JoAnna Commandaros  
**Synesthesia, 2013**  
steel, wire, manipulated silk, paper negative

Synesthesia: “A neurological phenomenon in which stimulation of one sensory or cognitive pathway leads to automatic, involuntary experiences in a second sensory or cognitive pathway.” The intent of this work is to provoke perception through the systems that allow living things to connect. The contrast created between the visual themes of disparate materials such as the Shibori fabric; a domestic process as well a visual display of the fractal concepts contained in matter. The wire as ‘drawing in space’ aims to play with perceptions between the two-dimensional and three-dimensional realms. The paper-negative photographs are objects of process embedded with allusive imagery. As a union of the senses this piece is meant to evoke peripheral memory of the experience of beauty.
Aaron Regal

*Net Generation Memory Palace*,
archival inkjet print

As a Millennial, I am arguably addicted to the Internet. I sometimes fear this constant and consuming bombardment of information has negative effects on my generation’s ability to retain information. With the aid of telecommunication infrastructure and the web at fingertip’s length, my human memory seemingly loses both practice and importance. This image and its counterparts are ominous depictions of contemporary memory palaces equip with antennas. Also known as The Method of loci, this ancient memory enhancement technique is used for improving information retention by visualizing architecture and its “contents”.

Greg Dunn

*What and Where*, 2012
Giclee print on aluminum of an original scratch hologram

*In the collection of Dr Michael Tarr.*
After completing my Ph.D. in neuroscience at the University of Pennsylvania in 2011, I devoted my career to exploring the intersections between art and science. I utilize scientific approaches not only in the subject matter of my work, but in the methods that I use to produce it. One of my most salient personal goals is to disseminate the beauty uncovered at the forefront of scientific research through the digestible medium of art for the benefit of the general public. To this end, I have founded a laboratory of art and science whose mission is to collaborate with basic science researchers to produce art based on data. In this way, I hope to bridge difficult gaps between the art and science worlds, providing a voice for scientists and breaking new ground through the development of novel artistic techniques.
Santiago Ramón y Cajal

“Like the entomologist in search of colorful butterflies, my attention has chased in the gardens of the grey matter cells with delicate and elegant shapes, the mysterious butterflies of the soul, whose beating of wings may one day reveal to us the secrets of the mind.”

Recollections of My Life, Santiago Ramón y Cajal

to the left

Portrait of Santiago Ramón y Cajal
photograph. In the collection of the cajal institute.

prints left to right; top to bottom

Purkinje cells development
Cerebral cortex
Dendritic Pyramidal cells
Hippocampus
Cerebelum
Cerebelo Celula de Purkinje

1899 - 1905. archival inkjet prints

book

Cajal’s Butterflies of the Soul: Science and Art
Marie Barcic
*Embryogenesis I*
2014
inkjet print

Through my artwork I attempt to discover order in nature by illuminating systems and patterns at play. Microscopic images originating in dissections of chick embryos are edited by converting color from dim to grotesquely vibrant, enhancing minute details, and transforming textures until the imagery resembles beautified data visualizations of heavenly bodies. The resulting representation has undergone such extensive revision that it is almost akin to a work of science fiction. By offering considered visual adaptations of natural subjects I hope this work encourages viewers to contemplate whether the natural universe appears measurable and scientific, random and accidental, or wonderful and intentional.
Excitatory pyramidal neuron filled with a fluorescent protein

Fluorescent neural tracer injected into motor cortex is taken up by local axons and transported to distant cell bodies

In-vitro electrophysiological recording of an illuminated neuron being sampled by a small glass pipette

Plexin - GFP labeled population of somatostatin containing neocortical interneurons
Erin Crowder

*Prosopagnosia*

archival inkjet print

*Prosopagnosia*, or face blindness, is a disorder that hinders face recognition. This disorder likely arises from an inability to represent faces holistically. To emulate prosopagnosia, I started with an algorithm that mimics primitive vision to reproduce the small scale texture of a photograph. I extended this process to organize textural elements into a global gestalt. The intermediate result is face-like but not identifiable.

The subject of this series is Chuck Close, a prolific portrait artist and prosopagnosic. Remarkably he was able to achieve a high degree of photorealism by subdividing photographs into a grid and replicating each square independently.
I am interested in the idea that we each are many – and that from moment to moment, we shift, split, merge, cooperate, compete or ignore ourselves. My work is inspired by current research in biology, and how the advances of this field are tied to the definition and redefinition of boundaries and discontinuities in the body. *One, No One and One Hundred Thousand* explores the parallels between the processes of painting and solvent transfer and the processes of biological memory, each lousy filters, subject to conscious and unconscious manipulation.
Rob Kesseler

*Rumia crithmifolia ventral view*  
(Apiaceae), 2006

*Rumia crithmifolia dorsal view*  
(Apiaceae), 2006

*Castilleja flava*  
(Yellow Indian Paintbrush), 2008

*Codonocarpus cotonifolius*  
(Desert poplar), 2005

hand coloured SEM, archival pigment prints.

Pattern is an essential characteristic of human evolution, our brains are wired to identify and map a range of patterns as a way of navigating the environments we inhabit. It aids spatial awareness and conversely it is used by animals in the form of camouflage which disrupts pattern. It is a human trait for us to use pattern and the way it influences form as a way of likening and distinguishing one object from another. This was highlighted by Shakespeare in Hamlet:

Hamlet: Do you see yonder cloud that's almost in shape of a camel?  
Polonius: By th’ Mass, and ‘tis like a camel, indeed.  
Hamlet: Methinks it is like a weasel.  
Polonius: It is backed like a weasel.  
Hamlet: Or like a whale.  
Polonius: Very like a whale.  
So methinks it looks like a brain!

*The artist would like to thank the Royal Botanic Garden Kew, Wolfgang Stuppy and Papadakis Publisher London for their support in the development of the work.*
In “Planetary” I used a photograph taken during a lab dissection of a sheep’s eye as a surface texture to construct another natural form. I created a black peephole graphic to suspend the intricate, ornate surface of the biological imagery in a flat plane. I imagine the tiny fractured melanin pigments of the sheep iris as the vast atmospheric surface of an unknown planet. This playful staging draws attention to the mysterious sculptural quality of the sheep eyes.
Kevin Jarbo and Tim Verstynen

**On the Spectrum**, 2014

inkjet print

Consisting of hundreds of millions of connections between the left and right halves of the brain, the corpus callosum is its major interhemispheric cortical white matter pathway. The corpus callosum has been shown to be involved in many functions including coordinating movement and integrating visual information. Studies of the organization of the corpus callosum and its involvement in so-called connectivity and spectrum disorders such as schizophrenia and autism inspired these images. The colors used represent individual segments of the pathway, its changing connectivity throughout the brain, and its association with spectrum disorders.

Qiong Zhang and Nicolas Kim

**Untitled**

archival inkjet print

A beautiful world is encoded in the complexity and richness of the brain. It breathes, shines, and branches under the sky. Molecules being the soil and nutrition, dendrites being the forest of trees, and different brain matters being the layers of the atmosphere.
INTO THE GREY
In the inn by the shore,
All the photographs are faded,
All the clocks are slow.
Last year’s words lie stale
Like smoke on used up air.
The piano keys are touched
Only to be dusted.
The rooms and furnishing
Have been so long familiar,
They are merely memories now
Happening elsewhere.
Radio plays in the low tv light.
On a screen without sound,
A hundred ballerinas dance
With the deft sadness of acrobats.
Clayton Merrell

*Unfurling Network*

*The Idea of Order*

2014
gouache on paper

These gouache paintings are studies for larger paintings yet to be made. In them, I am experimenting with the ways that order and pattern can emerge from randomness. The dot patterns begin simply as glitches in a watercolor wash that are emphasized, turned into data points and then turned again into a set of relationships, a framework, a shape, a form ... The somewhat arbitrary forces that determine the shape of the constellation are given credibility by duplication. The pattern echoes itself and through representation acquires extra solidity, purposefulness and almost a sense of inevitability. I am thinking of the description Wallace Stevens invokes of the way art creates or conjures the very world, the very order that it purports to represent:

It was her voice that made
The sky acutest at its vanishing.
She measured to the hour its solitude,
She was the single artificer of the world
In which she sang. And when she sang, the sea,
Whatever self it had, became the self
That was her song, for she was the maker. Then we,
As we beheld her striding there alone,
Knew that there never was a world for her
Except the one she sang and, singing, made.

-Wallace Stevens, from *The Idea of Order at Key West*
A connectionist network uses simple, interconnected processing units to model the operation and interactions of neurons in the brain. This piece depicts a particular type of network known as an encoder, in which activity patterns over the lower (input) units are reconstructed over the upper (output) units via a “bottleneck” of intermediate units which must learn to recode the patterns in a more compact and efficient manner.
Astrocyte Calcium Waves

monitor with looped film

(Astrocytes - from Greek astron = star and cyte = cell are star-shaped glial cells in the brain and spinal cord. They are the most abundant cells of the human brain.)

These films were the first to describe astrocytic Ca waves and oscillations (1990). It was later established that astrocytic Ca signals could be triggered by neuronal activity. It has been suggested that astrocytic Ca waves may couple neuronal activity to cerebral blood flow regulation, shape neural development and influence synaptic circuit activity, but they remain truly enigmatic.


Diderot

Encyclopédie; ou Dictionnaire raisonné des sciences, des arts et des métiers (1751)
Plate VIII - Figure premiere de Drake

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Children’s School, Carnegie Mellon

*Brain Art in Early Childhood*

2014

Summer camp provides a context for preschool and kindergarten children to explore their senses via directed lessons and indoor/outdoor explorations. Dr. Marlene Behrmann visited the children this summer to talk about the brain, how it works, how it grows, and whether everybody’s brain is the same or different. She taught the children that your brain makes you smell, taste, hear, see, feel what you are touching, think, play games, walk and run.

Dr. Sharon Carver, Director, Children’s School

*Gathered here is a selection of the children’s visual reflections created after the lesson.*