

Psychology and Neuropsychology of Language
Psychology GU4470
4 Points

Prof. Michele Miozzo mm1150@columbia.edu

Time: Tuesday 4:10-6:00 pm

Location: TBA

Office Hours: By appointment

Bulletin Description

The effects of brain lesions provide a primary source of evidence for understanding the organization of human brains. Students in this course observe the spelling deficits presented by individuals with brain damage resulting from stroke and conduct a study to determine the causes of their spelling deficits. The interaction with these individuals provides a unique opportunity to investigate brain lesions and understand the scientific value of this method.

Detailed Course Description

The investigation of the effects of brain lesions on brain and behavior has represented one of the most fruitful approaches used in neuroscience. Detailed reports of the consequences on memory, language, or personality resulting from selective brain lesions continue to provide a rich source of evidence for understanding the organization of the human brain. Students in this course have the opportunity to conduct research on the deficits experienced by individuals with acquired brain-damage caused by stroke. The course focuses on the spelling deficits of these individuals. Spelling is a complex multimodal task that requires the coordination of language, hand action, and visual control. The course focuses on spelling not only because it is a language task that sheds light on brain language mechanisms, but also because of its implications for learning and multimodal processing. Prior research has revealed that acquired brain lesions can produce selective spelling deficits. For example, deficits may affect vowels more severely than consonants, or verbs more severely than nouns. These selective deficits are detected by comparing how brain-damaged individuals write under dictation of different types of words (e.g., verbs vs. nouns). A variety of spelling deficits has been documented, each resulting from the impairment of specific spelling mechanisms. The investigation of spelling deficits provides a vantage point for understanding the neurocognitive organization of spelling processes. At the beginning of the course, students will learn about current cognitive and neurocognitive theories of spelling, and the logic of neuropsychological research on acquired brain lesions. Later in the course, students will design a scientific experiment that will be conducted with brain-damaged individuals with recognized spelling deficits. Experiments will require brain-damaged individuals to produce words or sentences in a given spelling task (e.g., handwriting). Analyses of where errors occur and in what form will be used to draw hypotheses about the spelling mechanisms. The experimental data will be presented at the end of the course and described in a final report.

Pre-requisites

UN1010 (Mind, Brain, & Behavior), UN2430 (Cognitive Neuroscience), or equivalent introductory course in neuroscience or cognitive psychology. Course in research methods or statistics strongly recommended.

Goals

- Gain direct exposure to the lesion-based method that students encounter in multiple courses but never observe in class.
- Sharpening skills required for the observation of behavioral and cognitive features that enrich scientific understanding.
- As the course requires assessing specific hypotheses, it helps students to formulate testable hypotheses and determine ways of testing the hypotheses.
- Because of its focus on spelling, the course offers opportunities to learn about language and its organization in the brain.
- Develop strong oral and written communication skills.

Role in the Psychology Curriculum

This course offers the opportunity to directly test and interact with a clinical population. The content and approach of this course are of interest especially for those students who want to pursue a career in medicine, clinical neuropsychology, and speech pathology.

- For students pursuing the Psychology major or concentration or the Postbaccalaureate Certificate Program in Psychology, this course could be used to fulfill the Group 2 distribution requirement.
- For students pursuing the Psychology major or the Postbac Certificate Program in Psychology, this course could be used to fulfill the seminar requirement.
- For students pursuing the Neuroscience & Behavior major, this course could be used to fulfill the P5 Advanced Seminar requirement.

Class Format and Readings

Classes are conducted in a seminar-like style and students are expected to participate actively in class discussions. Readings and class assignments will prepare the students for class discussions. Students are also expected to take turns in presenting and leading discussions. Classes toward the end of the course will be primarily devoted to the presentation and discussion of students' projects. Readings consist of scientific papers. Some of the readings are assigned to multiple classes; students approach the readings from different perspectives in each class – for example, they focus on the theory in one class but on the tested variables in another class. The reason for assigning readings in this way is to help students to analyze theories and scientific evidence more deeply. This approach is especially suited to a course that demands students to develop their own scientific projects, a task requiring deep understanding of a specific problem rather than encyclopedic knowledge.

Class grades

The final class grade depends on:

- (1) class participation (15%)
- (2) class assignments in weeks 2-7 (10%)
- (3) literature review (12%)
- (4) experiment preparation (16%)

- (5) data collection and data analysis (12%)
- (6) in class project presentation (15%)
- (7) final written report (20%)

Class Calendar

Week 1 *Course Introduction*

Readings From F. Coulmas, *Writing Systems*, Ch. 1, *What is writing*; Ch. 2, *The basic options: meaning and sound*; pp. 1-37.
 From F. Coulmas, *The writing systems of the world*, Ch. 2, *From Icon to Symbol: The General Trend of Evolution*; Ch. 2, *Units of speech and Units of Writing*; pp. 17-54.

Week 2 *What questions have been addressed?*

Class assignment Identify ten questions that have been addressed in the research on spelling.

Class objective Students are asked to identify the questions that propelled the research on spelling and to understand why these questions are critical.

Readings From Goldrick, Ferreira & Miozzo (Eds), *Oxford Book of Language Production* (2014): (a) Olson, D. R., *Writing systems, language production, and modes of rationality* (pp. 329-337). (b) Rapp, B., & Fischer-Baum, S., *The representation of orthographic knowledge* (pp. 338-357). (c) Miceli, G., & Costa, V. *The role of lexical and sublexical orthography in writing* (pp. 358-376).

Week 3 *What's the evidence?*

Class assignment Review of the evidence that was used in the research on spelling

Class objective Students are required to identify what evidence is critical for specific theories on spelling. By assessing what claims are supported by the evidence – and what are not – students can evaluate the strength of the evidence.

Readings The same as in week 2.

Week 4 *Review of seminal cases of individuals with selective spelling deficits*

Class objective Students learn about spelling deficits and the logic underpinning the investigation of brain deficits in neuroscience.

Readings (a) Coltheart, M. (2000). Assumptions and methods in cognitive neuropsychology (in *The handbook of Cognitive Neuropsychology*, pp. 3-22). (b) Caramazza, A., & Miceli, G. (1990). The structure of graphemic representations. *Cognition*, 37, 243-297.

Week 5 *Neuropsychological tests of spelling*

Class assignment What variables should we control?

Class objective Students are required to identify what variables were tested in prior research on spelling. This is a useful exercise for understanding measurable aspects of spelling that are critical for a scientific investigation of spelling.

Readings The readings assigned for classes 2-4.

Week 6 *Review of participants' spelling deficits*

Class assignment Before coming to class, students receive the results of spelling tests administered to the study participants. Students review the test results and make hypothesis about the nature of participants' spelling deficits.

Class objectives Evaluate real test data and make hypotheses about neuropsychological deficits.

Week 7 *The unanswered questions: What issues have remained unexplored?*

Class assignment Students review the readings assigned in the first six weeks of the course to identify questions that have been little explored in prior studies. Questions are first discussed in an individual meeting with Prof. Miozzo and then are presented in class.

Class objectives The class assignment helps students to review and evaluate scientific studies.

Week 8 *Spring break*

Week 9 *Project proposal*

Class assignment Students distribute the abstract of their research proposal and the list of relevant studies they found in the literature review. Students present the research proposal in class.

Class objectives Conduct a literature review to determine whether a question has been relatively unexplored. Identify a testable hypothesis.

Week 10 *Experiment proposal*

Class assignment Presentation of the experiment plan

Class objectives Learn to design an experiment suitable for investigating specific hypotheses. Design an experiment that works in practice.

Week 11-14 *Experiment preparation, data collection, and data analyses*

Class assignment In each class, students report on the progress with their experiments. Class time is also used to discuss problems that students encounter in designing their experiments. Once the experiment is ready, it is administered to participants under the supervision of Prof. Miozzo.

Class objectives Learn how to design and implement a scientific experiment.

Week 15 *Project presentation*

Class objectives Learn to present scientific material in concise and effective ways.

Special needs

If you are a student with special needs and require any type of accommodation, please make an appointment with Prof. Miozzo before the first class to discuss your needs. You are also *strongly encouraged* to contact the Office of Disability Services (<https://health.columbia.edu/content/disability-services>). The professionals in the office provide invaluable help and solutions to a variety of needs.

Religious observances

If you are going to miss one or more classes because of religious holidays, you must inform Prof. Miozzo during the first week of class, so that accommodations can be made.

Academic integrity

“Each one of us bears the responsibility to participate in scholarly discourse and research in a manner characterized by intellectual honesty and scholarly integrity.... The exchange of ideas relies upon a mutual trust that sources, opinions, facts, and insights will be properly noted and carefully credited. In practical terms, this means that, as students, you must be responsible for the full citations of others’ ideas in all of your research papers and projects... [and] you must always submit our own work and not that of another student, scholar, or internet agent.” Students in this course are expected to follow these guidelines from Columbia University Faculty Statement on Academic Integrity (<http://www.college.columbia.edu/academics/academicintegrity>). Whenever in doubt as to whether a practice is correct or appropriate, students should contact Prof. Miozzo to discuss the matters.

Attendance

As collegial activities, seminars require a commitment to attendance, preparation, and active participation. Without such a commitment, seminars cease to be rewarding learning experiences. Students are expected to demonstrate this commitment. Whenever students need to miss a class, they are required to communicate their absence to Prof. Miozzo. Students are still responsible for completing the work assigned for the class they missed.

Late assignments

Late assignments will be penalized, unless there is a valid justification. Students are encouraged to notify any foreseeable delay to Prof. Miozzo, so that a workable plan can be discussed.