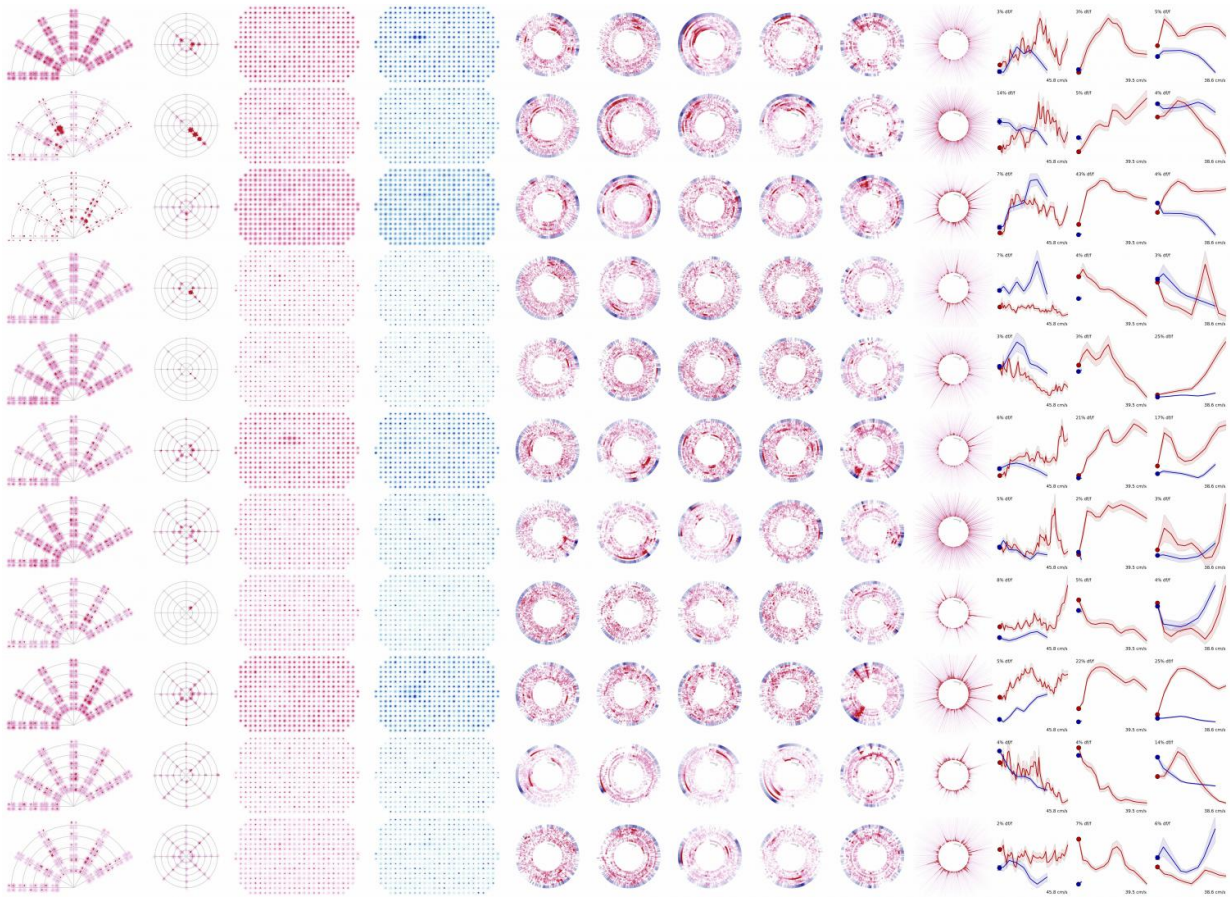

A small sample of the novel data visualizations for each of the 18,000 neurons contained in the first data release from the Allen Brain Observatory. Animals were presented with a large variety of visual stimuli to determine the "tuning," or preference, of each individual cell to visual features like motion and shape orientation, as well as complex images like natural scenes and movies that reveal integrative dynamics of visual processing. Credit: Allen Institute for Brain Science

The Allen Institute for Brain Science today announced the release of the Allen Brain Observatory: a highly standardized survey of cellular-level activity in the mouse visual system. This dynamic tool empowers scientists to investigate how circuits in the behaving mouse brain coordinate to drive activity and perception, and lays a crucial foundation for understanding perception, cognition and ultimately consciousness.

"The Allen Institute is known for our atlases—deep, high quality data sets revealing where genes are expressed and how cells and connections are arranged in the mouse and human brain," says Allan Jones, Ph.D., CEO of the Allen Institute. "With the Allen Brain Observatory, we've taken an important leap into measuring natural brain activity as it is actually happening."

The first data release of the Allen Brain Observatory is a survey of neurons in the visual cortex of mice as they respond to the presentation of a variety of visual stimuli, ranging from drifting black and white bars to film clips. The data are presented as part of the suite of Allen Brain Atlas tools in the uniform and shareable Neurodata Without Borders file format, which allows scientists around the world to easily mine and model the data. The mouse, a small rodent, is an important model system often used to understand the far less accessible and far larger human brain.

"The Allen Brain Observatory is a stunning window into the visual brain of the mouse," says Christof Koch, Ph.D., President and Chief Scientific Officer of the Allen Institute for Brain Science. "No one has ever taken this kind of standardized approach to surveying the active brain at cellular resolution in order to measure how the brain processes information in real time. This is a milestone in our quest to decode how the brain's computations give rise to perception, behavior, and consciousness. Just like in astronomy, modelers and theoreticians worldwide can now study this wealth of data using their own analysis

tools." The first data in the Allen Brain Observatory survey four areas in the mouse visual cortex at multiple depths, sampling more than 18,000 neurons in total. The mice were presented with a large variety of visual stimuli to determine the "tuning," or preference, of each individual cell to visual features like motion and shape orientation, as well as complex images like natural scenes and movies that reveal integrative dynamics of visual processing.

The data from thousands of individual cells and populations of cells are presented in a novel visualization format through the Allen Brain Atlas data portal, and are accompanied by analysis tools and access to all raw data, which allows scientists to deeply explore the rules that govern how networks of cells in the visual cortex communicate.

More than 100 people at the Allen Institute were involved in the creation of the Allen Brain Observatory, from animal care technicians to neuroscientists, engineers, microscopy experts, optical physiologists, physicists, mathematicians and computer scientists.

"The Allen Brain Observatory is a very exciting and valuable data resource for the computational and systems neuroscience community to explore the function of the primary visual cortex," says David J. Anderson, Ph.D., Seymour Benzer Professor of Biology and Howard Hughes Medical Institute Investigator at the California Institute of Technology. "The Allen Institute is uniquely equipped to provide this freely accessible resource, given the interdisciplinary teamwork involved and the large scale of the project. The web interface makes the data accessible and usable for the broader scientific community."

"Both the data and their presentation, with the extensive documentation and software development kit, are beautifully done in the Allen Brain Observatory," says Michael Stryker, Ph.D. Professor of Physiology in the Center for Integrative Neuroscience at the University of California,

San Francisco. "I predict the community will find this resource extremely useful and look forward to seeing the developments that emerge."

Understanding visual processing is a key gateway to understanding how other parts of the brain process information, and future releases of the Allen Brain Observatory will also explore the neural circuits that underlie more complex behaviors like decision-making.

"If we want to understand higher-order brain functions, we need to understand not just the individual components of the brain but how they all work together," says Koch. "The Allen Brain Observatory is an essential resource to explore how individual neurons—the atoms of perception—work together to give rise to the deepest, most meaningful aspects of experience."

Provided by Allen Institute for Brain Science