The Art & Neuroscience of Change: How does changing your behavior affect your brain?

Bill Griesar & Jeff Leake

NW Noggin, nwnoggin.org

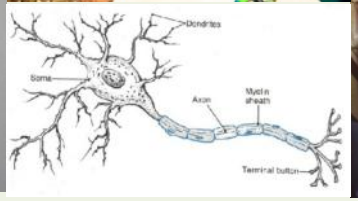
John Harkness, Neuroscience, WSU Vancouver

Kindra Crick

http://www.kindracrick.com/portfolio/gallery/

nwnoggin.org

Neuroscience Outreach Group: Growing in Networks…



- Jeff Leake, Arts Coordinator
- Bill Griesar, Neuroscience Coordinator
- Dedicated volunteers from PNCA, WSUV, PSU, OHSU

Who is involved?

- *Academic priority* K-12 students
  - Portland/Vancouver Public Schools
- Art and neuroscience undergraduates
  - Pacific Northwest College of Art, Portland State University, Washington State University Vancouver
- Art and neuroscience graduate students
  - PNCA, PSU, WSUV, Oregon Health & Science University
- Working artists and scientists

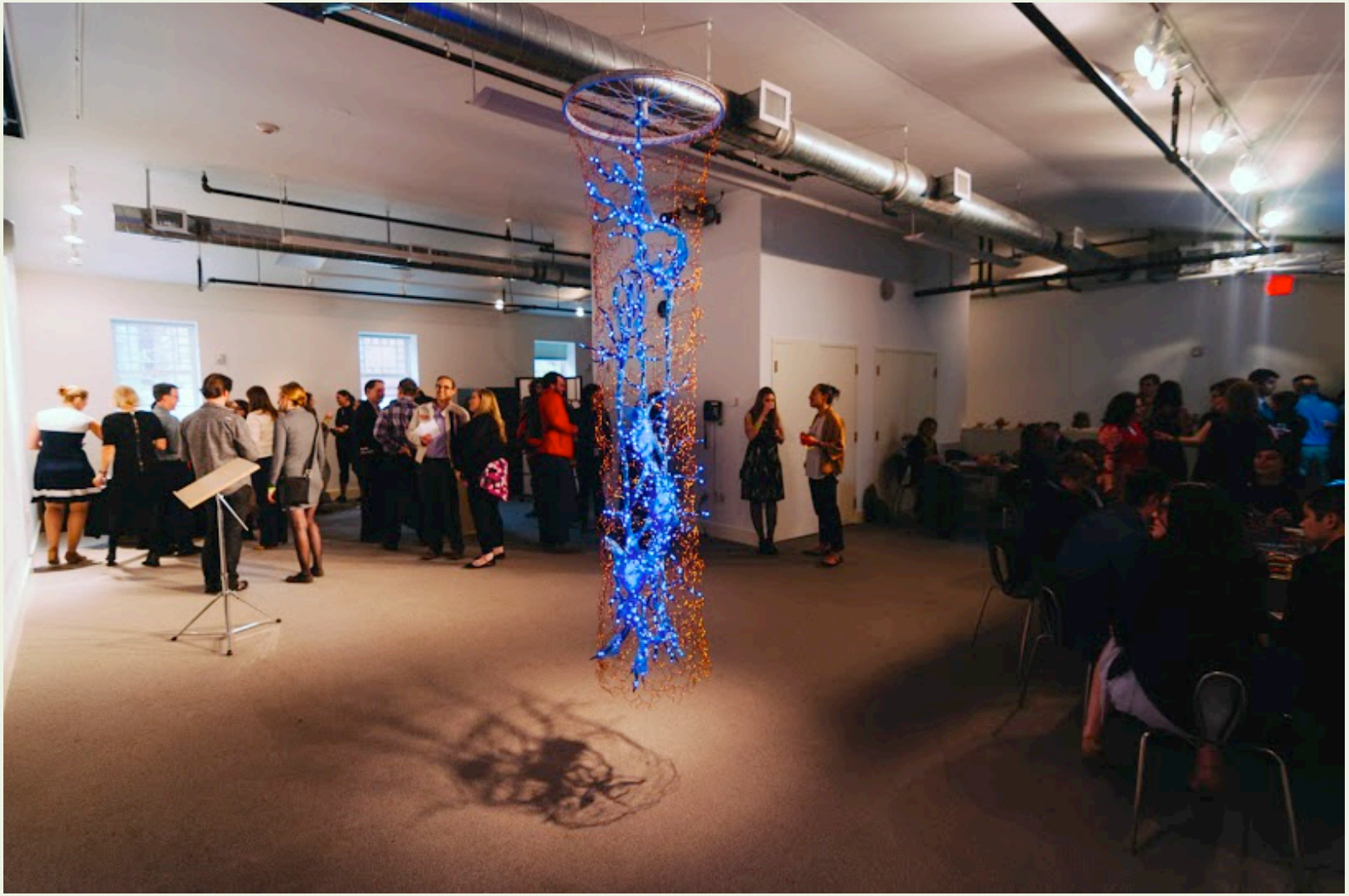
Why art - and brains..?

- Motivation and engagement
- Exploration, creativity, and discovery
- Personal relevance of STEAM material
- Internships, jobs and careers

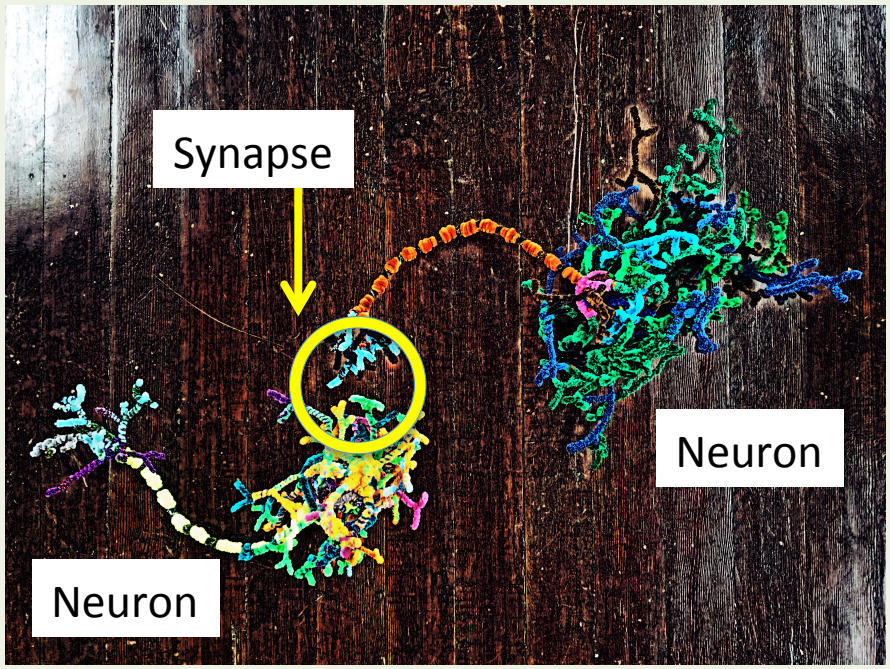
Where do we go?

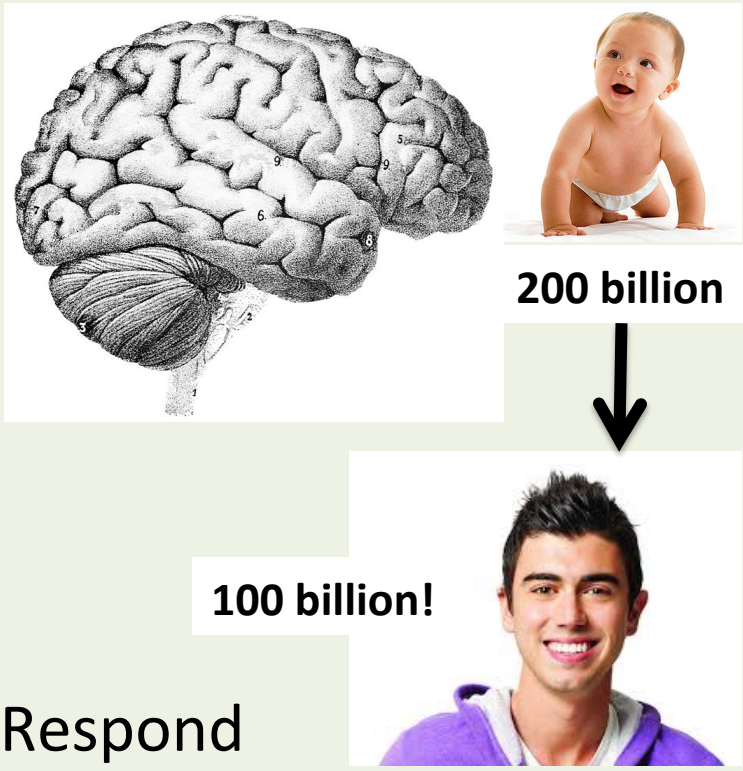
- K-12 schools
- Universities
- Retirement communities
- Hospitals
- Science museums
- Art museums
- Conferences
- Bike shops, pubs
- *Thousands reached*


NW Noggin:
Art and Brains
Bill Griesar, Ph.D., Neuroscience
Jeff Leake, MFA, Art
Graduates
Undergraduates
K-12 students
Scientists
Artists
WSU Vancouver, PSU, OHSU, Portland Art Museum, Phillips
NWNOGGIN.ORG
DC 2013
BRAINS + ART



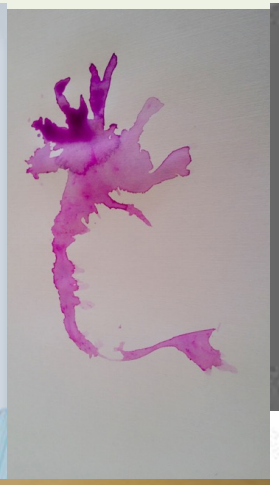
You are made of neurons

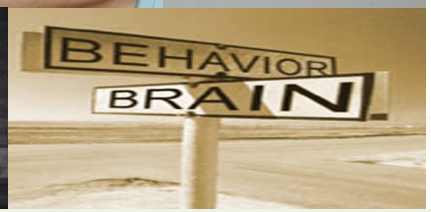


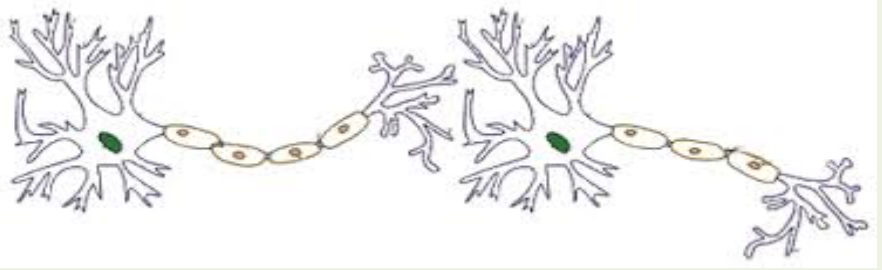


- Detect – (Perceive? Consider?) – Respond
- Networks of neurons carry out behavior, including complex behavior, and synapses change with experience
- *What you do/experience changes how your neurons wire together, and how fixed or "plastic" synapses become*

Changing behavior changes brain

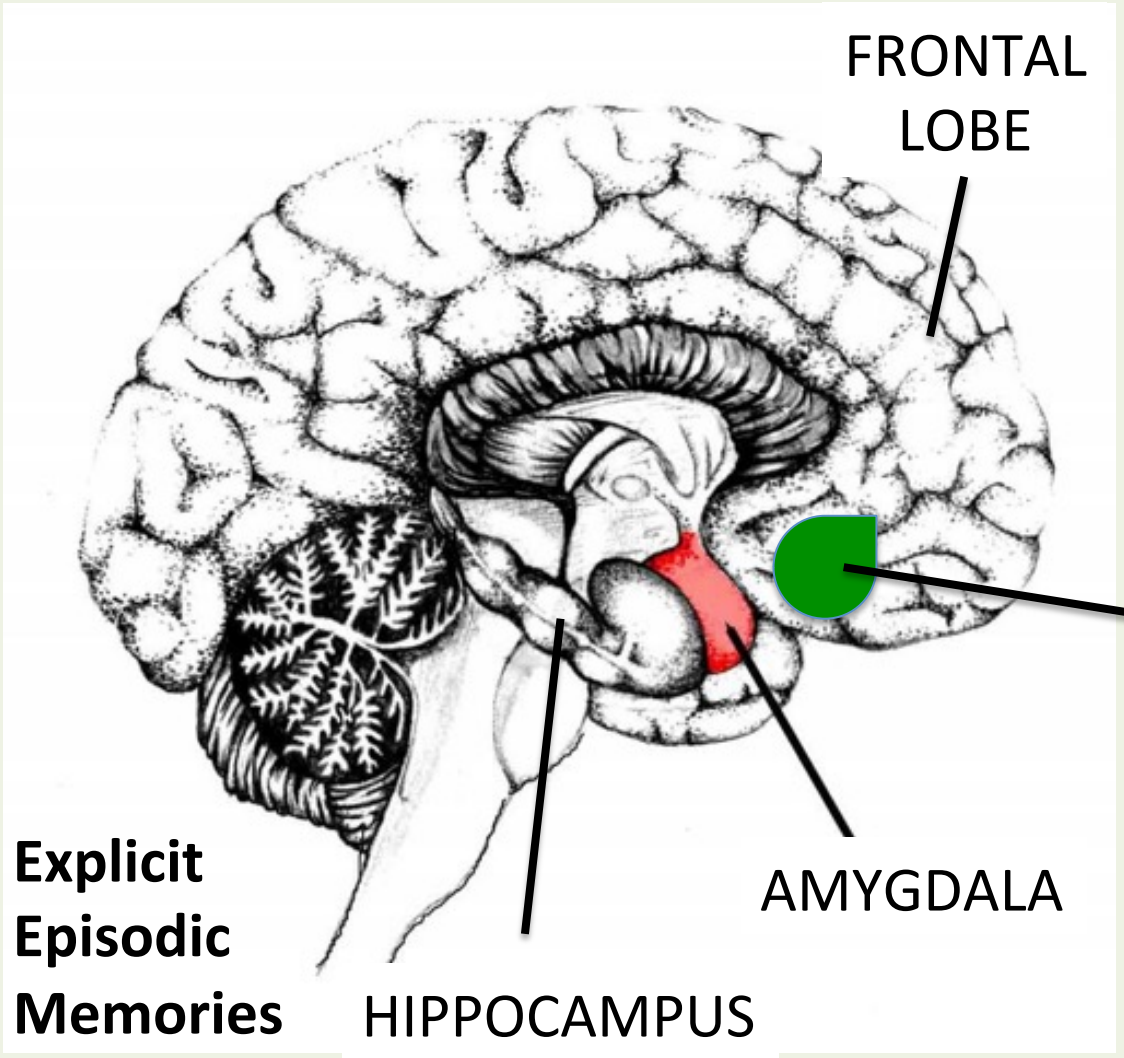






- **Habits**: "Motor," perceptual, cognitive/social
- *Often rapid, impulsive responses to what's around you*
- *Are your habits positive or negative?*
- *When is behavioral change beneficial?*

Brain networks *develop, collaborate*



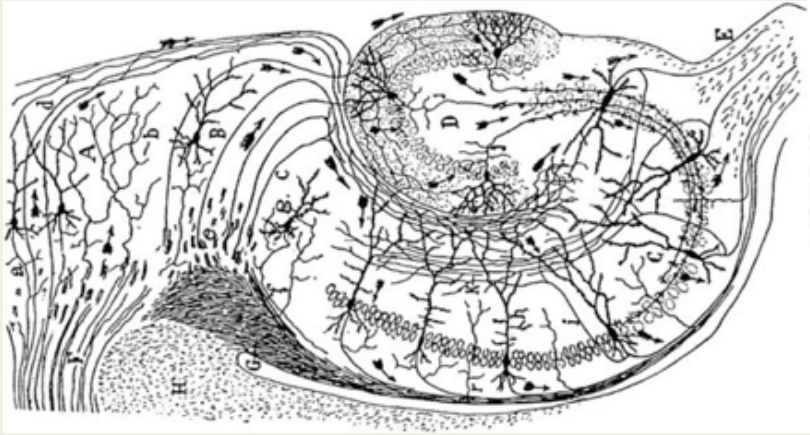
Complex social decision making Inhibition

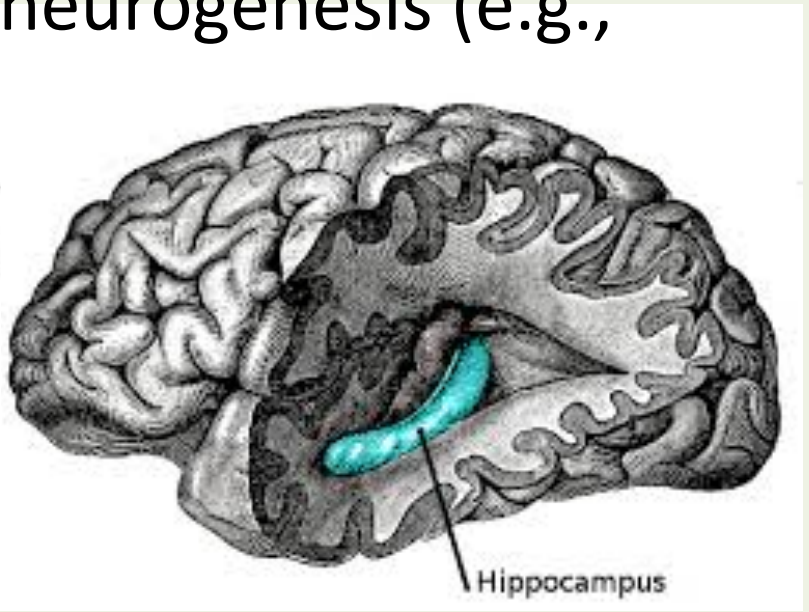
Emotions Motivations Fears

Explicit Episodic Memories

What affects your ability to change?

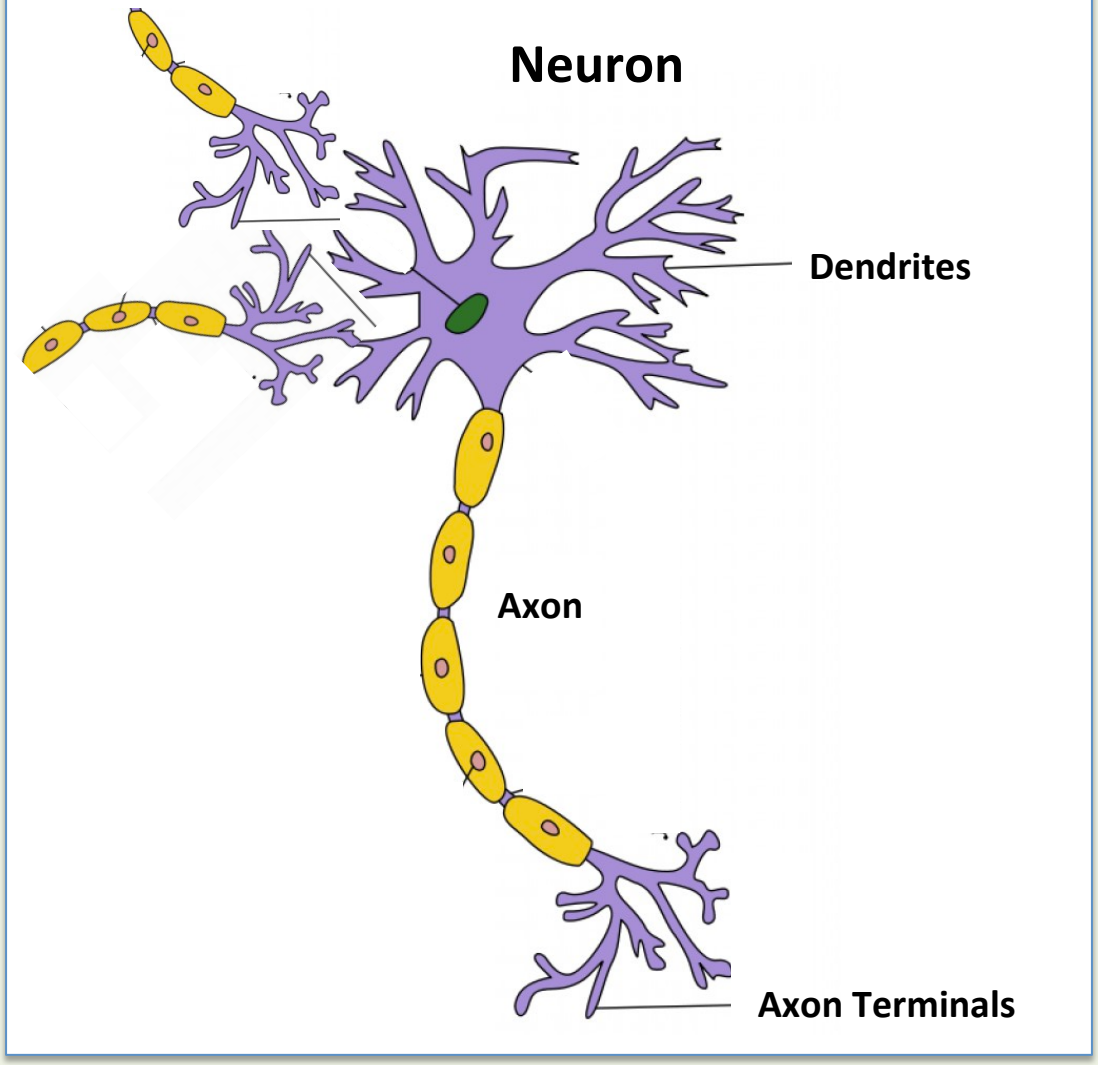
- Sleep, nutrition, exercise
- Life experience, including traumatic events
- Stress and neuron death, (e.g., Conrad 2008)
- Developmental stage: "critical periods"
- Exploratory activity and neurogenesis (e.g., Woollett et al 2011)

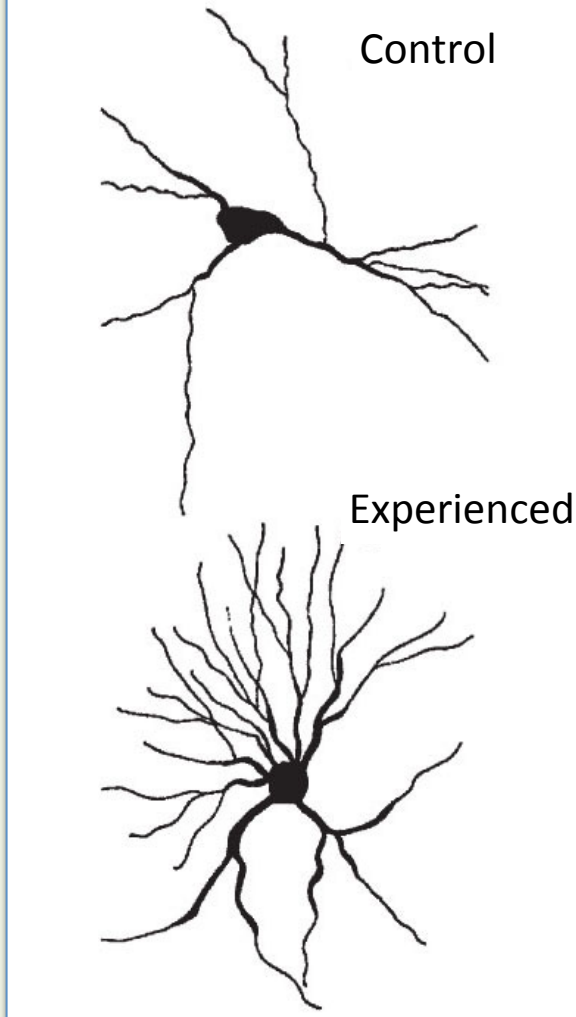




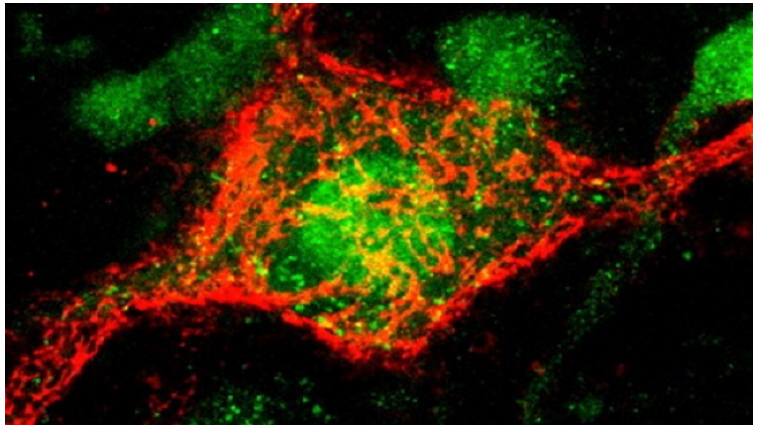
Anthony Cerniello via Vimeo

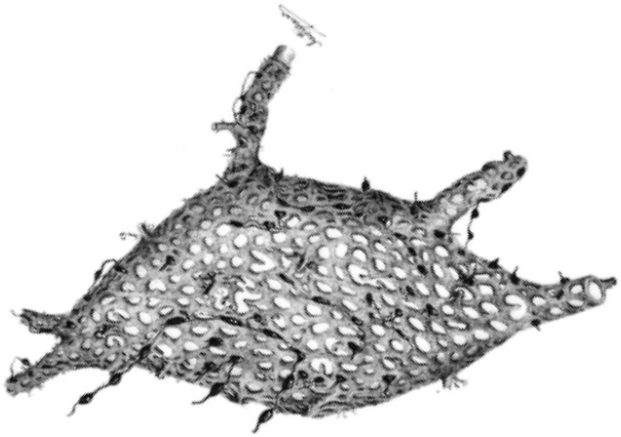
Experience leads to new synaptic plasticity



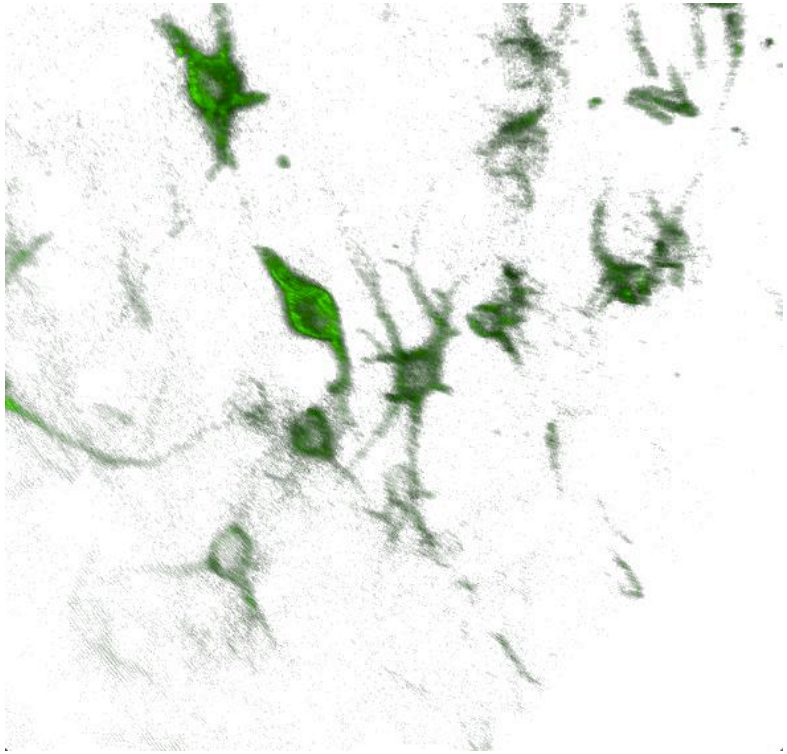


Synaptic connections are solidified by perineuronal nets (PNNs)



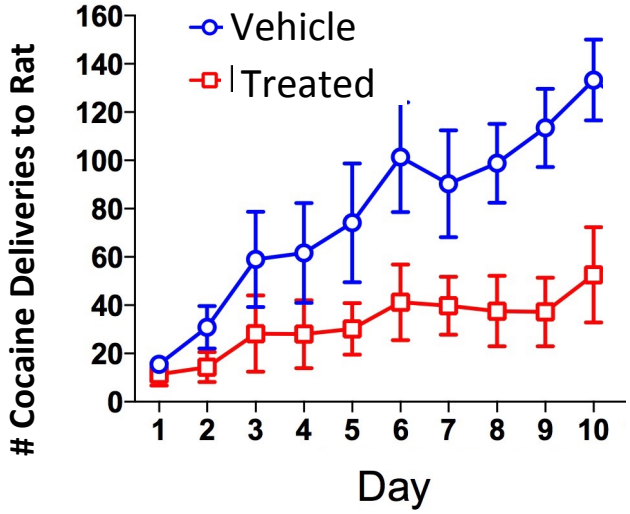


brainfacts.org

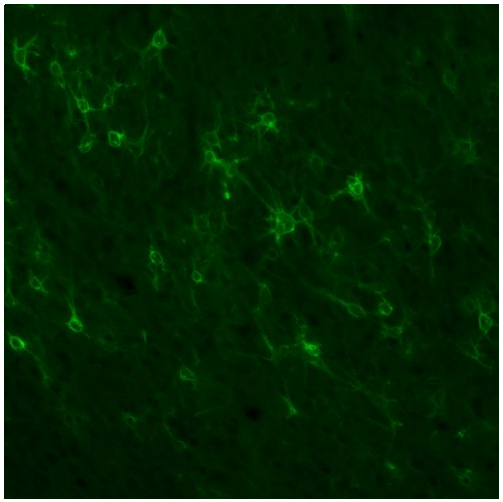


Harkness et al., unpublished

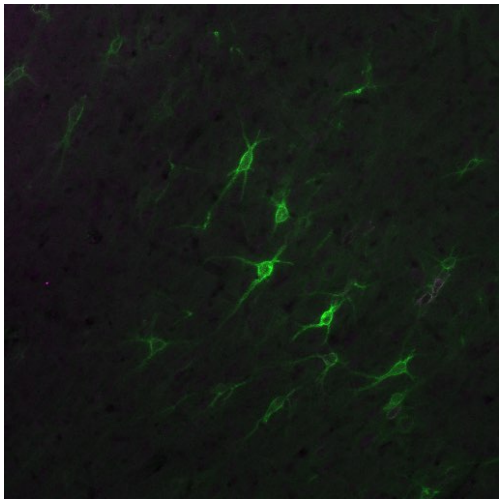
Disrupting perineuronal nets increases neuronal plasticity



Vehicle

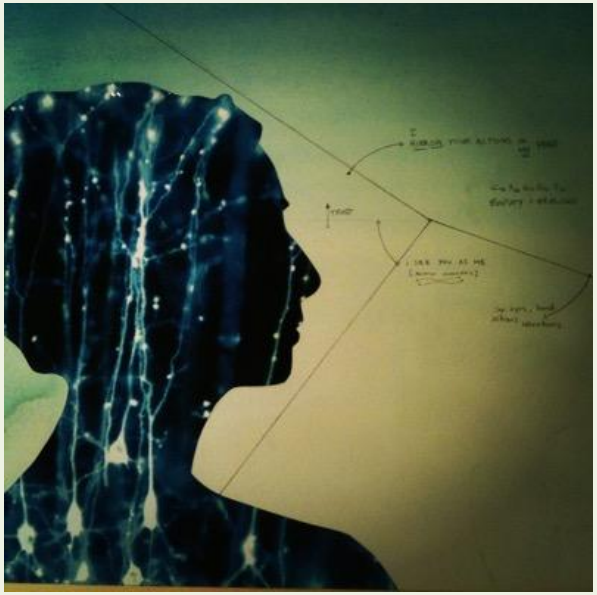


Treated



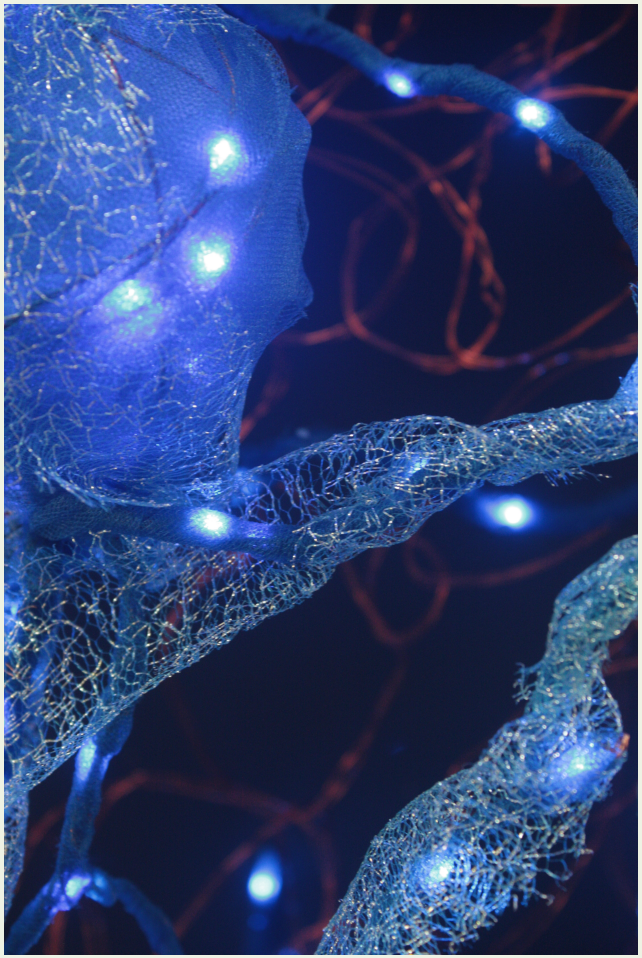
Sorg lab, unpublished

Art & Science's quest to better understand ourselves



Kindra Crick, *artist*

Intersection of Science & Art



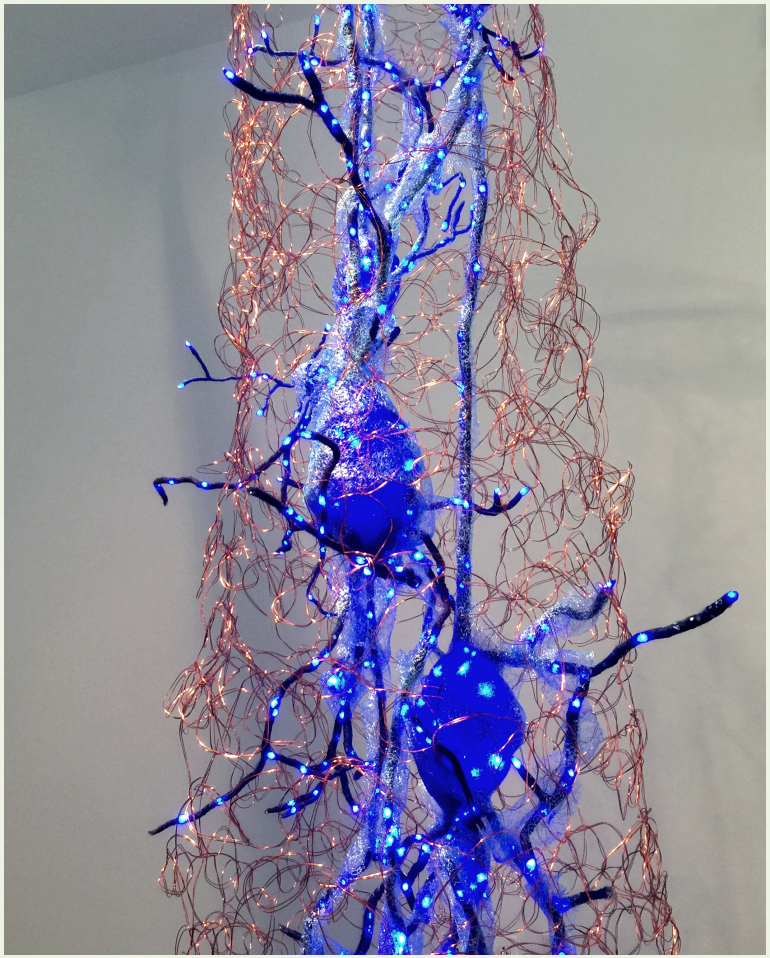
- Working at the intersection of 'two cultures' of science and art
- Collaboration

"…**a kind of corset** of neurokeratin which impeded the spread of current from cell to cell"

- Camillo Golgi

Caught in the net

- Magnify and reimagine to create wonder
- Creativity vs habit



Your Joys, Sorrows, Memory and Ambition