

WRITING ASSIGNMENTS: CN550, Spring 2009

READING JOURNALS Turn in a total of six, at most one per week.**FORMAT:** In the UPPER RIGHT–HAND corner of each journal, please type or print, in large letters:**YOUR NAME****DATE TURNED IN**

I will read each journal, and often reply to the class via e–mail or class discussion. However, I do not usually return the journals, so you should keep a copy for your records.

Part 1: Writing

This portion of your journal should include a short, well constructed essay based on one or more of the readings in the CN550 syllabus. The readings do not always need to be from the upcoming week’s lecture, but you should *vary your subjects from week to week*. Begin with a brief title, and list the article(s) your writing is based upon. The written piece should be approximately one page long. Try to construct a thoughtful, coherent, interesting essay, rather than a list of notes.

A critical goal of CN550 is writing skill improvement. You should devote considerable time to polishing and editing this short writing sample, each time attempting to stretch your capabilities as a writer of clear, specific, lively scientific prose. Review Strunk & White or another writing style book from time to time during the semester. Also, see the rules for writing at the end of this handout. As you read, think about how you might emulate aspects of writing you admire.

Part 2: Reading

You may select your own readings for CN550. A large majority should be from the syllabus, but you may include some others. In each journal, list:

a full citation of each item you have read for CN550 during the previous 1-2 weeks.

Annotate each citation with 1–2 sentences.

Select a canonical reference format, and check that your lists are complete, correct, and consistent.

**ESSAY on article and lecture (March 20, 2009) by Barbara Doshier
Due March 30**

Write a thoughtful essay (approximately 2 pages) based on Barbara Doshier’s CELEST Science of Learning Seminar *Mechanisms and modes of perceptual learning* (Friday, March 20, 2:00pm). Begin your essay with a title and a 2-3 sentence abstract.

Include in your essay a discussion of one or more of Barbara Doshier’s articles related to the subject matter of CN550.

For articles, see: <http://www.socsci.uci.edu/maplab/personal/publications.html>

RULES FOR WRITING

The following list includes many of the things that I find myself writing, or thinking, over and over again when reading, revising, or reviewing papers. Write your own rules for your journals and class project.

Try not to be boring.

Avoid the passive tense – see if you can eliminate it altogether.

Avoid jargon.

Draw pictures – lots of pictures.

For drafts, hand-drawn pictures are OK – computer pictures take too long.

Include all notation and network design in summary figures, if possible.

Explain by example.

List parameters, etc., in figure captions or tables.

Specify your system fully, so that a CNS student could replicate your results without having to ask you questions.

Edit your PRINTED text, in many drafts. Word processors are great, but computer screens give you tunnel vision.

Use consistent format (e.g., section headings) and notation throughout.

Cross-check all references cited in the text.

Be sure that each reference is complete, correct, and in a consistent format (e.g., capitalization of titles, page nos., dates). Choose a journal such as *Neural Networks* for your citation format (journals, books, chapters), and maintain that reference format in all your work. [Exception: Most publications have a required format.]

Omit all useless words and phrases lest you lose your busy and impatient readers.

Name your model, at least for purposes of internal exposition.

Check your text compulsively for small errors, including spelling, fonts, subscripts, references to figures, tables, and equations, ...

Use a spell check program – but do not rely on this as a substitute for proofreading.

Do not use footnotes.

Aim to write short sentences with short words.

Ask a friend to read your work and to ask you questions. Read your friend's work, too. Be kind but honest. This is good practice for the rest of your life. Try to remain friends.

Give a talk on your work (to more friends) before writing a final draft, if possible.

Keep thinking about your reader.

Be punctual.

Thank people who invite you to write a chapter in their book, help you improve your paper, etc., etc.

Submit your work for presentation at a small or large meeting.

Be specific rather than vaguely general.

Be especially specific if you are being even slightly critical of another author, and be sure you are accurate. Err on the side of kindness. Use description, examples, and quotes, then let the reader draw conclusions.

Read: Strunk, William, Jr., and White E.B. (1979) *Elements of Style*, Third Edition, New York: Macmillan Publ.

Spell out acronyms (MLP, ART, ...) on first use and after a long time since prior use.

Begin each section with a strong, descriptive sentence.

Build a paper around figures and tables whenever possible.

On computer-generated figures, make lettering large enough to read, or put the information into the text or caption.

Define terms on first use.

Read the whole paper, on paper, before anyone else does. Check for order, flow of ideas, interest, consistency of style, tenses, and notations, ...

Allow plenty of time for writing and editing.

Use specific headings and subheadings to guide the reader with information (cf. vague headings such as: Introduction, Results, Conclusion).

Don't apologize.

Don't say that anything is obvious or trivial.

Notice and learn from the styles of authors whose work you consider well written.

Make your own list of rules.

OPTIONAL ASSIGNMENT: PHASE PLANE ANALYSIS

The following page and the notes below describe a major assignment that I used for many years in CN550. In order to make room for new projects, this assignment is no longer required. Many students have found this assignment to be of great value to them. You are welcome and encouraged to try all or part of it. Jeff is available to give you help and feedback on your work.

A main purpose of this analysis is for you to be able to make rapid, accurate sketches of phase plane dynamics without resorting to a computer.

Another goal is to give you a sense of exploring a problem mathematically. Computer simulations can test hypotheses, but rarely generate them. In recent years, students have come to rely increasingly – even exclusively – on this mode of analysis. This assignment is a chance for you to think about the strengths and weaknesses of complementary analytic tools.

Specify each case in terms of the set of *all* parameters a, b, c that produce that case. The phase plane illustration of each case chooses a specific example of parameters from this case, but this is not the whole story.

Try to explore the entire parameter space, following the model of the class lecture notes.

It would take you a very long time, without much benefit, to do local analysis (eigenvalues, eigenvectors, etc.) at each critical point. Indicate how to do this, with an example calculated for 1–2 characteristic points. In your phase portraits, use local geometry to obtain accurate estimates of how trajectories approach critical points.

A complete assignment is a coherent *analysis* which is *illustrated* by ~15 phase planes diagrams – *not* an undigested set of plots.

OPTIONAL ASSIGNMENT: PHASE PLANE ANALYSIS

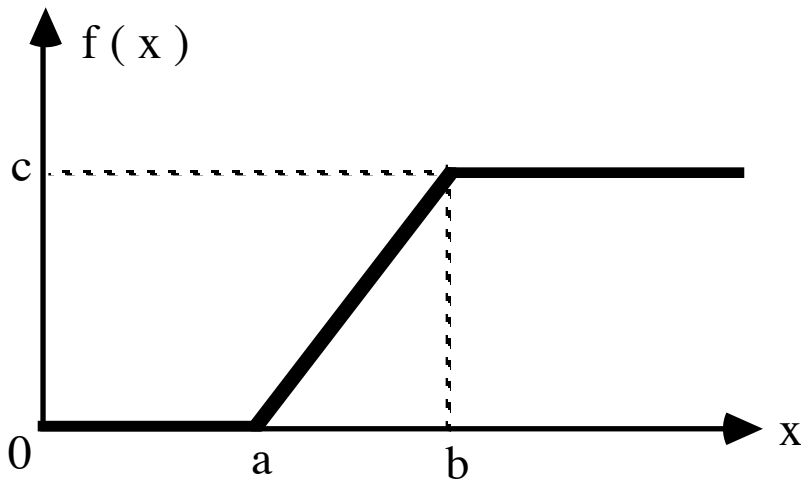
DO NOT USE COMPUTERS FOR THIS ASSIGNMENT, EXCEPT FOR WORD PROCESSING.

Use phase plane analysis to describe the dynamics of the two-dimensional, on-center, off-surround, shunting, competitive network (with inputs $\equiv 0$) given by:

$$\frac{d}{dt} x_1 = -x_1 + f(x_1) - x_1 [f(x_1) + f(x_2)]$$

$$\frac{d}{dt} x_2 = -x_2 + f(x_2) - x_2 [f(x_1) + f(x_2)]$$

where $f(x)$ is the piecewise-linear function shown below.



Analyze and show HAND-DRAWN phase portraits of the solutions to this system for characteristic values of the (dimensionless) parameters a , b , and c .

All parameters are ≥ 0 , and $a \leq b$.

Include details (arrows, etc.) to clarify dynamics, as in the lecture notes.

State the range of parameter values that yield each class of dynamics. For example (hypothetically), “for $0 < ab < c$, all solutions $\rightarrow 0$.”

Illustrate each class with a characteristic phase portrait, approximately $3'' \times 3''$ in size.

Describe your analysis of the phase planes (e.g., nullclines, critical points etc.).