

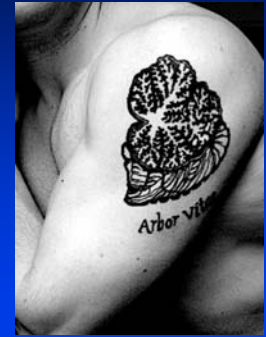
# The Cerebellum: Is it Just for Motor Control? AS.080.370(01): Fall 2017

Instructor:  
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Cognitive Science, and Neuroscience Program  
Johns Hopkins University

# Alternative Course Titles

- The cerebellum: It's not just for breakfast anymore
- The cerebellum: WTF?



Courtesy of Dr. Catherine Stoodley

# My Background

- PhD: UMASS, Amherst, Psychology
- Stanford University, 1993
  - Assistant Professor, Radiology
  - Functional MRI: New research tool launched new career

The Journal of Neuroscience, December 16, 2009 • 29(50):16100–16108

## Lobular Patterns of Cerebellar Activation in Verbal Working-Memory and Finger-Tapping Tasks as Revealed by Functional MRI

John E. Desmond,<sup>1</sup> John D. Scahill,<sup>1</sup> Anthony D. Wayne,<sup>1</sup> Bruce L. Glazer,<sup>1</sup> and Gary H. Glover<sup>1,2</sup>

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**Abstract** Cerebellar activation in verbal working memory and finger-tapping tasks was examined using functional MRI (fMRI). The cerebellum is a highly organized structure, and its functional organization is not fully understood. We used a task-based approach to identify functional regions within the cerebellum that are involved in verbal working memory and finger-tapping tasks. We found that the cerebellum is involved in verbal working memory and finger-tapping tasks, and that these tasks activate different regions of the cerebellum. The results suggest that the cerebellum is involved in verbal working memory and finger-tapping tasks, and that these tasks activate different regions of the cerebellum.

**Introduction** The cerebellum is a highly organized structure, and its functional organization is not fully understood. We used a task-based approach to identify functional regions within the cerebellum that are involved in verbal working memory and finger-tapping tasks. We found that the cerebellum is involved in verbal working memory and finger-tapping tasks, and that these tasks activate different regions of the cerebellum.

**Key Words:** cerebellum; functional MRI; verbal working memory; finger-tapping; task-based approach; functional organization

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## Course Organization

- Lectures (from me and a few guest lectures)
- Paper discussions
- Student Presentations
  - Society for Neuroscience-style slide (powerpoint) presentation

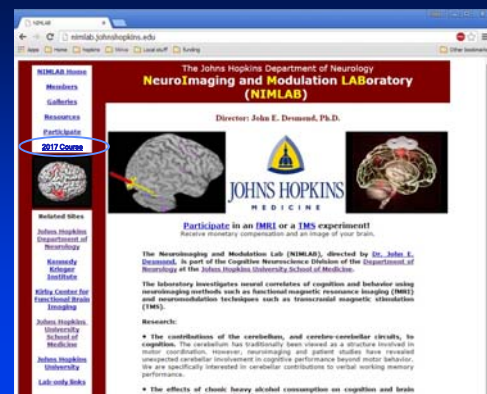
## Grading

- 25% Participation
- 37.5% Midterm
- 37.5% Final (non-cumulative)

## Participation

- Paper discussions on most Tuesdays
- Participation = contribution to discussion, voluntarily and/or via instructor selection + class presentation
- Attendance and participation in paper discussions and class presentation counts toward participation portion of grade

Website: [nimlab.johnshopkins.edu](http://nimlab.johnshopkins.edu) -- click on "2017 Course"



The screenshot shows a web browser window displaying the NIMLAB website. The browser's address bar shows [nimlab.johnshopkins.edu](http://nimlab.johnshopkins.edu). The website header includes "The Johns Hopkins Department of Neurology Neuroimaging and Modulation Laboratory (NIMLAB)" and "Director: John E. Desmond, Ph.D.". A navigation menu on the left lists "Home", "About", "Research", "Participate", and "2017 Course", with "2017 Course" highlighted by a red circle. The main content area features a brain scan image and text inviting participation in an fMRI or TMS experiment, including details about the laboratory's research on cognitive correlates of cognition and behavior.

## The Cerebellum: Is it Just for Motor Control?

AS.080.370: Fall 2017

This website will be used to post lecture notes and papers for discussion.

### Messages:

Update: 8/29/2017 7:50 PM

Welcome!! This page will be updated periodically with pdf links to lecture notes and papers that will be discussed in class. Also, please see links below for syllabus and additional information on grading policy.

Instructor: [Dr. John E. Desmond](#) ← Email link

[Course syllabus is here.](#) ← Syllabus and grading info download

[Additional information on grading is here.](#)

**Tip Step 5:** Course Introduction: [Intro Slides](#). Lecture 01. Cerebellar Anatomy, Theory. [Lecture notes:](#) For Lectures 1 and 2 with one slide per page, click [here](#).

Today's lecture notes (will try to provide these in advance)

## Course Objectives

- Provide overview of cerebellar anatomy and circuitry
- Describe motor aspects of cerebellum, motor symptoms, some theories of cerebellar function
- Survey evidence for cerebellar involvement in functions other than classical motor control

## Cerebellum: Party Line View

Example of a Google search on "cerebellum"

## Non-classical motor topics

- Sensory acquisition
- Timing
- Classical conditioning
- Verbal working memory
- Language
- Executive function
- Neuropsychiatric disorders

## Goals

- Give you more knowledge about cerebellum than you had before
- Give you an appreciation that there are many mysteries regarding cerebellar function, and that shedding light on those mysteries is an area of active research
- Develop skills in reading research papers
- Develop skills in conference-style oral presentations

## Class Presentation Format

- **Introduction**
  - Background on an issue or problem
- **Purpose**
  - ...of the present study
- **Hypothesis**
  - if there is one
- **Methods**
  - Subject info, procedures, variables measured, how data are analyzed
- **Results**
  - Statistical test results, graphics
- **Discussion**
  - e.g., how does the present study relate to other studies
- **Conclusions**
  - Summary of the take-home message

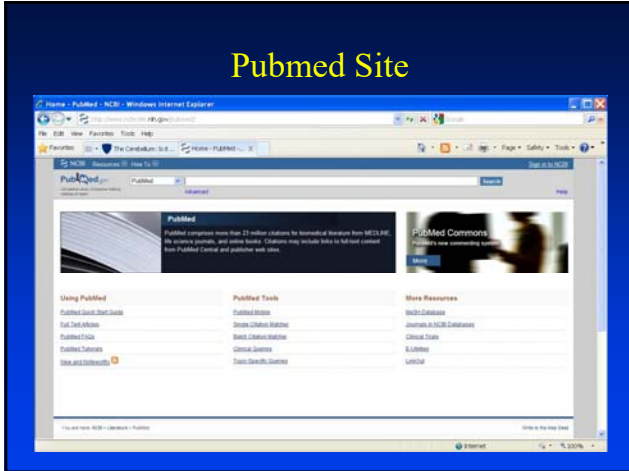
## Class Presentations

- Powerpoint preferred
- Give your file to me, or bring your own computer (vga hookup available – if you use a Mac, bring adapter)
- Allow a couple of minutes for questions
- It is important to adhere to time constraints

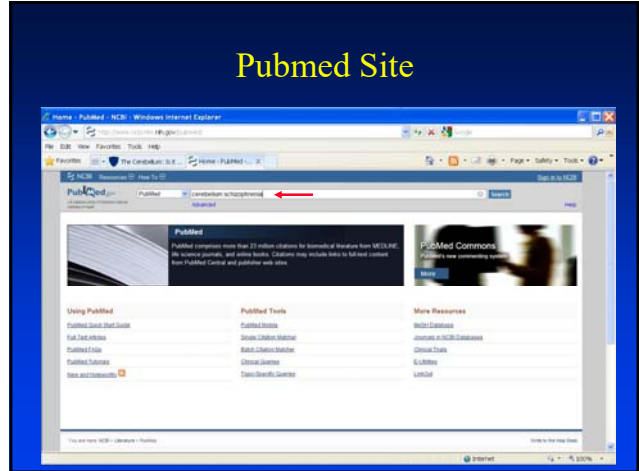
## Class Presentations

- Presentation Topic: Anything related to cerebellum that interests you
- Find a paper on Pubmed and present it as if it is your own work
  - A research paper, NOT a review paper
- Pubmed:  
<http://www.ncbi.nlm.nih.gov/pubmed/>

## Pubmed Site



## Pubmed Site



## Pubmed



## Pubmed



## Getting full text of article

- Make sure you are on the Johns Hopkins network
  - ...otherwise journals will not recognize the subscription
- If not directly via pubmed's link, try this:
- <https://findit.library.jhu.edu/>
- Once you have full text pdf, you can copy and paste figures, tables into powerpoint presentation

## Getting full text of article



## Presentation Schedule

- Half the class: Nov 14
- The other half: Nov 16
- Will be looking for volunteers for Nov 14
- Email the article to me in advance for approval (to avoid duplication)

## Presentation Schedule

- List of speakers needed by Oct 24 (3 wks in advance)
- Paper approval by Oct 31 (2 wks in adv)

## Paper Discussions

- Read the article and generate in advance - for the Introduction, Methods, Results, and Discussion – at least 2-3 factual questions that could be answered by another student if he/she read the article:
  - e.g., “How was response difficulty quantified?”

## Paper Discussions

- In addition be prepared to discuss
  - Each figure and table (e.g., be able to describe the axes, if applicable, and what the figure is trying to show)

## Routine for Paper Discussion

- First a student’s name is drawn randomly, and then a powerpoint slide will be displayed. That powerpoint slide will say either:
  - Ask a question
  - Describe a figure/table

## Routine for Paper Discussion

- If “Ask a Question” a second student’s name will be drawn to answer the question given by the first student
  - The first student will evaluate the second student’s answer

## Routine for Paper Discussion

- So, when you read a paper, keep in mind that you will be generating questions for other students, and that you will be answering questions posed by other students (or me, if needed)