No realm of life is left unexplored by artists. A myriad of forms and objects are explored, but one object is different. Unlike all other objects depicted, the artist’s brain is the very object considering itself. The explosion of neuroscience research in the last decades has been accompanied by a similar flourishing interest in exploring the brain in the visual arts. This lecture will examine the different ways in which artists have considered the brain. It will also discuss the challenges and progress that can be made via collaborations between artists and neuroscientists.
Overview

• Introduce two installations

• Discuss the creative process that led to these installations

• How does this work relate to other visual art works exploring neuroscience topics

• Do painters, sculptors and architects think differently about space?
NEUROTOPOGRAPHICS
PATTERN COMPLETION
PATTERN COMPLETION
In 2009-10 we developed an installation to explore some of the phenomenological and biological differences associated with subjective experiences and representations of pattern completion and memory fragmentation. The installation applied these processes to the recollection of specific types of place, using sound recordings and photographic sequences captured in forests as catalysts for the staging of associative memories and perceptions. In the installation fragmented images and sounds are shuffled and projected into constellations of suspended glass spheres, their arrangement determined by an auto-associative algorithm based on the processes that are thought to underlie pattern completion.
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The plasticity of the installation echoes both the temporal instantiation of memory patterns within the synapses in the brain, and the ephemeral and fleeting nature of our memories. The spatialised pockets of images and sounds in our installation echo the anatomical arrangement of these networks of cells within the hippocampus. The installation reflects the idea that individual memories may sit in different regions of the hippocampus and that their positions may shift or alter over the course of our lives.
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Neurotopographics
Gimpel Fils, Mayfair London
Figure 4. "Place cells" around the environment (adapted from Fig. 5).

Grid cells, together with other cells in the entorhinal cortex that recognize the direction of the head of the animal and the border of the room, form networks with the place cells in the hippocampus. This circuitry constitutes a comprehensive positioning system, an inner GPS, in the brain. The positioning system in the human brain appears to have similar components as those of the rat brain.
Development drawings by Bettina Vismann
Lilliputian Delusions

Alice in wonderland syndrome
Mapping the space

The map stretches

Re-mapping the space

Un-anchoring from the space
Pattern Completion
Pattern Completion
Autoassociation
Pattern Completion
MaxMSP program used to determine sound and image playback
The topological images used in the installation capture natural patterns in the environment and represent events that take place alongside them. The sequences record one-point perspectives, using pathways and clearings to create images that direct attention and anticipate narrative. The animated scenes we used are unreal, fabricated, staged, their component parts constructed from manipulated overlapping photographs. The different phases of movement and the intervals between them heighten our sense of the passing of time, interrupting perception and representation.
The sound and image sequences intimate the forest's complex mythological make-up, from its dark, nightmarish aspects to its tranquil and protecting qualities. Recordings made at different heights and perspectives and at different times of the day and night, are used to explore ways our memories, thoughts and feelings change over time.
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In the installation scenes are projected in fragments into an arrangement of glass spheres. Sounds and images are shuffled between the spheres so that compositions that initially appear jumbled gradually come together into coherent audio-visual scenes. Meta data identifying each scene and the way it has been fragmented is embedded in the sound and image sequences. The data is used with a self-organising map. 

* Robin Meier, jit.robosom MaxMSP/Jitter object, 2004
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Drawing by Santiago Ramon y Cajal
Drawing by Santiago Ramon J Cajal
Drawing by Santiago Ramon J Cajal
Drawing by Santiago Ramon J Cajal
Neurons in the cat brain illustrated by Cajal

Drawing by Santiago Ramon J Cajal
Two Pyramidals - Greg Dunn
Signals pulsing between connections in the hippocampus take information from the physicality of a situation: sound, sight and so on. The brain cells get excited by these sights and sounds re-emerging in our memory. A name in itself reverberating in your brain can summon up a sight or a sound of a person. Memories can be incredibly faulty and we often add to these by taking on board other perspectives and contexts.
Magic Forest – 2002 – Andrew Carnie (science museum London)
Winning image from the Wellcome Trust Biomedical Image Award in 2003 (Mark Lythgoe and Chloe Hutton). Novartis / Daily Telegraph award 2003
Expectation confirmation

Spiers and Maguire 2007
Trends in Cognitive Sciences
BRAINS

The Mind as Matter
29 March – 17 June

www.wellcomecollection.org/brains
Head Ache – Helen Pynor 2008

Handwritten note:
Headache
Press brown paper soaked in vinegar against the forehead
My soul in your hands
Katherine Dowson 2007
Blind light
Antony Gormley 2007
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Image-Question Task
1. Could you please describe the environment that you see in this picture?
2. How would you explore the space in this image, where would you go?
3. If you were given the chance, how would you change the environment in this image?

Final Question
4. A final question, what is space for you?

Cognitive Discourse Analysis
<table>
<thead>
<tr>
<th>Question-Task</th>
<th>Non-Professionals</th>
<th>Architects</th>
<th>Sculptors</th>
<th>Painters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Could you please describe the environment that you see in this picture?</td>
<td>a building façade or interior possibly superimposed on an image of the sea and the ship, and rocks, and it’s quite dark, apart from the light in the center.</td>
<td>a body of water going down between huge cliffs disappearing into some bits…a lot of light towards the end.</td>
<td>it starts at the top as a mixture of architectural wall and a landscape…a chasm at the end of which it seems there is the setting sun.</td>
<td>there is a ship in the middle coming through a distorted window, a high arched window with what looked like mountains at the back.</td>
</tr>
<tr>
<td>How would you explore the space in this image, where would you go?</td>
<td>I just like to explore and see what’s there, obviously I can see what’s here but behind the arches and behind that pillar…I’d just walk around and see all the hidden statues… and obviously looking up at the ceiling as well… so that’s what I would do.</td>
<td>I would touch materials around, it’s a very cold stone seems inviting to touch. I would want to go to the side walls and touch them.</td>
<td>I always like to get up close to the surfaces of things, sort of see how the floors are laid and look at the panels on the pillars and then the copper ceilings and see how things were made…</td>
<td>I’d probably walk down towards the crossing…maybe back into the nave here…now just looking at it as a 2 dimensional abstract image, my eye goes straight to this on the right…all these lines take my eye down…there’s a bit of a yellow colour…</td>
</tr>
<tr>
<td>If you were given the chance, how would you change the environment in this image?</td>
<td>I suppose you could have a cycle lane…so that people can cycle along this street…hum, trees, more trees is always nice.</td>
<td>to take away that barrier to the river, it be quite nice to be able to walk along the edge and feel you were directly over the water…so having a solid balustrade puts a bit of a barrier between you and the river… breaking about barriers between you and the pavement, and the pavement and the river…</td>
<td>there are a lot of objects already there…. if I were to make a sculpture somewhere along this area I would remove the telephone box, which is extremely red as an object, a very powerful object. I would turn the sound on…plenty of sits for people to sit on…</td>
<td>I would want to straighten up the diagonal of the road and make it more flat to the bottom edge, flatten it down, I’d want to bring it down…less of an angle…</td>
</tr>
</tbody>
</table>
Conclusions

• Certain words/phrases can be used to distinguish between the spatial practitioners and non-practioners (e.g. ‘the end’)

• Painters switch between a 3D movement through the space and a 2D or layered approach to considering the space depicted

• Architects focus less on the 2D properties and more on the materiality of the content

• Sculptors are generally similar to architects but present a pattern half-way between architects and sculptors
Summing Up

• Neuroscientists should engage researchers in the visual arts

• The arts gain from a broader range of ideas to explore

• Scientists gain from the broadening of experience
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