

Language and the Brain – W 2440 – Spring 2004

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Course content: The course addresses two issues: (a) the psychological processes that underlie the comprehension and production of words and sentences, reading and writing; and (b) the organization of these processes in the brain. The course reviews the approaches adopted in language science to investigate various linguistic tasks and the experimental findings that are at the basis of current models of language processing. The performance of brain-damaged patients with deficits selectively affecting a given language function (e.g., oral naming or reading) are also considered. The analyses of these deficits help us to understand how language mechanisms are organized in the brain. To determine the brain regions related to language and meaning, some recent investigations make use of neuroimaging techniques such as positron emission tomography, functional magnetic imaging, and event-related potential. The relevance of neuroimaging data for psychological and neurological theories of language processing is discussed. The course also surveys topics related to language acquisition, reading deficits (dyslexias), the evolution of language, and bilingualism.

Classes: Classes consist of lectures. Between one and three classes are devoted to the discussion of a general topic (e.g., language production; reading). Following a general introduction of the topic, the discussion will focus on a specific issue and the relevant experimental evidence that has been provided to support a given account. For example, in discussing word meaning, it will be examined whether distinct brain regions are devoted to the processing of animate and inanimate concepts. During classes students will participate in several experiments.

Readings: The readings include: (a) chapters from the textbook (“Psycholinguistics,” Berko and Bernstein editors) and (b) articles from scientific journals and books. While the textbook offers an overview of the topics discussed in class, articles focus on specific issues and present a theoretical view or exemplify an approach for investigating an aspect of language. Students are expected to come to class having read the material assigned for class. Students can buy the reading package at Copy Quick. Copies of the reading are also available at the Psychology Library (Schermerhorn Hall rm 409).

Exams/Grading: There are two in-class exams – a midterm and a final. The midterm exam covers all the material assigned up to that point and contributes 40% to the final grade. The final exam covers the material from the entire semester, although it emphasizes the material presented in the second part of the semester. The final exam accounts for 60% of the final grade. Both exams include multiple choice and 2 essay questions.

SYLLABUS

01.20 **Overview of course topics**

Approaches to the study of language processing (Textbook Ch. 1 & 2)

01.22 The linguistic and psycholinguistic approach

Reading: Jackendoff, R. (1994). *Patterns in the mind*. Part 1.1. (p. 8-20). Basic Books

01.27 Brain-damaged patients and neuroimaging techniques

Reading: Martin, A., Haxby, J. V., Lalonde, F. M., Wiggs, C. L., & Ungerleider, L. G. (1995). Discrete cortical regions associated with knowledge of color and knowledge of action. *Science*, 270, 102-105

Speaking: From Meaning to word sound (Textbook Ch. 4)

01.29 The relation between word forms and meaning

02.03 Category-specific deficits

Reading: Shelton, J. R., & Caramazza, A. (1999). Deficits in lexical and semantic processing: Implications for models of normal language. *Psychonomic Bulletin & Review*, 6, 5-27

02.05 Models of language production (Textbook Ch. 7)

Reading: Levelt, W. J. M. (1999). Models of word production. *Trends in Cognitive Sciences*, 3, 223-232

02.10 Disturbances of language production – anomias

Reading: Badecker, W., Miozzo, M., & Zanuttini, R. (1995). The two-stage model of lexical retrieval: evidence from a case of anomia with selective preservation of grammatical gender. *Cognition*, 57, 193-216

02.12 Word rules?

Reading: Pinker, S. (1999). *Words and Rules*. Basic Books. pp. 83-187

02.17 The retrieval of phonological information

Language Comprehension: From word sound to meaning (Textbook Ch. 3)

02.19 Phonetics

Reading: Lieberman, A. M., & Mattingly, I. G. (1989). A specialization for speech perception. *Science*, 243, 489-494

02.24 Word segmentation

Reading: Cutler, A., & McQueen. M. (1995). The recognition of lexical units in speech. In: L. Feldman (Ed.), *Morphological Aspects of Language Processing: Cross-Linguistic Perspectives*. Hillsdale, NJ: Lawrence Erlbaum Associates

02.26 Access of word meaning and the recognition of morphologically complex words

03.02 *Mid-term exam*

Sentence Processing (Textbook Ch. 5 & 6)

03.04 The syntactic structure of sentences and syntactic parsing

Reading: Lasnik, H. (1995). The forms of sentences. In L. R. Gleitman & M. Lieberman (Eds.) *Language*. Cambridge (MA): MIT Press. (pp 283-291; pp 291-310 are optional)

03.09 Agrammatism and the failure to process passive clauses

Intermezzo: A science play

03.11 Class review of a scientific study (paper to be assigned)

The Evolution of Language

03.23 The emergence of language

Reading: Hauser, M., Chomsky, N., & Tecumseh Fitch, W. (2002). The faculty of language: what is it, who has it, and how did it evolve? *Sciences*, 298, 1569-1579

03.25 Language creation: Pidgin and Creole languages

Bickerton, D. (1999). How to acquire language without positive evidence: what acquisitionists can learn from Creoles. In M. DeGraff (Ed.), *Language creation and language change*. MIT Press.

Language Acquisition (Textbook Ch. 8)

03.30 Speech recognition in infants

Reading: Mehler, J. & Dupoux, E. (1994). *What infants know*. Cambridge (MA): Blackwell; p.151-173.

04.01 Word acquisition

Reading: Clark, E. (1993). *The lexicon in acquisition*. Cambridge: Cambridge University Press; pp. 43-66.

04.06 Early stages of sentence processing

Readings: Pinker, S. (1994). *The language instinct*. New York (NY): Morrow; pp-262-296.
Goldin-Meadow, S. & Mylander, C. (1998). Spontaneous sign systems created by deaf children in two cultures. *Nature*, 391, 279-281.

04.08 A special vocabulary: Spatial terms

Reading: Landau, B. (1996). Multiple geometric representations of objects in language and language learners. In P. Bloom et al. (Eds.), *Language and Space*, MIT Press.

Bilingualism (Textbook Ch. 10)

04.13 Language organization in bilinguals

04.15 Bilinguals' brains

Reading: Kim, K. H., Relkin, N. R., Lee, K. M., & Hirsch, J. (1997). Distinct cortical areas associated with native and second language. *Nature*, 388, 171-4.

Reading (Textbook Ch. 9)

04.20 Early stages of word reading and “peripheral” dyslexias
Reading: Coltheart et al. (1993). Models of reading aloud. *Psychological Review*, 100, 589-608

04.22 Access to word meaning and word sounds and “central” dyslexias
Reading: Ellis, A. W. (1994). *Reading, writing and dyslexia*. Hove: L. Erlbaum. pp. 93-111.

04.27 Where are reading processes in the brain?
Reading: Petersen, S. E., Fox, P. T., Snyder, A. Z., Raichle, M. E. (1990). Activation of extrastriate and frontal cortical areas by visual words and word-like stimuli. *Science*, 249, 10421-1044.

Writing

04.29 Writing deficits: Implications for models of normal writing
Readings: Ellis, A. W. (1994). *Reading, writing and dyslexia*. Hove: L. Erlbaum. pp. 59-73.
Cubelli, R. (1991). A selective deficit for writing vowels in acquired dysgraphia. *Nature*, 353, 258-260.