444A/544A Final Project Information

In the final project, you can either (a) use simulations to examine some psychological phenomenon of interest to you; or (b) do a literature search and write a review of how recent computational models have addressed a particular topic, including successes and shortcomings yet to be addressed. Choice (a) will of course take more computer time, where you will explore manipulations of one of the models in the text and write up results and conclusions. If you choose (a), *Do not be overly ambitious* — relatively clear and simple but thoughtful work is preferred to a complicated half-baked mess. Do not be misled by the relative simplicity of running the canned exercises in the book — *simulation projects take a long time to complete!*

Choice (b) will require more reading and integration of scientific articles. While this does not involve you actually simulating anything, it will require more in depth understanding of publishable research modeling. You will also have to compare and contrast at least two models in the literature and how they differentially account for your phenomenon of interest, and comment on which you think is a more realistic account, supported by data, and why.

You can work in groups of 2, but each of you will have to contribute independently and each of you will have to write up separate components of the final paper. The following timeline is designed to ensure that you make progress on your project (5 of the 30 points for the project will come from simply making each of the 4 deadlines before the final due date) and that you receive feedback on it before turning in the final version.

Deadline	**Assignment**
Mar 7	Project topic
Mar 19	Project proposal (1 page summary of your question of interest and proposed approach to explore this question through simulations or literature review)
Mar 26-30	Meeting w/instructor about project
Apr 23-30	Presentation of project to class
May 4	Final paper

INSTRUCTIONS FOR THE FINAL PROJECT PROPOSAL

The proposal should be at least one page. If you are unsure about which topic to pursue, you should read over the "general advice on choosing topics" section (below). Also, if you come up with more than one idea for your project proposal, and you aren't sure which one sounds best, feel free to suggest multiple ideas. The benefit of suggesting multiple ideas (as opposed to suggesting one, and waiting to hear back from us) is that it will help us agree on a topic more quickly. The sooner you get an approved topic, the more time you will have to work on your project....

For choice (a), you should be as specific as you can about what you want to do with the model (what hypothesis do you want to test; what findings do you want to model). Don't just list a general domain (e.g., memory); you should say what hypothesis you want to test about memory, and/or what specific memory findings you want to model. You should also provide a "first pass" description of what you propose to modify in a model to answer your question (e.g, add a layer, add a connection, "lesion" units, change learning rate, modify inhibition parameters, etc.). You don't need to know all the details (this is part of the explorations you will do in your actual project), but I do want to see that you've started to put some thought

into what you will do. You will be graded on what you do with your model, not how complex your model is. Projects that do interesting things with simple models will get better grades than projects where the student spent all of their time trying to get a complex architecture to work, and didn't have any time left to actually run any interesting simulations.

Make sure that the modeling project is a good fit for your technical expertise. I will definitely be around to help you solve problems, but there are limits on what I can do, given the size of the class. As stated above, I would much prefer that you do interesting things with a simple model / modification of a textbook simulation.

For choice (b), you should include in your proposal a working link to the published paper(s) (or a pdf of the paper itself). I want to see evidence that you have done some digging around on the internet, and in the scientific literature, to see what other models (if any) have addressed the topic that you're interested in exploring. Just because a model was published doesn't mean that it's any good. Your job will be to be critical about whether the paper/model really captures the relevant psychological phenomenon in an interesting way that sheds new light on the topic. Does the model make new predictions that can be tested? Have they since been tested experimentally? If so, how did the model fare?

General advice on choosing a topic

Once you have an idea for a topic, search for related references on pubmed, google, and google scholar

Read ahead in the book & see if any models are particularly interesting to you. In the past, some of the best student projects have involved taking an existing book project & modifying it and/or applying it to a new dataset. You don't have to build a totally new project from scratch to get a good grade!

If you're fishing for ideas, here are some URLs of labs doing interesting connectionist modeling work:

gluck lab (learning & memory)

http://www.gluck.edu/

plaut lab (sequential behavior, language)

http://www.cnbc.cmu.edu/ plaut/

o'reilly lab (lots of things)

http://psych.colorado.edu/ oreilly/

munakata lab (cognitive development)

http://psych.colorado.edu/ munakata/

mcclelland lab (lots of things)

http://www.cnbc.cmu.edu/ jlm/

seidenberg lab (language)

http://lcnl.wisc.edu/

rogers lab (semantic memory)

http://psych.wisc.edu/Rogers/

cottrell lab (face recognition, expertise)

http://www.cs.ucsd.edu/users/gary/

braver/barch lab (cognitive control)

http://www.iac.wustl.edu/ ccpweb/

burgess lab (spatial navigation)

http://www.icn.ucl.ac.uk/nburgess/papers/index.html

cohen lab (cognitive control)

http://www.csbmb.princeton.edu/ncc/

norman lab (learning & memory)

http://compmem.princeton.edu **(note: there are lots of memory / hippocampus simulations that are downloadable from this website – in theory you could use these to explore your question of interest)**

cleeremans lab (sequence learning, artificial grammar learning)

http://srsc.ulb.ac.be/axcWWW/axc.html

botvinick lab (sequence learning, cognitive control)

http://ccn.upenn.edu/ mmb/

frank lab (reinforcement learning, working memory, basal ganglia)

http://www.u.arizona.edu/ mfrank/ http://www.u.arizona.edu/ mfrank/BGmodel_movies.html

web site on neural modeling of psychiatric disorders

http://www.cnbc.cmu.edu/Resources/disordermodels/