Crystal balls reveal how the brain recalls the past

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Art Exhibitions

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Memory is intimate, emotive, aesthetically lavish - and electrochemically encoded in the biostuff between our ears. Offering all that to play with, the physical mechanism of remembering would seem an obvious subject for an art-science enterprise.

Yet according to neuroscientist Hugo Spiers of University College London, he and his two collaborators - an artist and a sound designer - are the first to do anything about it. The result, on show last weekend in the gallery Gimpel Fils, located in the staggeringly expensive Mayfair district of central London, is called *Pattern Completion*.

Pattern Completion *(installation view) (Image: Michaela Nettell & Tom Simmons)*

It's a cluster of four glowing glass globes hanging at eye level in a dim, windowless room. A concealed video projector illuminates the frosted rear of each globe: peer inside them and you'll see images of woodland, time-lapse photographs that reveal the movement of plants swaying in the wind as each frame dissolves into the next, until an abrupt cut changes the scene. You might notice that the view you were watching has jumped to another globe, or that in another still a scene has continued unchanged. On wireless headphones, meanwhile, you hear bird calls, the sound of wind in leaves and rushing water in sequences that change with the images.

On Saturday I went to see *Pattern Completion* and hear what its three makers had to say about it. The artwork's title is the process by which memories are recalled by cells in a brain region called the hippocampus. Through an elegant mechanism of repeated stimulation and feedback, the cell network of the hippocampus recalls a memory by recreating the pattern of neural activity that was created when the memory was encoded. The glass spheres might therefore be seen as blown-up brain cells, said Michaela Nettell, the artist responsible for the visual aspects of the work.

I doubt I would have intuited this from the work itself if I hadn't known it already. I might have thought the globes were high-tech alternatives to the goldfish bowl, meant to catalyse sylvan reverie, or crystal balls foretelling a new career for me in forestry.

Allerthorpe Common, Yorkshire, Spring 2009 *(Image: Michaela Nettell & Tom Simmons)*

The choice of forest imagery was no whim: the team wanted to use images that strongly evoked a sense of place because, as Spiers told us, certain cells of the hippocampus seem to specialise in remembering particular places.

But when I was looking at the globes I felt that my imagination, not my memory, was being stimulated: I was looking for potential stories, rhythms and patterns in the delicately evocative images, rather than feeling drawn back into my own past experience.

Nor did seeing and hearing the artwork lead me to imagine that it was controlled by the same processes that enact memory recall in the brain. I learned this only when the project's sound designer, Tom Simmons, described the neural network software that runs on an out-of-sight computer and directs the sequencing and positioning of the images on different globes and the sounds in a virtual spherical sound space. In gradually reconstructing a complete image from disconnected fragments, the software models the pattern completion process that is thought to recall memories in the hippocampus.

I asked Simmons why he had hidden away the installation's electronic brain. He explained that the team's aim had been to re-invoke experiences that the viewer may have had, and that they had chosen to do this by means of the sounds and images and the particular materials the team employed.

They wanted the particular distortions introduced by the glass globes and their delicate suspension by fine fishing wire to create a sense of the fragility and imperfections of memory. Nettell added that she wanted the piece to affect the viewer without their having to understand the process behind it.

Still, I wish they had found a way of showing the neural net mechanism working, and not just its rather enigmatic audiovisual output.

Of course, there is nothing wrong with enjoying the beautiful sounds and images of the piece without a single neurobiological thought in your head, and Nettell was content that some viewers do just that. But I felt the use of photographic images and sound recordings to carry the artwork was rather simplistic. Perception and memory are not skull cinemas playing back movies of the past and present: the correspondence between conscious experience and neural activity is not so direct.

When I asked Spiers about this, it turned out that the neural mechanics of visual memory are more complicated than the installation suggests. He said that we may remember a forest we have visited, but unlike Nettell's evocative photographs, our brains don't record the images of individual trees.

Indeed, he said that the hippocampus seems to function as an index of remembered places: if a memory trace of a place links to a sense of trees, the experience of remembering what the trees looked like is played out in the brain's sensory regions.

Pattern Completion, as Nettell pointed out, is a work of art, not an illustration of neurobiology. Even so, the neural processes of memory have a beauty of their own. This attempt to fuse that fascination with the subtle powers of the sound and image work doesn't do justice to either side of the art/science divide.

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