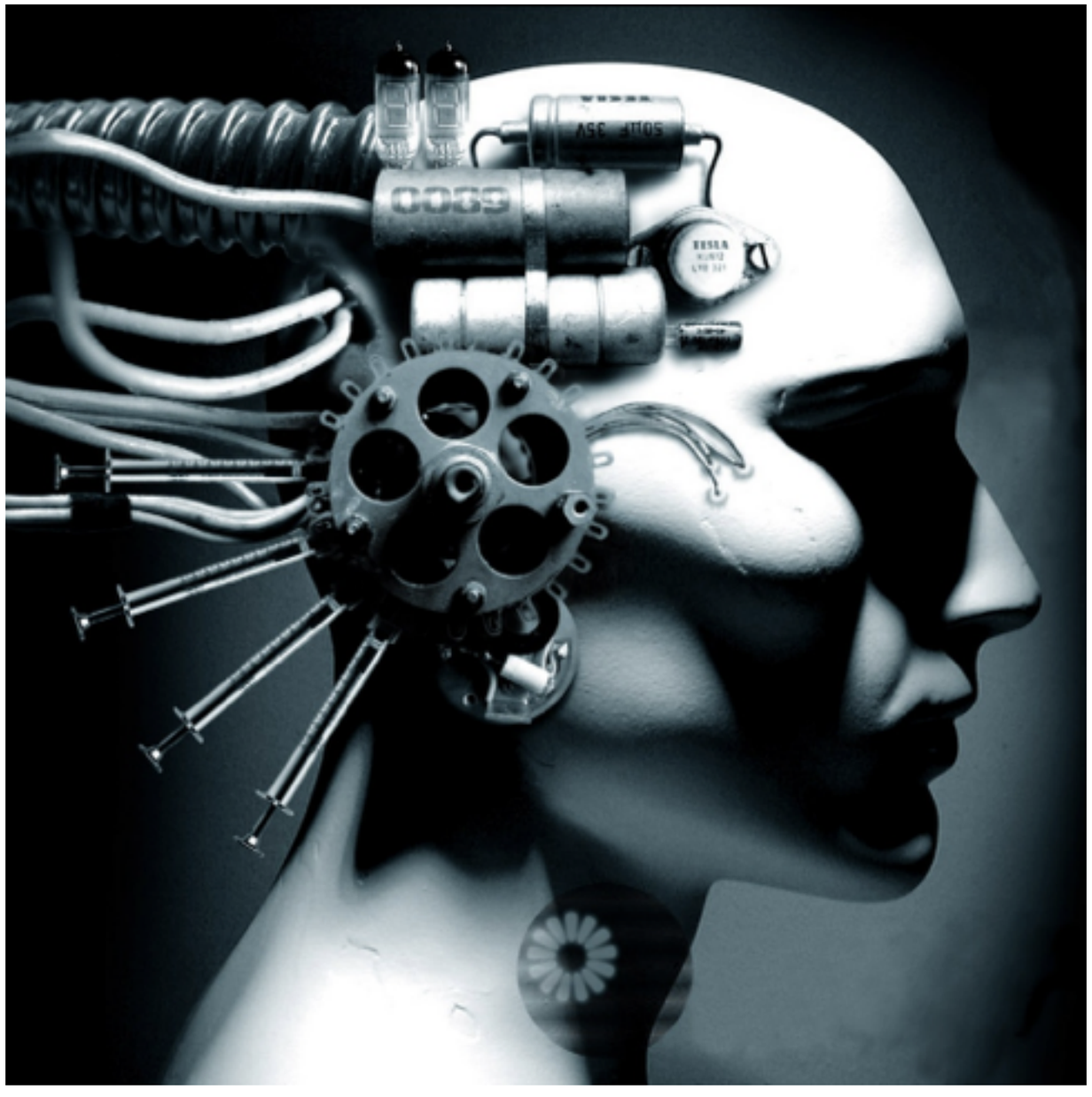
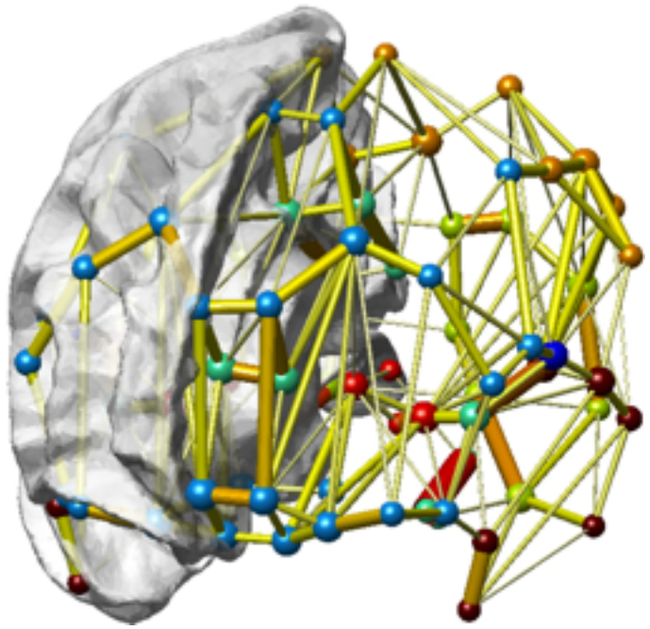
Virtual Neuroanatomy

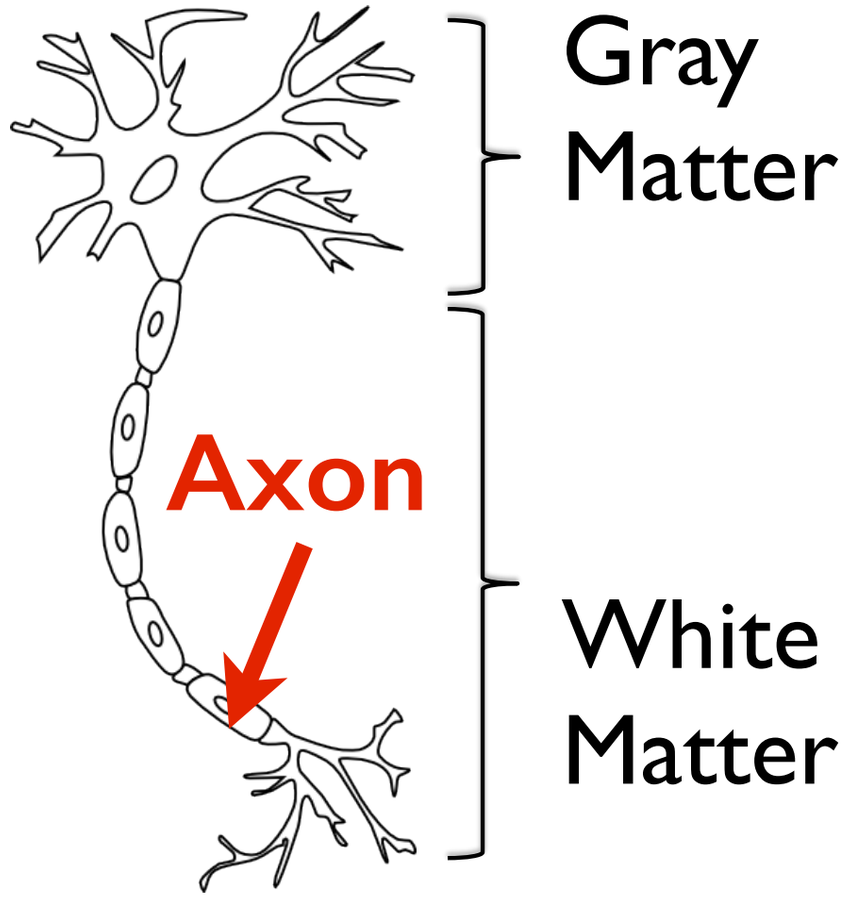
Introduction to Virtually Navigating the Human Brain



8/26/2014

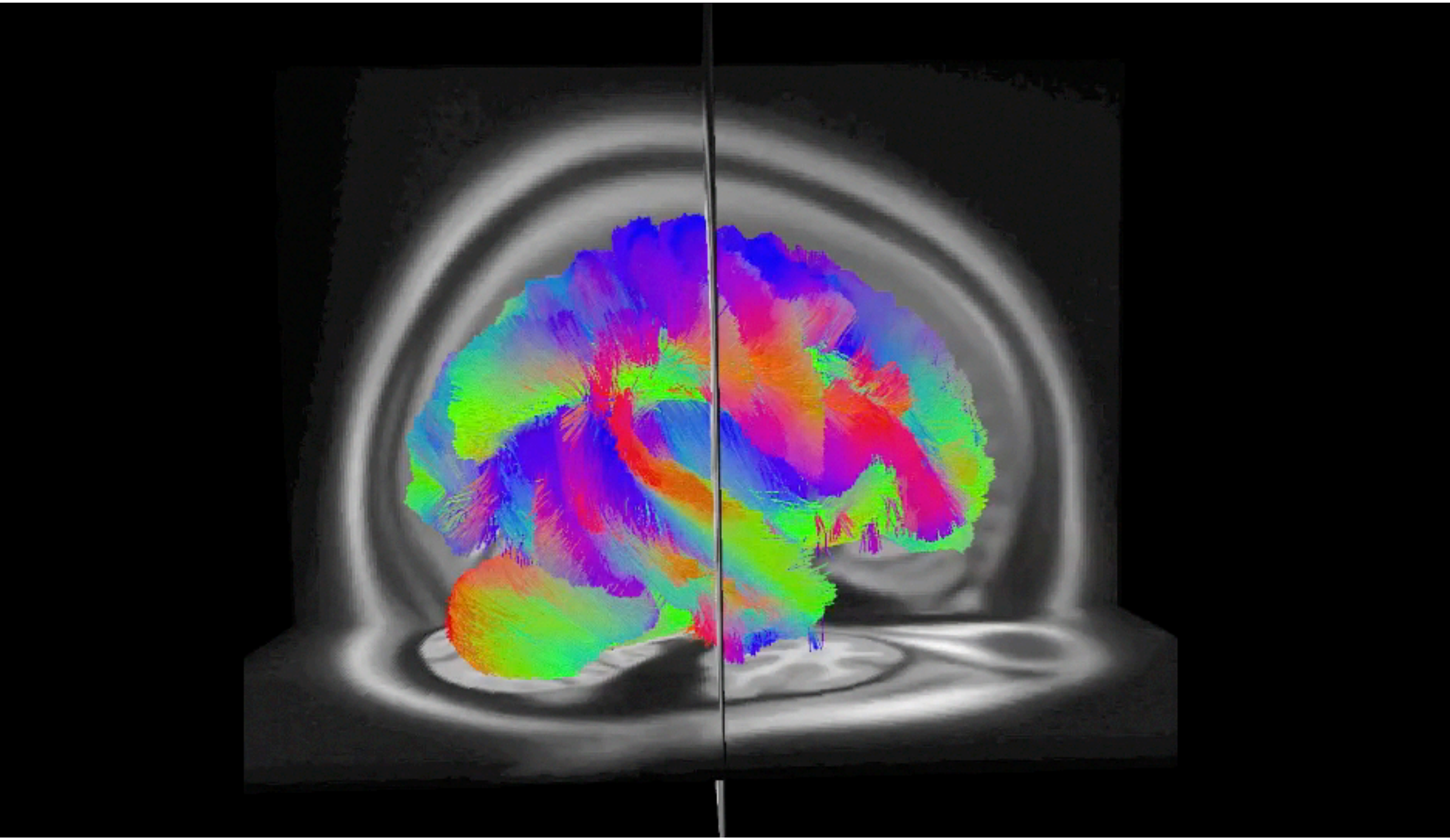
Why should I care about neuroanatomy if I'm interested in behavior or brain function?



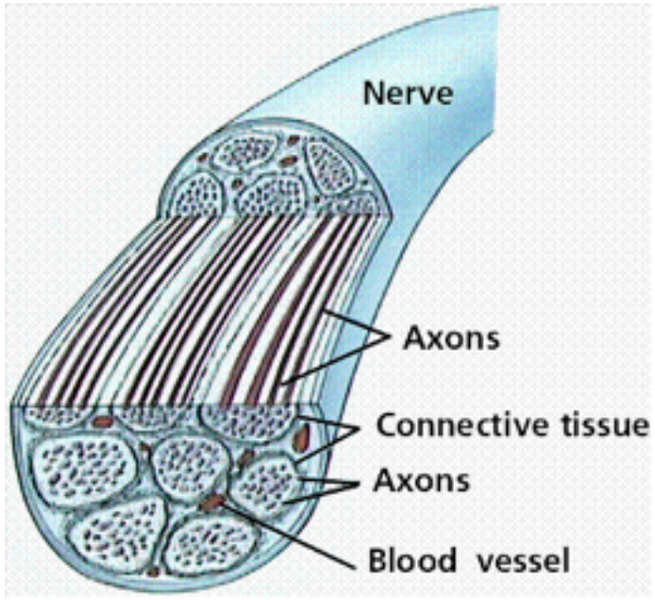


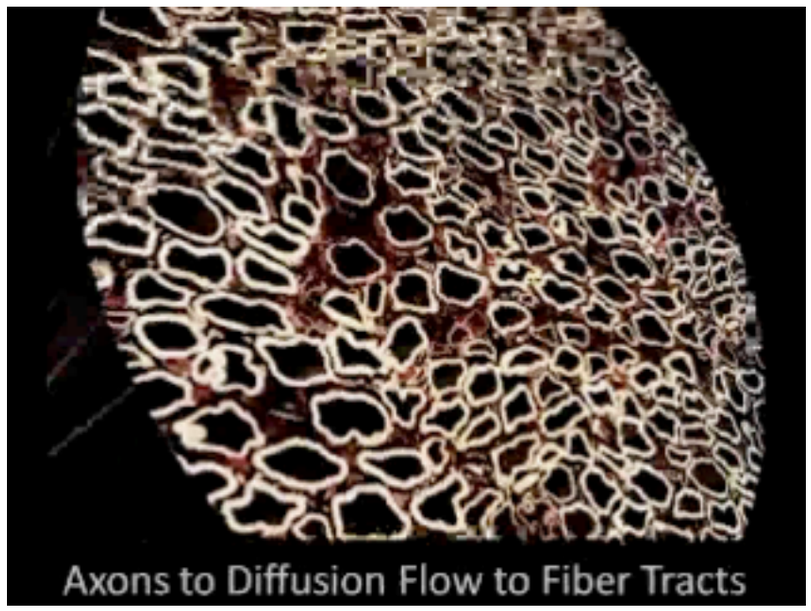
Traditional neuroanatomy approach

Today's neuroanatomy approach

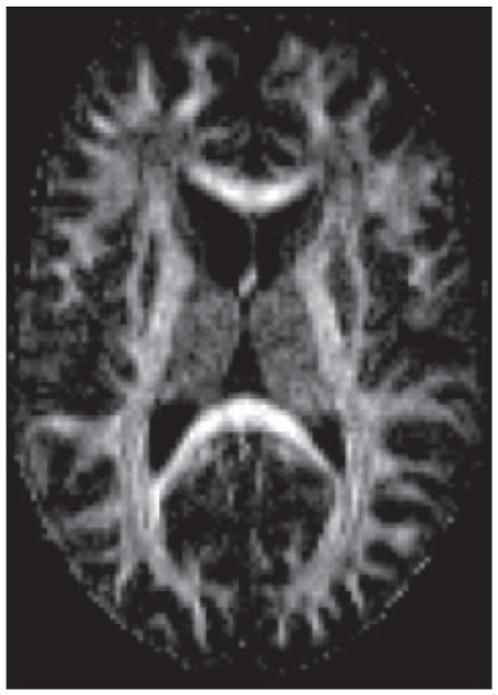


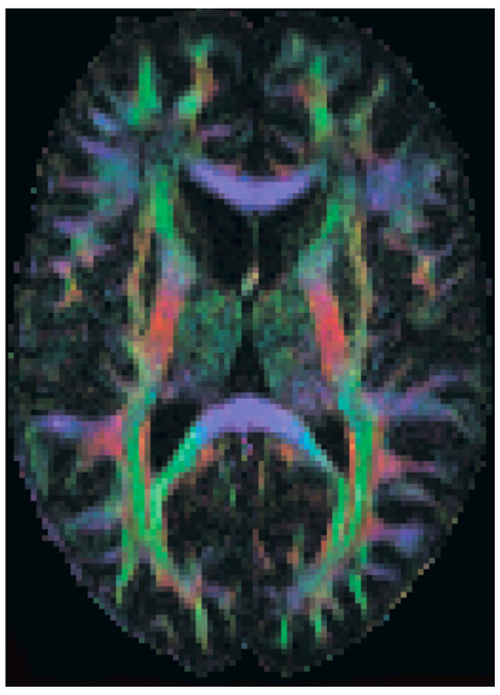
Diffusion weighted imaging



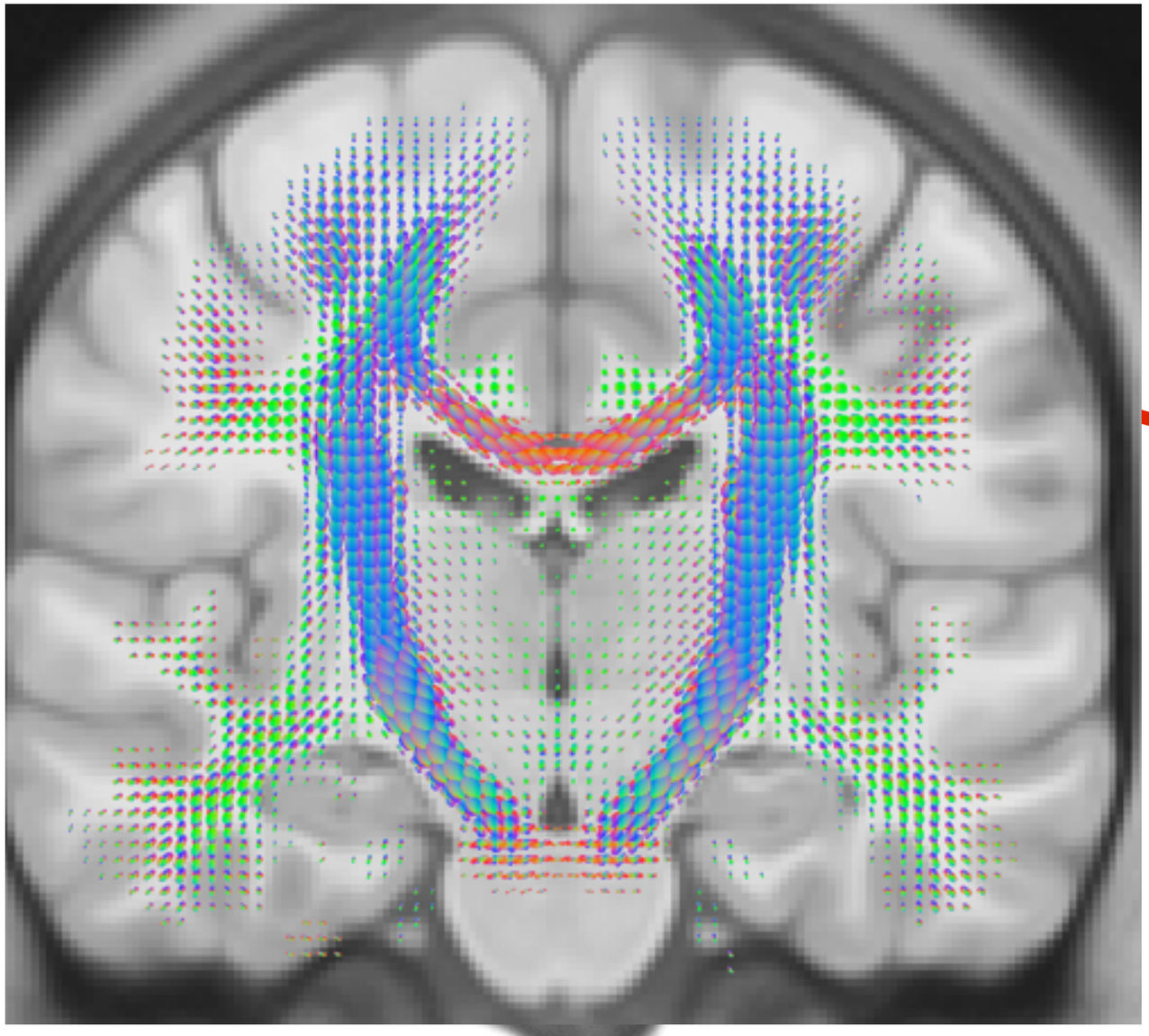


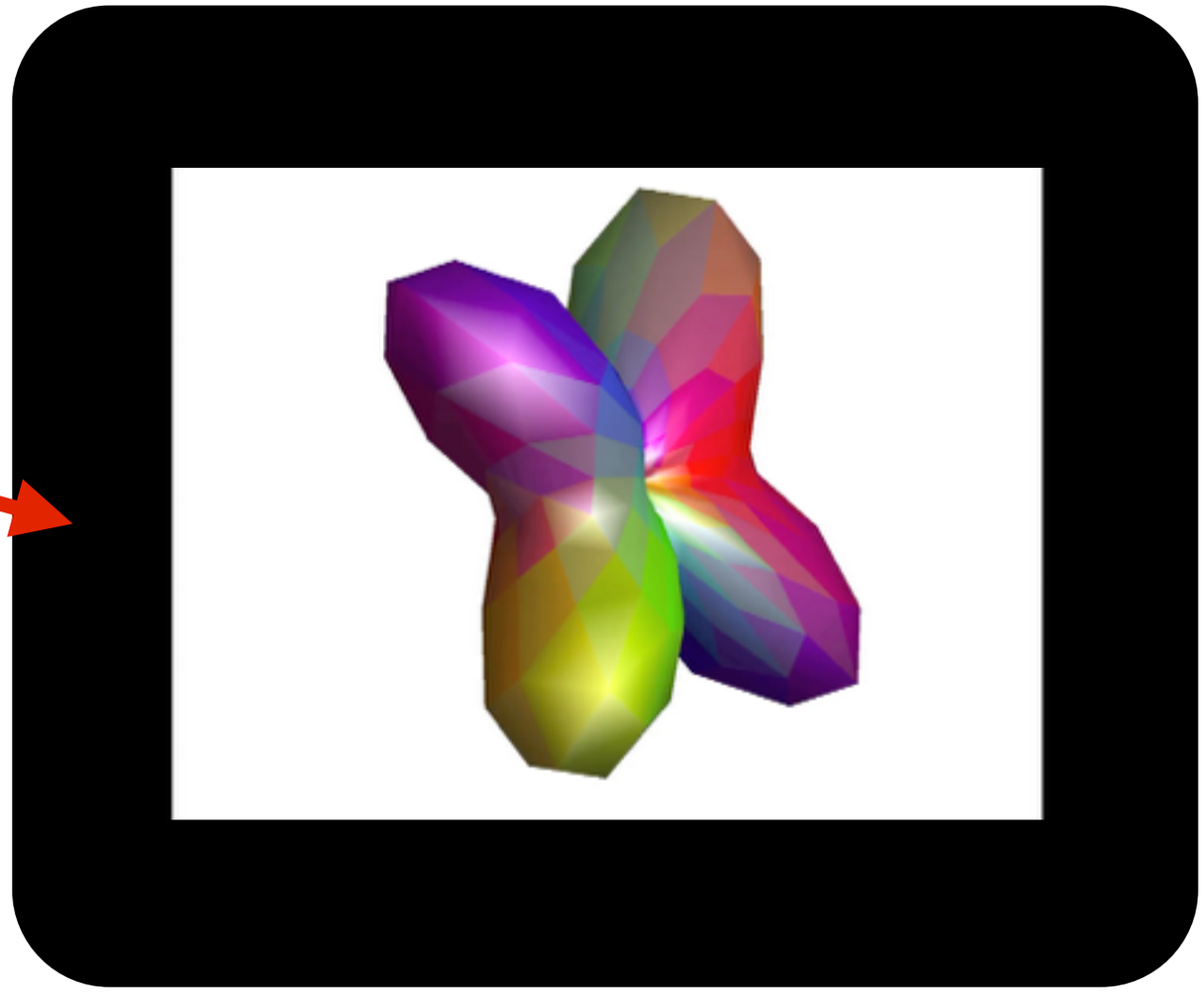
(video courtesy of Concha & Torres)





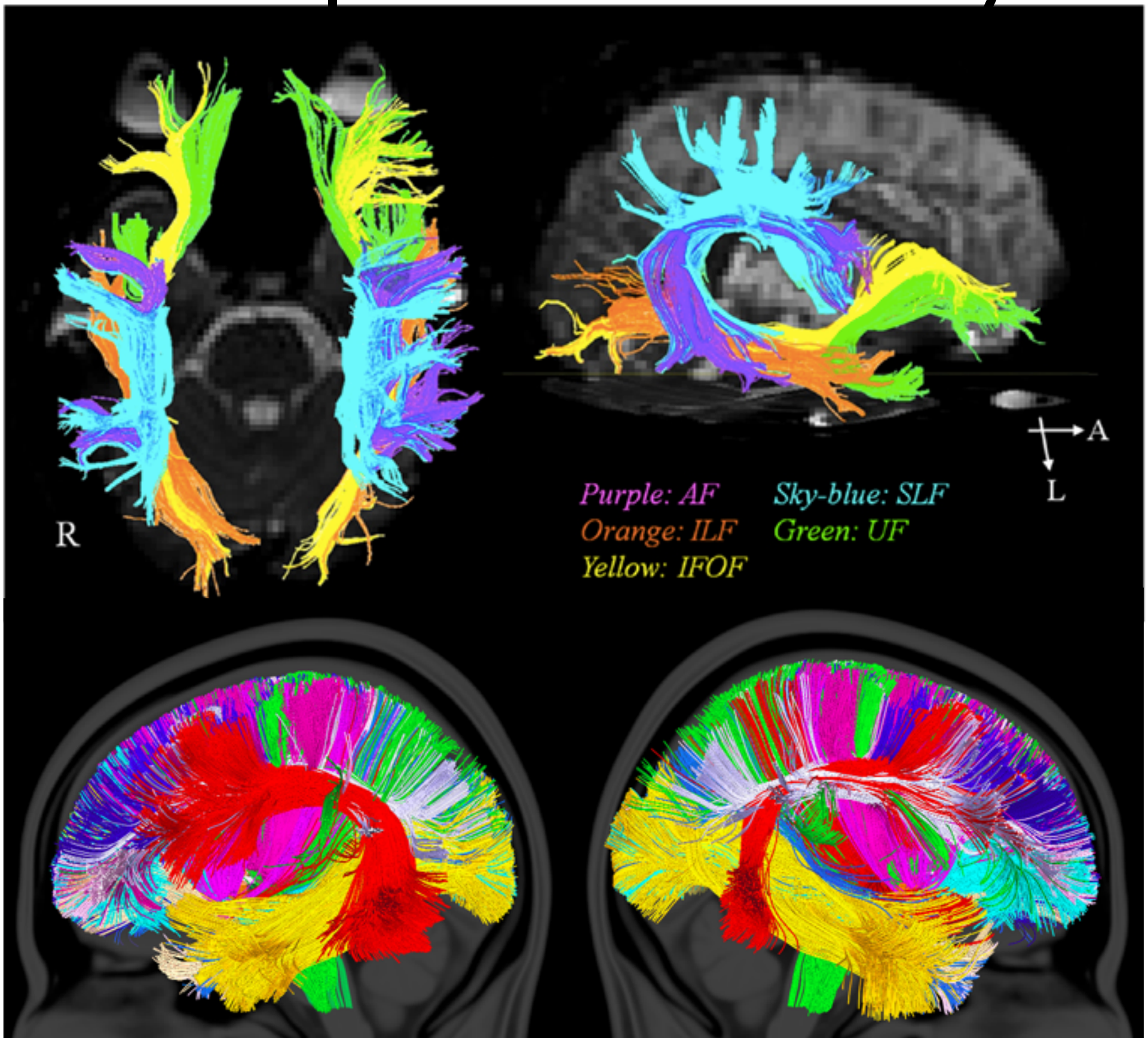
Diffusion weighted imaging





Diffusion weighted imaging

Anatomical maps of white matter systems



Two explicit goals for this class:

1. Learn to use the DWI tools that map neuroanatomical structure white matter pathways.
   - Normative templates of healthy human brain.

2. Learn about macroscopic neuroanatomical pathways interactively using neuroimaging data.
   - Whole Circuits!
     - Location, representation, function, connectivity, behavioral analogue

Meta-goal for the class

Begin building an Open Source atlas of the major white matter pathways in the human brain

- Use trained "diffusion anatomists" (i.e. you) to segment anatomically meaningful brain circuits and provide a description of their function.

- Post results online (URL to be determined), with attribution of authors of work.

Resources we will use

DSI Studio

dsi-studio.labsolver.org

DSI Studio

Introduction
Citations
Documentation
Download
Feature requests
Forum
Sample Images
Sitemap
Recent site activity

Contact

Questions, bug report, or any suggestions:

e-mail: frank.yeh (at) gmail.com

Developed by
Fang-Cheng (Frank) Yeh
CV, google citation

Department of Psychology
Carnegie Mellon University

Supported by

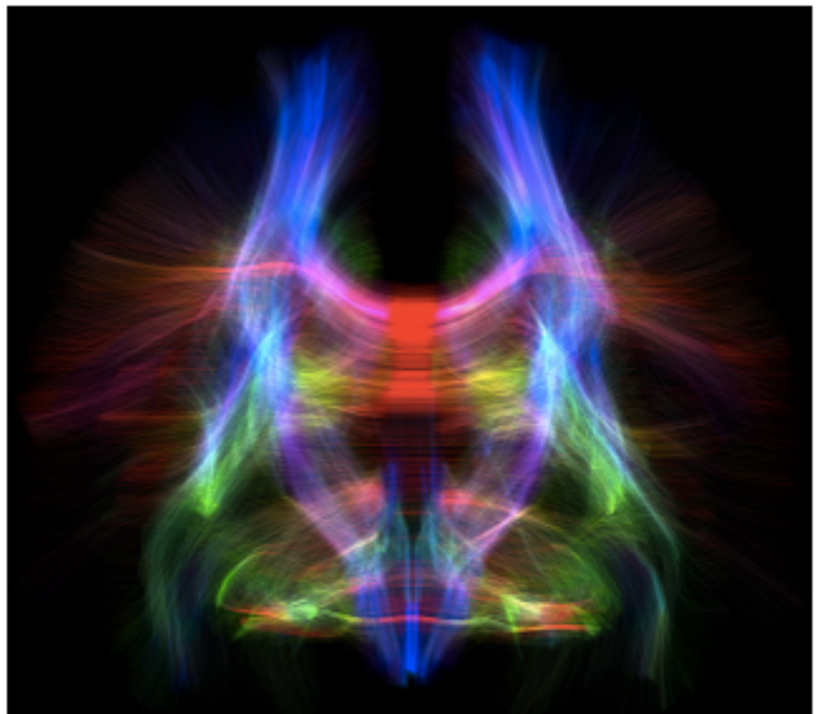
Advanced Biomedical MRI Lab, National Taiwan University Hospital

Cognitive Axon Lab, Carngie Mellon University

Introduction

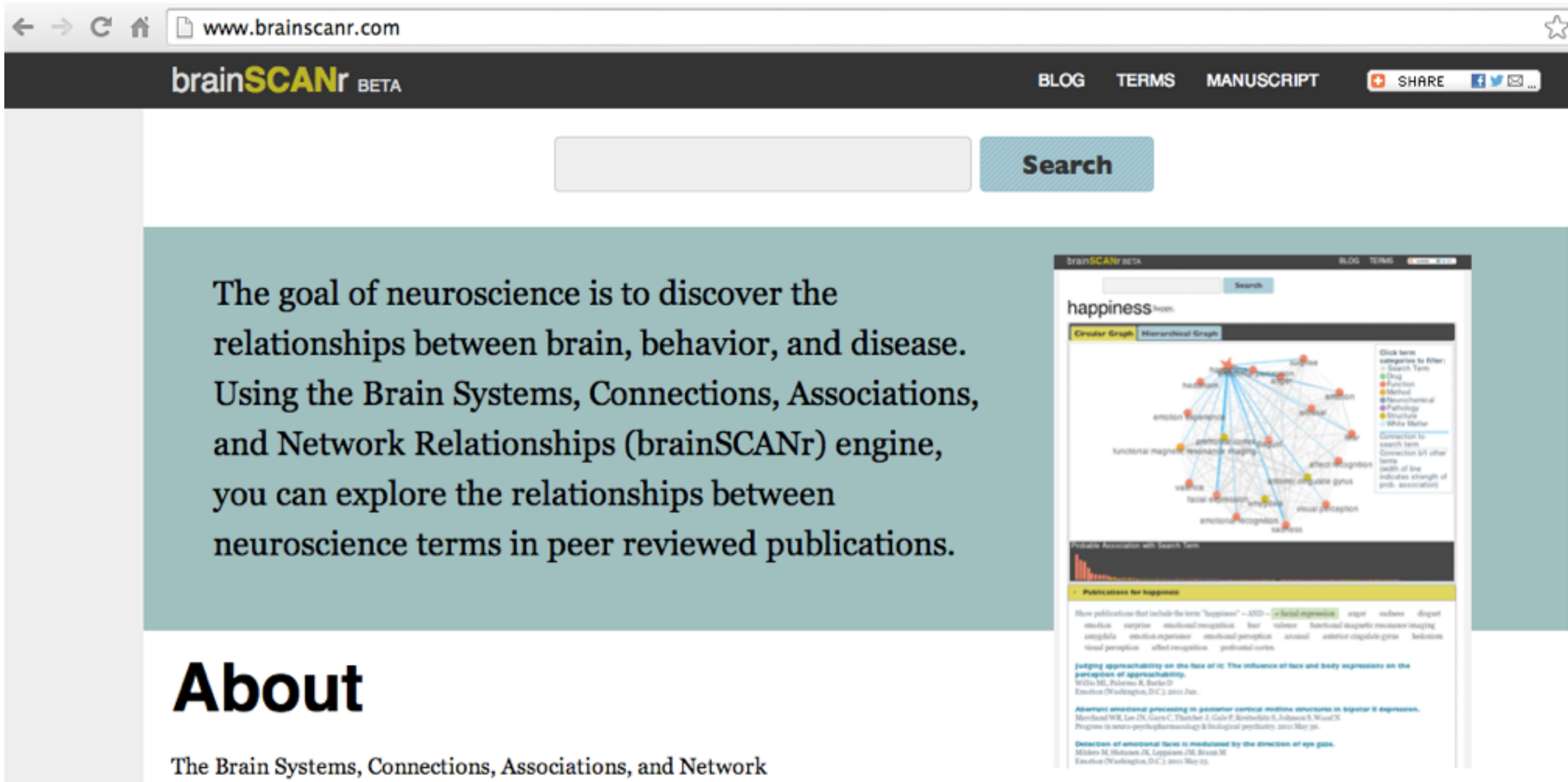
Reconstruction

- Diffusion tensor imaging (DTI),
- Q-ball imaging (QBI) using Funk-Radon transform or Spherical hormonic
- Diffusion spectrum imaging (DSI)
- Generalized Q-sampling Imaging (GQI)
- Diffusion Deconvolution
- Q-space Diffeomorphic Reconstruction (QSDR)



Resources we will use

BrainSCANr



Resources we will use

NeuroSynth

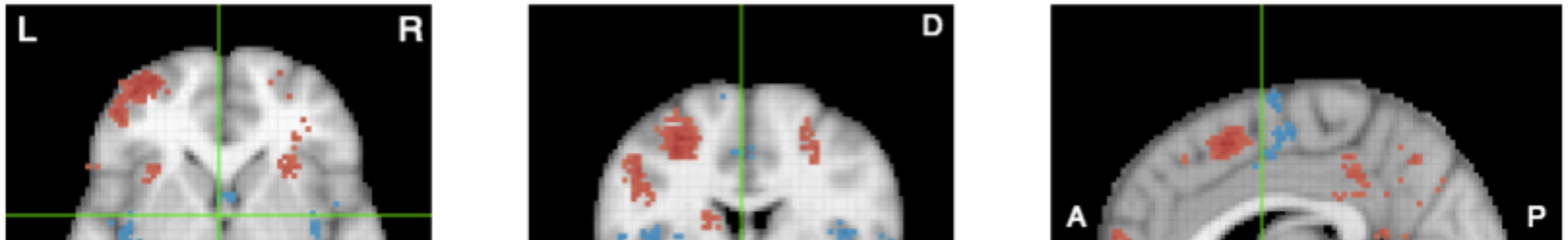
www.neurosynth.org

neurosynth.org (beta) | Home | Explore | Sets | Features | Studies | Locations | Code

neurosynth.org

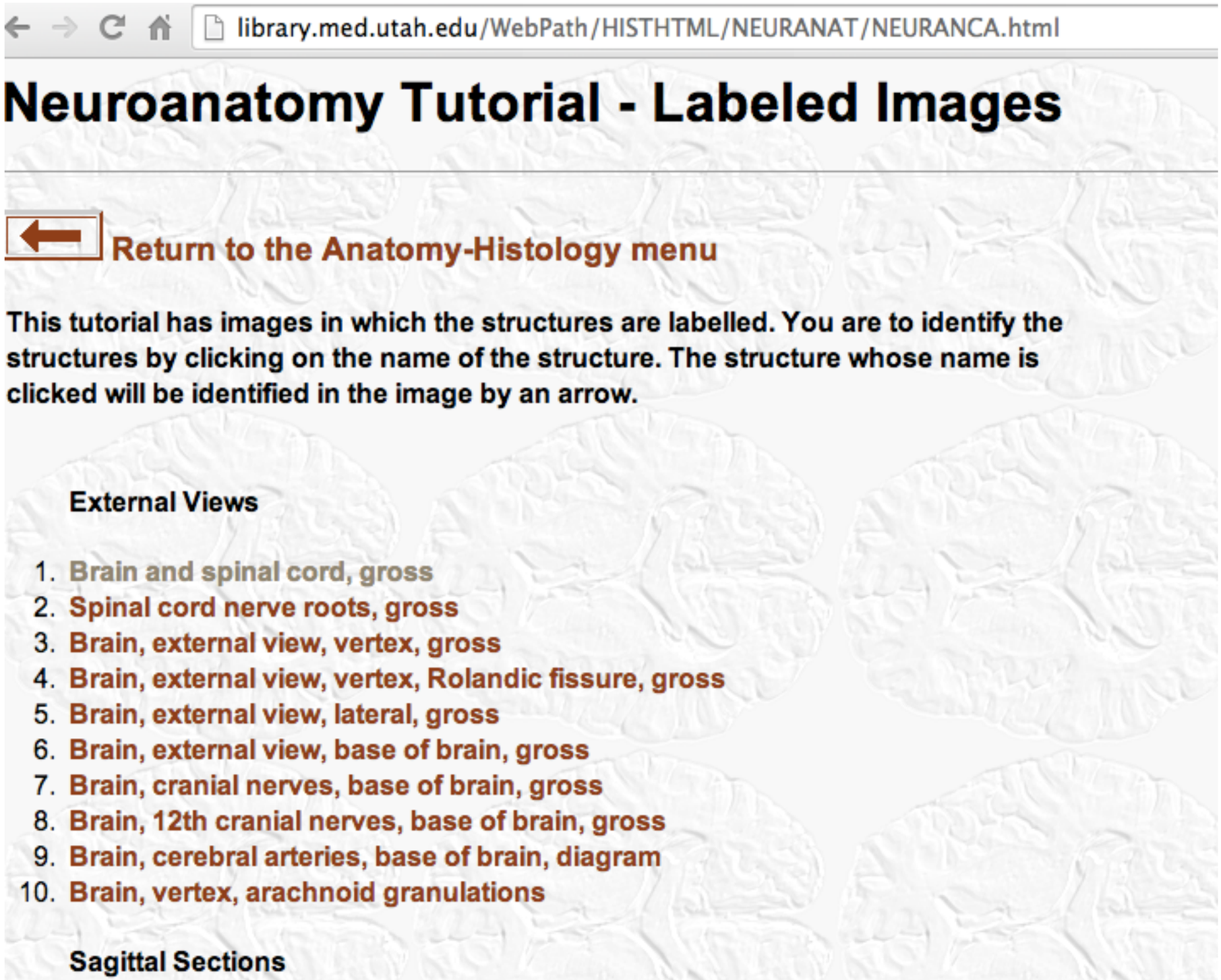
What is this?

NeuroSynth is a platform for large-scale, automated synthesis of functional magnetic resonance imaging (fMRI) data extracted from published articles. It's a website wrapped around a set of open-source Python and JavaScript packages. Neurosynth lets you run crude but useful analyses of fMRI data on a very large scale. For example, here's an automated meta-analysis of 1470 memory-related studies, visualized interactively:



Resources we will use

University of Utah Neuroanatomy Guide



Resources we will use

Good ol' Wikipedia

en.wikipedia.org/wiki/Neuroanatomy

WIKIPEDIA
The Free Encyclopedia

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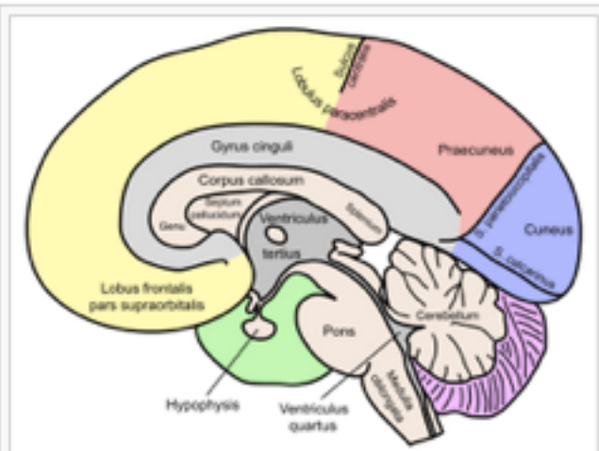
Neuroanatomy

From Wikipedia, the free encyclopedia

This article **is incomplete**. Please help to improve the section, or discuss the issue on the talk page. *(January 2010)*

Neuroanatomy is the study of the anatomy and stereotyped organization of nervous systems. In contrast to animals with radial symmetry, whose nervous system consists of a distributed network of cells, animals with bilateral symmetry have segregated, defined nervous systems, and thus we can make much more precise statements about their neuroanatomy. In vertebrates, the nervous system is segregated into the internal structure of the brain and spinal cord (together called the central nervous system, or CNS) and the routes of the nerves that connect to the rest of the body (known as the peripheral nervous system, or PNS). The delineation of distinct structures and regions of the nervous system has been critical in investigating how it works. For example, much of what neuroscientists have learned comes from observing how damage or "lesions" to specific brain areas affects behavior or other neural functions.



Anatomy of the human brain.

For information about the composition of animal nervous systems, see nervous system. For information about the

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Special pages
Permanent link

Before next class…

1. Download DSI Studio and get familiar with the latest interface.
   - This will also be installed on the lab computers.
2. Identify the the pathway you would like to study for your class project.
   - Think BIG pathways (smaller pathways are harder to map)
3. Do the readings (will be emailed)