# Project Background

## Background

Alzheimer's disease is the sixth leading cause of death in the United States, yet is the only disease within the top ten leading causes of death that cannot be cured, slowed, or prevented. To develop better treatments, many researchers are now trying to target presymptomatic Alzheimer's disease, before the symptoms progress so far that they cannot be reversed. However, we are not very good at predicting whether or not someone will develop Alzheimer's disease. My PhD thesis research focused on how the brain networks in mouse models of Alzheimer's disease go awry throughout their lives, and how this relates to their ability to form memories. I uncovered a way to predict the extent of memory loss 10 months before symptoms manifest, or the equivalent of 30 years in humans. We could use this method to test the effectiveness of early treatments in mouse models and eventually to predict future Alzheimer's disease in patients.

## Project Pitch

You would analyze data from this project using the code I wrote during my thesis, all of which is available on free public repositories. You would be free to come up with your own questions, or to tackle one or two questions that I had started examining during my thesis research but didn't have time to complete. Your goal would be to extract a feature from the dataset, then together we would see if it was different between Alzheimer's disease and control mice and if it predicted future memory impairment.

## Questions

Your goal would be to extract dentate spikes and/or REM sleep from the hippocampal local field potential data. Dentate spikes are an indication of input to the hippocampus and are very poorly understood. We know that the dentate gyrus in our Alzheimer's disease model mice is damaged, but we don't know how that affects dentate spikes. We also know that sleep is disrupted in Alzheimer's patients, but we don't know whether or how sleep is disrupted in our model mice. Are these 2 features different between Alzheimer's disease and control mice? Do differences in these features predict future memory impairment?

## Resources

# Timeline

### Week 0

- Onboarding meeting #1
- Set up space & time for lab work
- Fill in the blanks on this Google doc

### Week 1

- Mentor: Adapt weekly plan to include specific skills goals
- Mentor: Set up career coffees with relevant professional contacts
- Training: how to read a paper, how to navigate Pubmed, how to keep track of your bibliography
- Read Wikipedia and Scholarpedia pages on: [insert keywords here]
- Read [first, most critical paper] and explain it in your own words

### Week 2

- Read and take notes using the worksheets (if needed): [next most critical papers, no more than 5]
- Present [one of those papers] as a short journal club
    - 1 slide intro / 1 methods / results / 1 slide conclusions, interpretation/analysis (personal take, future implications)
    - Demonstrate what the figures mean and inform about the paper
- Present the project in your own words: What is the broad aim? What are the justifications for the project (why is it important)? What are the specific objectives? What is your testable hypothesis?
- Outline the introduction/background section. Determine which papers you need to read next.

### Week 3

- Training: how to keep a coding lab notebook, how to use Github
- Set up a Github repository and fork code into it
- Training: how I work (career coffee) and How to Succeed in Science
- Set up coding environment
- Learn the basics of coding & the algorithms we'll be using (pick which resources work best for you)
    - [insert resources here]
- Practice: write a script or two that does the following things: [list what general concepts you'd like the student to be able to code]

### Week 4

- Training: overview of data analysis pipeline & algorithms we use
- Familiarize yourself with the data and code
- Practice: [list specific things you'd like to student to be able to do with the analysis; ask them to walk you through their work]

### Week 5

- Training: resume feedback [send your resume to them in advance]
- Training: networking (bring questions) (resources: Inside Higher Ed, Plos Comp Bio 10 Simple Rules, Edge for Scholars, Chronicle of Higher Education, Networking for Nerds, Networking for People Who Hate Networking)
    - Watch ahead of time: Networking 101
- Final round of reading: papers that get into the most specifics about this topic
- Document current analysis code. Walk through the code line-by-line and make sure the variables are the values you expect.
- Start adapting the code to do the analysis you are trying to do
    - Change an element of the code
    - Look at the output
    - Iterate. Record all of this in your lab notebook and through Github commits .
- Present the project in your own words: How did we obtain the data? What processing was applied before your code? How does your code work? What data are you extracting, and what are the possible interpretations of the results?
    - Outline the methods section using these questions
- Halfway check-in
    - Lab notebook review
    - Mentoring metrics review

### Week 6

- Training: Responsible Conduct of Research (https://oprs.usc.edu/training/rcr/)
- Continue week 5 activities

### Week 7

- Training: explain your project in ~5 minutes to a classmate and have them explain it back to you
- Training: writing rubrics
- Continue week 5 activities
- Make figures that document how you extracted the data. Write figure legends.
- Present the project in your own words: walk through the figures

### Week 8

- Training: how to give a talk: The Art of Lecturing, Guidelines, and Rubric
- Outline the results and discussion section
- Write the title and abstract

# Structure

- Track hours & keep records of what you did as a way to measure whether expectations were reasonable and stay accountable and focused on the important
- Daily 5 minute check-in: what did you work on yesterday, what is the plan for today, what do you need help with?
- Weekly “career coffee” with another scientist
- Weekly 1-hour meeting over coffee to review expectations & give feedback
- As-needed collaborative coding meetings
- Attend at least 1 lab meeting and go on a virtual lab tour

### Communication

- [List your contact info here, for the mentor & mentee]
- Preferred communication for big things: [would you rather be reached by Slack, text, or email?]
- Work-life boundaries: [spell out expectations so your intern knows that if you message them outside of work hours, they shouldn’t feel obligated to respond]

### Onboarding Meeting(s)

- Set start date & next meeting
- Personal background (hobbies, lab tour)
- Going through this document
- Imposter syndrome
- Practice asking questions
- Filling in this document
- Top level intro presentation

### Weekly Meetings

- Write down the answers to these questions & compare each week
- What is challenging? Unexpected? Fun? Exciting?
- What is 1 thing we are doing well? (to and from each person)
- What is 1 thing we could improve/do differently next week? (to and from each person)
- Are we meeting this week’s expectations? What should we adjust for next week?
- What questions do you have about the project?
- What help do you need? In what ways are you comfortable being independent?
- What are your expectations for what time and resources you’ll need to complete next week? How confident are you in those expectations?
- What skills (technical and professional) would you like to learn next?
- How are our mentorship preferences working or not?

### Career Coffees

- **Start:** explain who you are, what your interests are, and why you are interested in talking to them (mention what you already know about them)
- What is an average work week like for you?
- What lead you to this career? What training did you do? Why did you choose this path?
- What is the most challenging part of your job? The most enjoyable/rewarding?
- What kinds of traits do people in this field have?
- If you could give your high school self some advice about your career, what would it be?
- **End:** respect their time by ending promptly on the (half) hour, thank them and explain how they helped you

### Exit Meeting

- Biggest accomplishment
- Biggest challenge
- What was learned
- Greatest strengths, area for improvement
- Did you meet your goals?
- How to maintain contact
- Career path from here

### Resources for the future

- iBiology course on how to design a project

# Expectations

Read this article on how to get the most out of a summer research project to set your expectations

### Skills Assessment

Read this list of core research competencies and fill out the table.
Skills to improve this summer (score 1-5):

| Skill | Current Level | End of Project Level |
|---|---|---|
| | | |
| | | |
| | | |
| | | |

Skills to get exposure to this summer:

- 

### Mentee's Goals as a Scientist this Summer

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### Mentee's Career Goals

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### Mentor's Goals as a Mentor this Summer

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### Expectations of Mentee from Mentor

- Be available and responsive in communication
- Give and be receptive to regular positive and constructive feedback
- Ask for help when you need it
- Take initiative: when you can, work independently without my instructions

- Be open and accountable: track your progress and identify when we need to adjust expectations
- Identify a few skills to train on and work proactively on them
- Think critically and be curious
- Maintain a detailed and up-to-date lab notebook
- Stay on top of deliverables

### Expectations of Mentor from Mentor

- Be available and responsive in communication
- Give and be receptive to regular positive and constructive feedback
- Provide structure to the internship and set reasonable expectations
- Facilitate training for goal skills through 1-on-1 meetings and resources
- Assess understanding at each stage
- Adapt mentoring style to match
- Monitor progress and adjust expectations as needed
- Provide input on project direction as it develops
- Sign off on any and all use of this research
- Write recommendation letters in the future

### Expectations of Mentor from Mentee

-

### Expectations of Mentee from Mentee

-

# Work & Mentoring Styles

Work styles are a combination of your talents and your preferences:
*learning, organizing, communicating, handling conflict, feedback format*

- **Learning:**
    - visual vs aural vs reading vs kinesthetic
    - big picture vs details
    - words vs images
    - focused vs switching
- **Organizing:**
    - early starter (thrive with internal deadlines) vs pressure prompted (thrive at own pace)
    - planner vs flexible
- **Communicating:** internal vs external processor, systematic vs organic, concrete vs abstract
    - internal processors need space to think before discussing things; external processors think by discussing things
    - Systematic communicators walk you through a list of steps (can be a slog); organic communicators show how all the pieces are connected (can be confusing)
    - Abstract communicators use concepts, metaphors, and imagery; concrete communicators use specifics
- **Handling conflict:** sliding scale of cooperativeness and assertiveness
- **Feedback format:**
    - spontaneous (anytime, unprompted) vs structured (only during defined meetings)
    - pervasive (about anything) vs focused (only about big, critical things)
    - active (asks for feedback) vs passive (waits for feedback to be given)

**Mentor is....**

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**Mentee is….**

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Mentoring styles: the SCARF model
*status, certainty, autonomy, relatedness, fairness*

- **Status** is threatened by feedback and impostor syndrome
- **Certainty** is threatened during change
- **Autonomy** is threatened by lack of independence
- **Relatedness** is threatened by social differences
- **Fairness** is threatened by different standards