

LANGUAGE AND BRAIN

Programme in which offered: -All Bachelor's Degree Programmes

Course Category: Minor

Schedule of offering: Odd Semester

Course Credit structure: 3

Lecture:3

Tutorial: 0

Practical: 0

Contact hours per week: 3

Course Instructor: Dr. Sandhya Shankar

1. Introduction

This course looks at language processing from a biological point of view, i.e. how language is processed in our brain. It studies which all different parts in the brain are activated for the various language functions, thus making it possible for a person to understand the language but unable to produce it or else, being able to produce it correctly but unable to comprehend the language. Brian is such a fascinating subject where a lot is left unexplored. Together with the study of language processing, an area which itself is vast, this course aims to introduce the students to the basics of language processing in the brain. This has chiefly been possible due to the various brain studies of people suffering from strokes and other language disorders. The final part of the paper will be looking at some such case studies for better understanding.

2. Course Objectives

To familiarize students with language processing in brain
To identify the various areas in brain related to language processing
To identify various speech and communication disorders
To identify different types of aphasia and study case studies related to it

3. Pre-requisites

No pre-requisites essential. Basic English knowledge is desirable. It will be especially beneficial to students who are engaged in understanding how language is processed and child language acquisition.

4. Readings

Primary Reading:

- Pinker, S. (2003). *The language instinct: How the mind creates language*. Penguin UK.
- Jackendoff, R., & Pinker, S. (2005). The nature of the language faculty and its implications for evolution of language (Reply to Fitch, Hauser, and Chomsky). *Cognition*, 97(2), 211-225.
- Coppens, P. (2016). *Aphasia and related neurogenic communication disorders*. Jones & Bartlett Publishers.

- Clark, D. G., & Cummings, J. L. (2003). Aphasia. In *Neurological Disorders* (pp. 265-275). Academic Press.
- Obler, L. K., & Gjerlow, K. (1999). *Language and the Brain*. Cambridge University Press.
- Angell, C. A. (2009). *Language development and disorders: A case study approach*. Jones & Bartlett Publishers.
- Vygotsky, L. S. (1964). Thought and language. *Annals of Dyslexia*, 14(1), 97-98.
- McLeod, S. (2014). Lev vygotsky. *Simply Psychology*.
- Baddeley, A. (2003). Working memory and language: An overview. *Journal of communication disorders*, 36(3), 189-208.
- Anderson, J. R. (2013). *Language, memory, and thought*. Psychology Press.

Suggested Readings:

- Berwick, R. C., Friederici, A. D., Chomsky, N., & Bolhuis, J. J. (2013). Evolution, brain, and the nature of language. *Trends in cognitive sciences*, 17(2), 89-98.
- Bernstein, D. K., Tiegerman-Farber, E., & Tiegerman-Farber, E. (1993). *Language and communication disorders in children*. Merrill.
- Thulborn, K. R., Carpenter, P. A., & Just, M. A. (1999). Plasticity of language-related brain function during recovery from stroke. *Stroke*, 30(4), 749-754.
- Meinzer, M., Elbert, T., Wienbruch, C., Djundja, D., Barthel, G., & Rockstroh, B. (2004). Intensive language training enhances brain plasticity in chronic aphasia. *BMC biology*, 2(1), 20.
- Deacon, T. W. (2000). Evolutionary perspectives on language and brain plasticity. *Journal of Communication Disorders*, 33(4), 273-291.
- Neville, H., & Bavelier, D. (2002). Human brain plasticity: evidence from sensory deprivation and altered language experience. In *Progress in brain research* (Vol. 138, pp. 177-188). Elsevier.
- Binder, J. R., Frost, J. A., Hammeke, T. A., Cox, R. W., Rao, S. M., & Prieto, T. (1997). Human brain language areas identified by functional magnetic resonance imaging. *Journal of Neuroscience*, 17(1), 353-362.
- Jung-Beeman, M. (2005). Bilateral brain processes for comprehending natural language. *Trends in cognitive sciences*, 9(11), 512-518.
- Hagoort, P. (2005). On Broca, brain, and binding: a new framework. *Trends in cognitive sciences*, 9(9), 416-423.
- Friston, K. (2002). Beyond phrenology: what can neuroimaging tell us about distributed circuitry?. *Annual review of neuroscience*, 25(1), 221-250.
- Franz, S. I. (1912). New phrenology. *Science*, 35(896), 321-328.
- Finlay, B. L., Darlington, R. B., & Nicastro, N. (2001). Developmental structure in brain evolution. *Behavioral and Brain Sciences*, 24(2), 263-278.

5. Module wise topics

Module 1: Introduction (9 sessions)

- Core properties of human language

- Critical period hypothesis
- Language Acquisition stages
- Innate Hypothesis
- Sign Language

Module 2: Brain (9 sessions)

- Structure and Evolution of Brain
- Phrenology
- Localization and Lateralization
- Language areas in Brain
- Plasticity
- Brain Mapping Studies

Module 3: Language Disorders (8 sessions)

- Dyslexia
- Dysgraphia
- Speech disorders
- Communication Disorders

Module 4: Aphasia (8 sessions)

- Causes
- Types
- Hemispherectomy
- Case Studies

Module 5: Memory (7 sessions)

- Language and Memory
- Memory organization in brain
- Memory and thought

Module 6: Conclusion (4 sessions)

- Revision of Language Acquisition Studies
- Revision of Speech and Communication Disorders
- Revision of Aphasic studies

6. Pedagogy

The teaching methodology will mostly be lectures and discussions. Case studies would be focussed to provide a better understanding of the subject. Presentations at the end of the discussions would also be a main component of the course.

Evaluation Pattern

Assignments: 10%

Mid Semester Exam: 25%

Presentation: 25%

End Semester Exam: 40%