The Economist

Science

Piece of mind

Paul Allen, co-founder of the Allen Institute for Brain Science (and of Microsoft), believes a tipping-point is near in brain research

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The mystery of how the brain works is the most compelling question in science. We can discover new planets around distant stars and find water on Mars, but over 95% of the workings of the brain remain unexplored and unexplained.

So six years ago I brought together a group of leading neuroscientists to find the basis for an approach that could advance the entire field of brain research. It was clear there needed to be a comprehensive database of information on where genes are turned on (or expressed) in the mouse brain—a map, or atlas, of the brain's frontiers that would provide more encyclopedic information than any individual lab could afford to generate.

It seemed achievable. With the help of several noted researchers, I founded the Allen Institute for Brain Science in 2003 to undertake this project. Three years later, the institute had completed an atlas of gene expression in the mouse brain.

The scientists used state-of-the-art technology to dissect a mouse brain, photographed it sliver section by section, then reassembled it in a computer database that would allow easy access. But it was the speed at which the project was accomplished and what they did with it

afterwards that changed the game.

They released it to the public. Over the internet. Free.

When we first put the mouse-brain atlas online free, it was met by the research world with suspicion. People wondered what the catch was. Scientific research has long been a solitary endeavour—one researcher, one microscope. Findings are protected so that discovery credit can be clearly defined and awarded. This is a successful model and will continue to be.

However, the Human Genome Project demonstrated a different path: multiple teams working collaboratively towards a common goal. I believe a real acceleration in progress and innovation comes from the open sharing of ideas and collaboration. We wanted the mouse atlas to be free and available for all to use as the basis for foundational research and discovery.

If we thought it would be a hit right out of the gate, we were slightly wrong. It took a while for people to trust that it really was free to use. No one believed in a free lunch.

Now, things have changed. Today we have many scientists using the atlas for their research into Alzheimer's, bipolar disorders, Down's syndrome, Parkinson's, fragile x mental retardation and epilepsy. The atlas is also giving scientists insight into alcoholism, obesity, sleep, hearing and memory.

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The greatest testament to what we did was that researchers of spinal-cord diseases, trauma and disorders approached the institute and asked us to create a spinal-cord atlas, which is now close to completion. We will launch the first phase of a human-brain atlas, a four-year project, in 2010.

Like the Human Genome Project, the Allen Brain Atlases and Spinal-Cord Atlas have helped democratise the scientific landscape. When you can log on to a map of gene expression from anywhere in the world, more people can enter the scientific conversation. The result is a massive

saving in time, since without the atlas each researcher could spend a lifetime trying to gather complete gene-expression data for his or her work.

Brainstorming

Clearly the model of providing a freely accessible database is a successful one. In a sense, we have challenged other researchers to offer greater access to their findings. Will they take the challenge? My bet is that over the next 18 months we are going to see more open access and more collaboration.

In the next decade we will make great strides in uncovering the complex network of gene interactions that govern every major brain disease and will create effective therapies through traditional drug discovery or new methods for modifying gene activity. Just as the use of cardiac pacemakers or artificial knees is common today, a new generation of implantable pacemakers for the brain will be widely used to treat everything from depression to addiction and Parkinson's disease.

Our increasing knowledge will shed light on how information is processed and stored in the human brain at a molecular level. Even now, scientists are already mimicking the brain's information-processing capabilities to create a new generation of computer processes. We are going to get far better at this as our understanding of the brain improves.

Private philanthropy will continue to grow and help to accelerate scientific discovery. I believe we are nearing a tipping-point in brain research where the discoveries, treatments and cures will come more quickly than the questions. Private dollars, combined with broader adoption of open collaboration and data-sharing models, will help push us over the top. Success will follow.

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