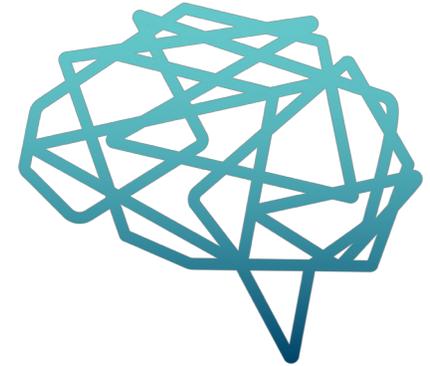


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BRAIN IMAGING RESEARCH CENTER

birc.uconn.edu



Introduction to the Brain Imaging Research Center

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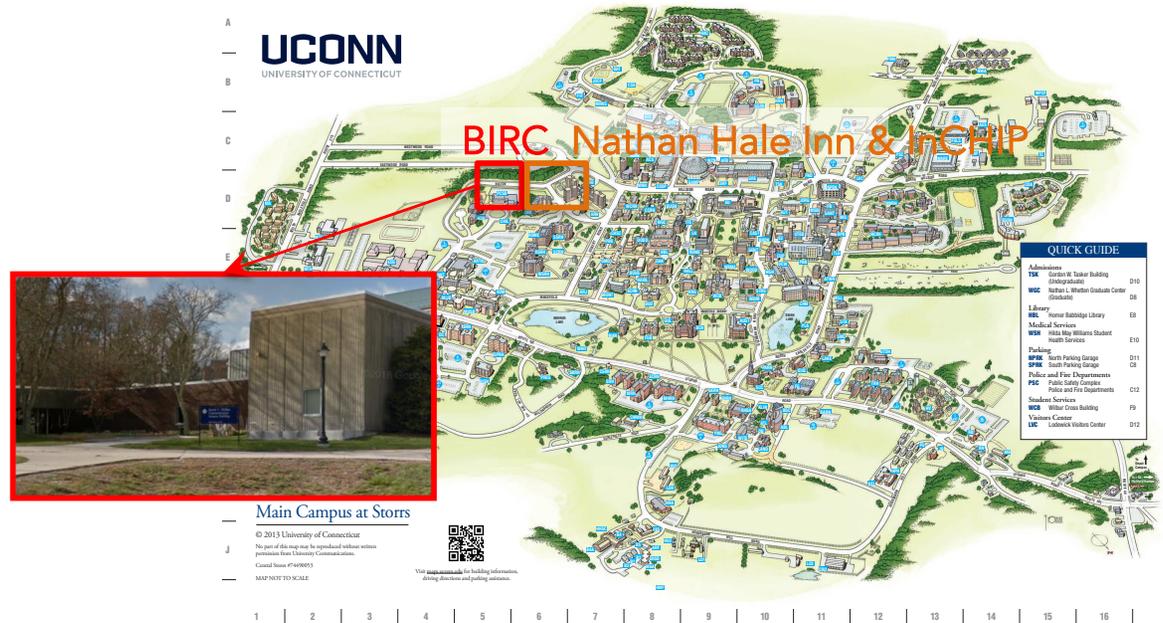


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UConn

BIRC: Brain Imaging Research Center



E.Collin

BIRC: Brain Imaging Research Center

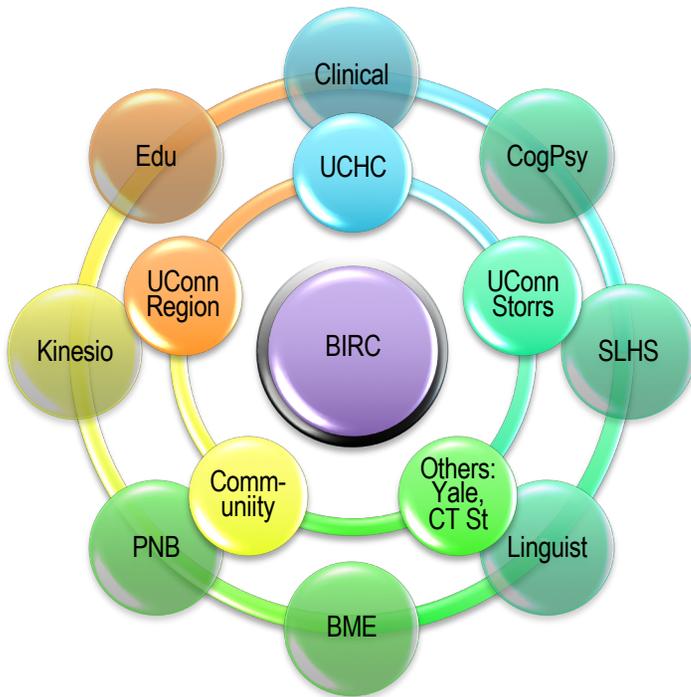


E.Collin

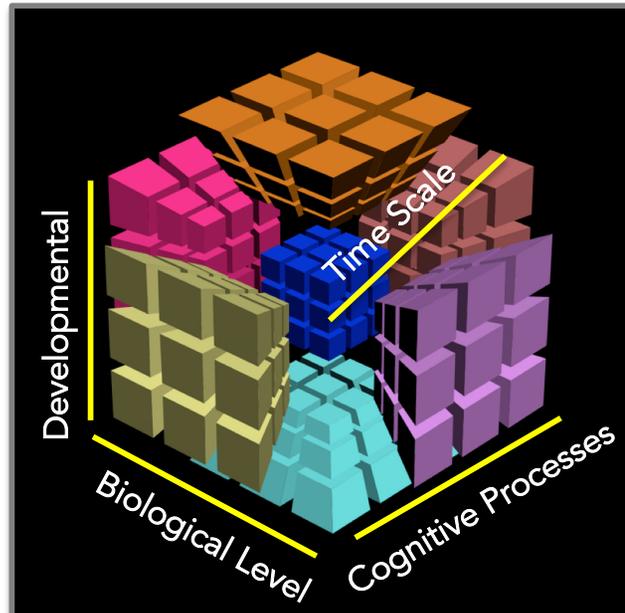
- Housed in the Philips Communication Building, Storrs campus
- Opened its door in 2015
- 3,200 square feet of renovated research space for cognitive neuroscience
- Provides a multidisciplinary hub for new research
- Offers clinical services in collaboration with UCHC Radiology since Fall, 2018

BIRC Vision

FOSTER MULTIDISCIPLINARY
COLLABORATION



FACILITATE SCIENTIFIC
DISCOVERY &
ADVANCE THEORY



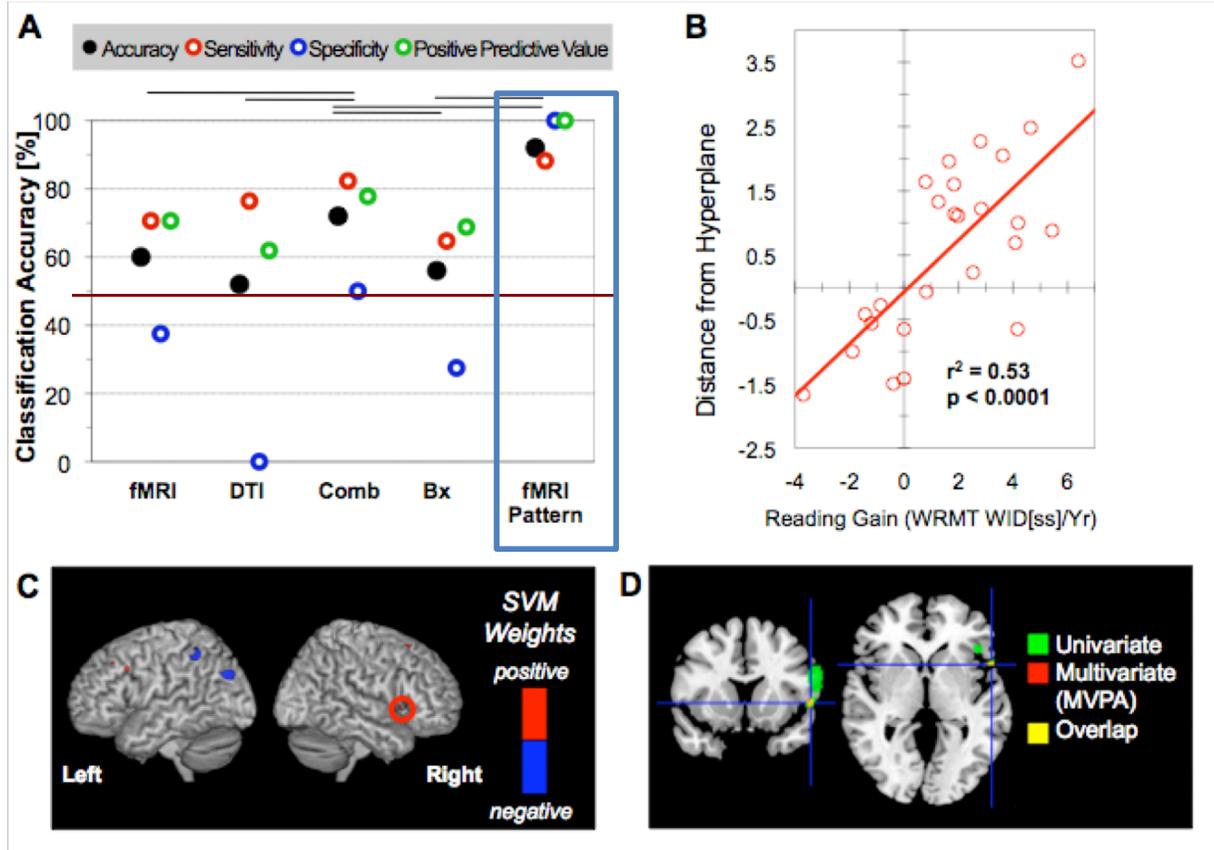
ENGAGE THE COMMUNITY



What can brain imaging tell us?

- **Biomarkers.** Brain patterns can be used for early identification & to predict treatment response. e.g. Alzheimer's Disease
- **Training Effect.** Brain pattern can track and change with treatment, instruction and training. E.g. exercise
- **Phenotypes.** Identification of unexplored subtypes. E.g. autism
- **Inform Practice.** R&D of practical tools such as an app
- **Others.** Imaging genetics, heritability. Cross-species comparison. Neurochemistry. Laminar & columnar structure. Network analyses. Machine learning, pattern classification.

e.g. Biomarkers: Predicting outcome by MRI and behavior are not 2 sides of the same coin

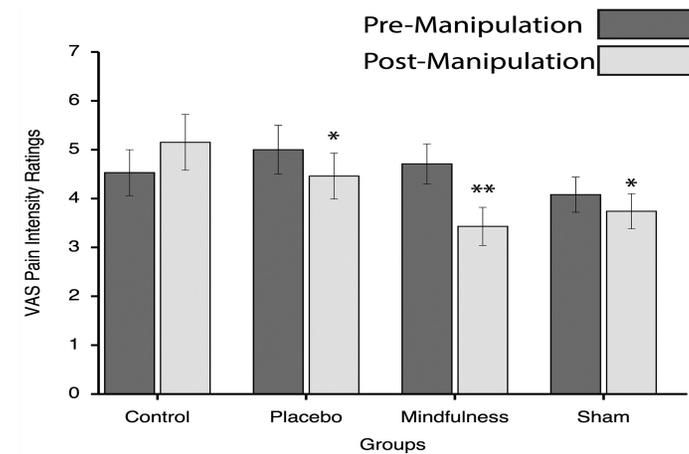
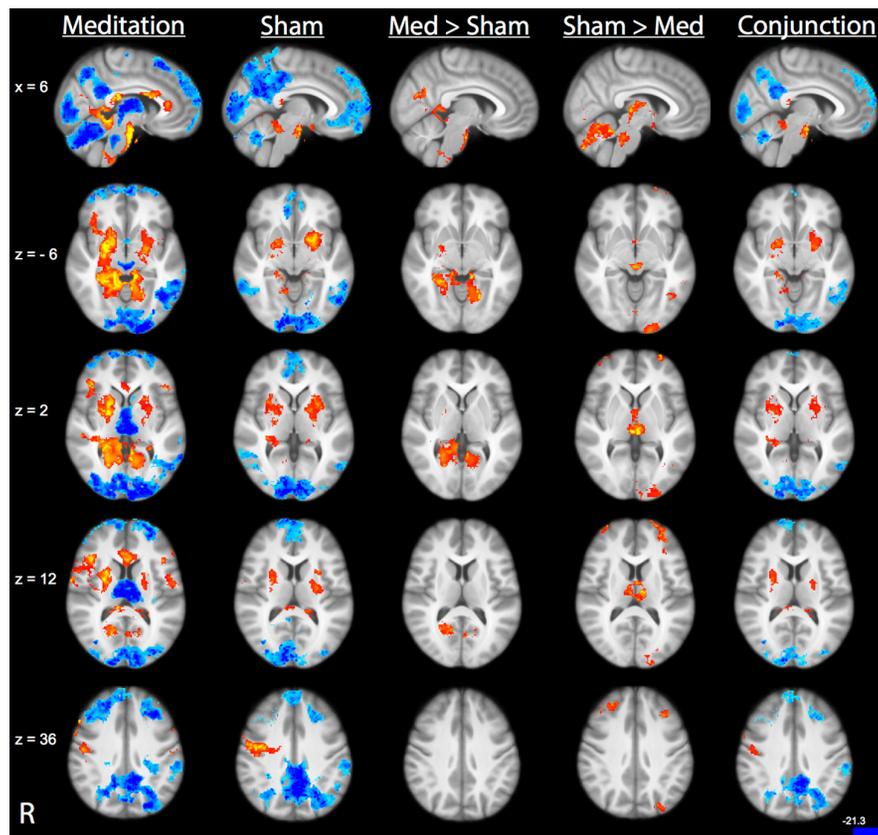


Brain patterns using machine learning predicts outcome better than Bx alone (>90% vs. <60%).

Behavior (Bx) and Brain combo (81%) predicted academic outcome better than Bx (65%) or Brain (57%) alone (vs. 81%).

Hoefl ... Gabrieli. Beh neurosci 2007
Hoefl... Gabrieli. PNAS 2011

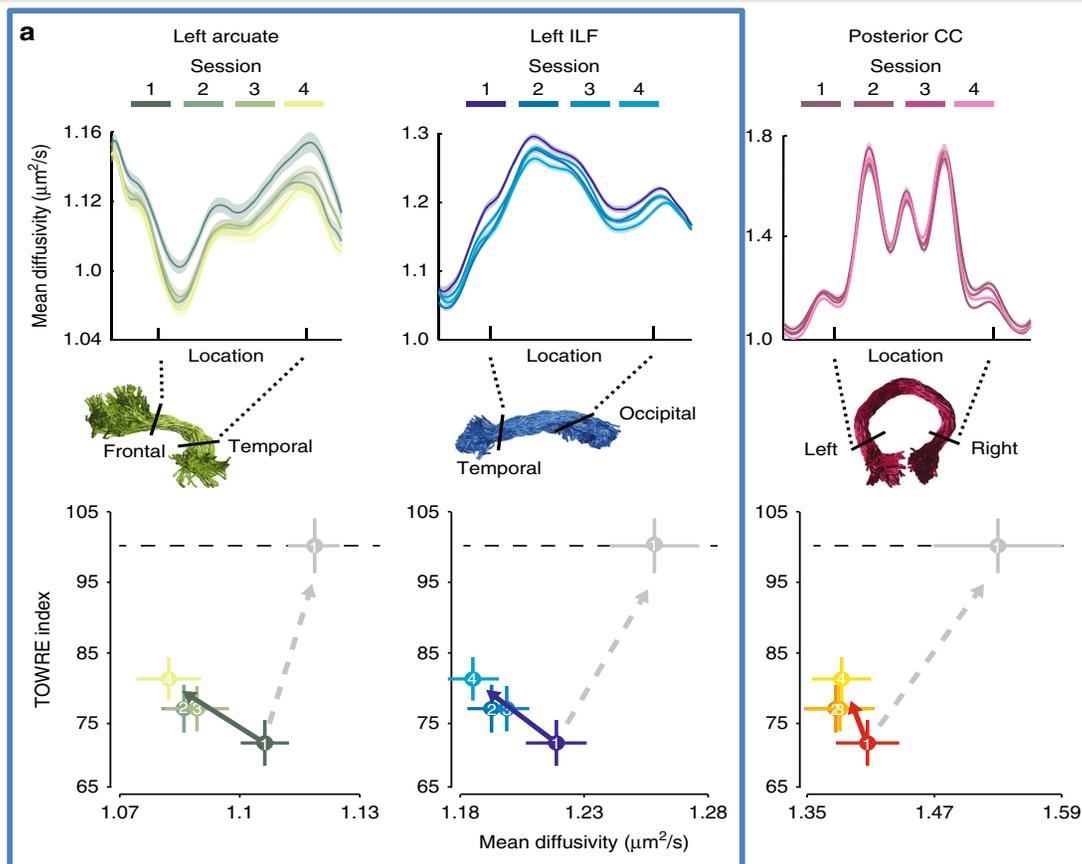
e.g. Intervention Effect: Different strategies: same pain reduction, different mechanism



Mindfulness meditation-based pain relief
employs different neural mechanisms than
placebo and sham mindfulness meditation-
induced analgesia

Zeidan... Coghill. J Neurosci 2015

e.g. Intervention Effect: Rapid compensatory changes



Reading intervention in dyslexia causes:

- Rapid (~2.5wks) & specific reorganization of white matter fibers.
- Reflects compensatory mechanism, not normalization.
- Relationship with behavior changes (so longitudinal research necessary, not snapshot)

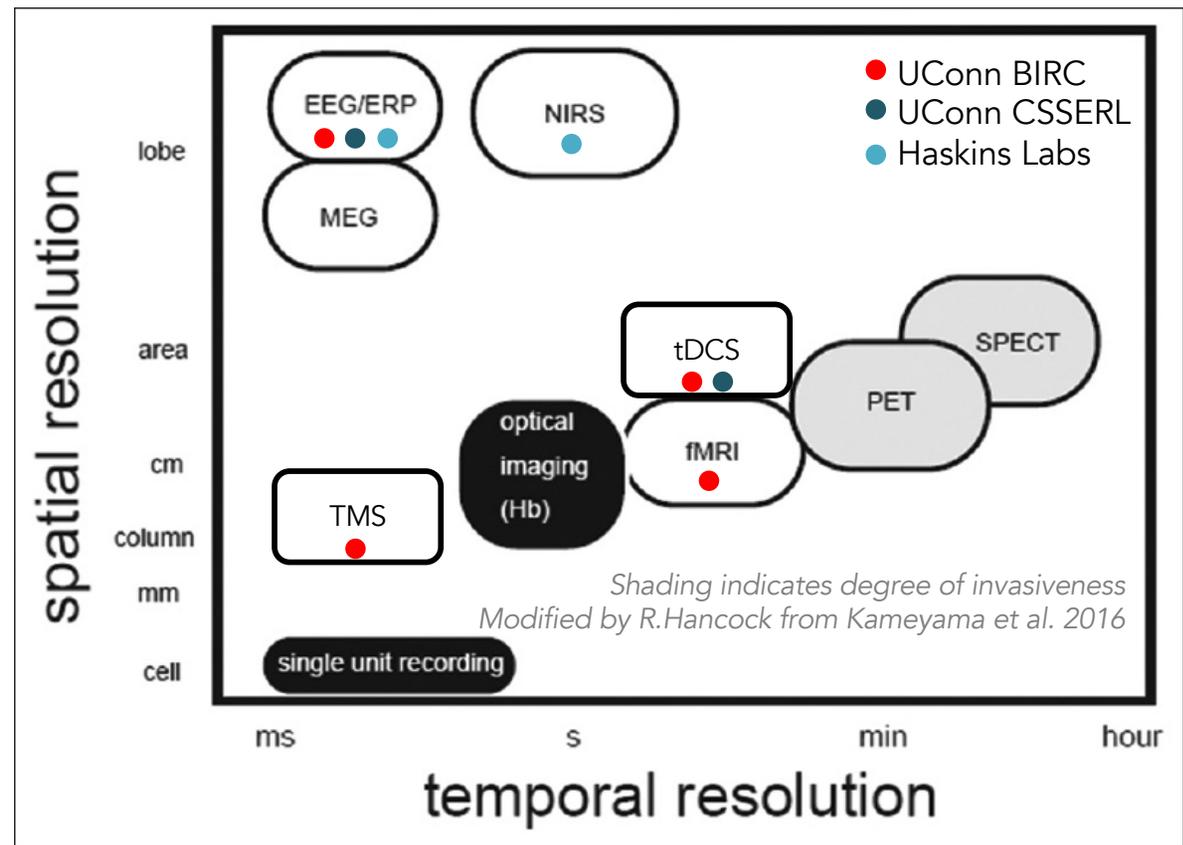
e.g. From Neuroimaging to App R&D

Leverage multidisciplinary collaboration, technology, and insights from neuroscience for R&D of a school readiness & dyslexia-screener app

by F.Hoefl in collaboration with brainLENS, UCSF, Curious Learning, MIT, UConn

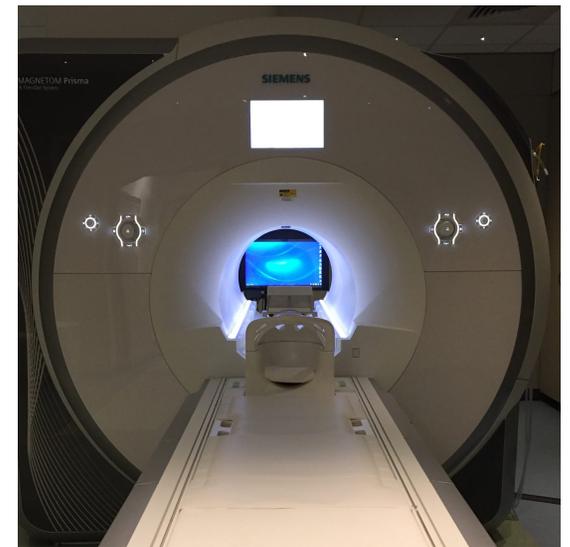
Techniques Available

- Complementary techniques available
- Multiple techniques probe brain function at different temporal and spatial scales
- Allows for a complete picture of macroscopic brain function

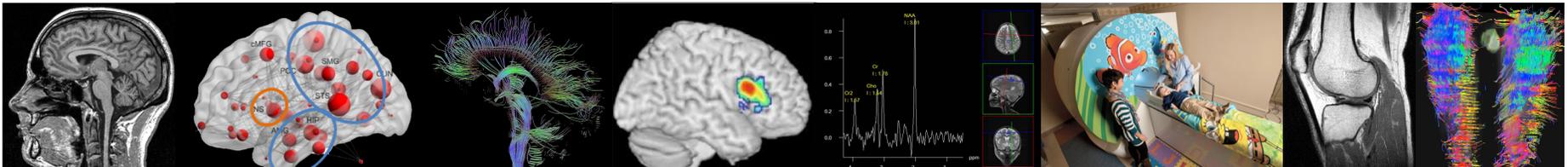


MRI: Magnetic Resonance Imaging

- Magnetic Resonance Imaging (MRI)
- Best commercially available high field MRI (Siemens 3T Prisma)
- MRI uses a powerful magnet to image the body (x600 strength of fridge!)
- Completely non invasive, no ionizing radiation exposure
- Measures anatomy and brain function

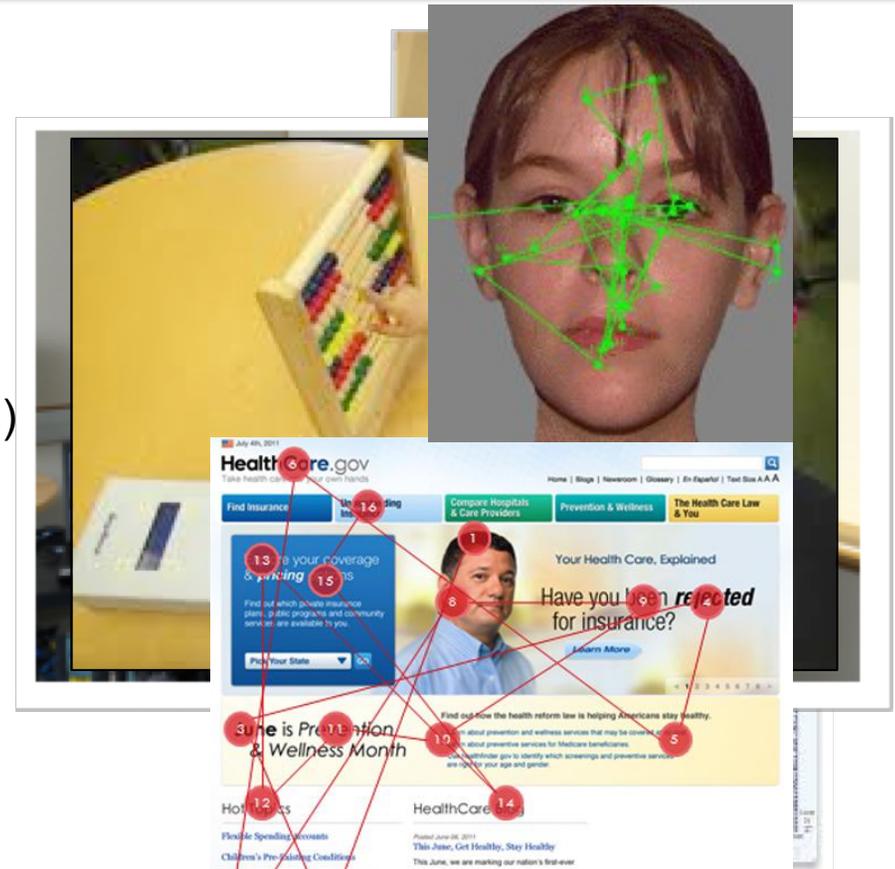


functional MRI (fMRI), structural MRI, diffusion weighted imaging (DWI), magnetic resonance spectroscopy (MRS), etc...



Other Equipment

- High density electroencephalography (EEG)
 - 2x 256 channel systems
 - Records electrical activity in the brain
 - Systems for use in and out of the MRI
- Transcranial magnetic stimulation (TMS)
 - Modulates brain activity. Blocks & enhances.
- High density transcranial electrical stimulation (tES)
- Eye tracking
 - Records eye movement during behavior
 - Systems for use in and out of the MRI



Support for Participants: Mock MRI etc

- Mimics the feel and sound of an MRI
- Acclimates participants to the MRI
- Particularly helpful for children
- Staging of MRI & MRI prep video



Support for Users: Workspace and Data Analysis

- Shared space for data analysis
- Computing resources
- Access to high performance computing systems



Training: IBRAiN Fellowships

- IBACS-BIRC Research Assistantships in Neuroimaging
- Graduate training in neuroimaging
- 1-2 year 10hr/wk fellowships
- MRI scan time for fellows to develop their own projects
- Fellows support the community by consulting and mentoring faculty and students
- **Your students can apply to become experts**
- **Your team can get support to jump start your project**



Inaugural IBRAiN Cohort (2018)

Summary of BIRC

- BIRC provides a multidisciplinary hub for research in cognitive science and other fields
- Supports a wide range of basic and applied research
- Provides training opportunities and support to users
- And... MRI is one of the most expensive research tools that IDC applies (MRI: \$500-1,000/sj, Bx: \$0-10/sj) 😊

Visit birc.uconn.edu to learn more!



InCHIP offers a “one stop shop” for successful grant writing and to perform impactful health-related research.

Training, Mentoring, Researcher network, & Grant management

Visit <http://inchip.uconn.edu/>

 Institute for Collaboration on Health, Intervention, and Policy
 @UCONNInCHIP

FY19



Research Seed Grant

- The [Institute for Collaboration on Health Intervention and Policy \(InCHIP\)](#) and the [Brain Imaging Research Center \(BIRC\)](#) are offering a \$30,000 seed grant for an innovative pilot project in health with a neuroimaging component.
 - \$15,000 exclusively for BIRC equipment usage.
 - \$15,000 for other research costs associated with the pilot project.
- The funded pilot project *must* involve neuroimaging-related research that includes MRI, TMS, tDCS/tACS, and/or EEG usage at BIRC.
- Click [here](#) for more information about this seed grant.

\$30,000 seed grant opportunity!
LOI due 4/26

