Cognitive Science MA Program, Boğaziçi University

Entrance Exam

The entrance exam for the 2023 application cycle will be made up of true-false and multiple-choice questions. The exam will assess applicants' aptitude in the topics outlined below.

Topics:

- The definitions, aims and subfields of cognitive science
    - Dominant paradigms of cognitive science
    - Research methods of cognitive science
    - History of milestones in cognitive science

- Artificial intelligence
    - Knowledge representation
    - Language processing
    - Learning and pattern recognition
    - Recent trends in artificial intelligence

- Philosophy
    - Philosophy of mind
    - Rationality

- Psychology
    - Cognitive psychology
    - Attention
    - Vision
    - Sensation, perception, and action
    - Learning and development
    - Memory
    - Social cognition

- Linguistics
    - Linguistics
    - Language learning and representation
    - Symbolic and connectionist accounts of language acquisition

- Neuroscience
    - Brain imaging and anatomy of the brain
    - Computational modeling of brain functions
    - Brain neurobiology
    - Research techniques in neuroscience

For more information visit http://www.cogsci.boun.edu.tr

Cognitive Science MA Program, Boğaziçi University

Mock Exam Questions

- What is cognitive science? Which fields is cognitive science comprised of?

- What is AI, what does it try to do?

- Describe 3 of the areas below:

- Natural language processing
- Machine learning
- Pattern recognition
- Expert systems
- Embodied systems and robotics

- What is Marr's paradigm? How does it explain information-processing tasks?

- Write 2 functions of the

- frontal
- parietal
- occipital
- temporal lobes

- Explain Sperry's brain experiments and their implications.

- Write the names and definitions of two different brain imaging techniques.

- Explain broadly the functional differences of right and left-brain hemispheres.

- What is cocktail party effect? What does it imply about human attention?

- What are mirror neurons? Why are they important?

- Explain the Sapir Whorf hypothesis.

- What is universal grammar?

Explain the branches of linguistics below:

- Syntax
- Semantics
- Pragmatics
- Phonology
- morphology

-Which language skills are Broca's and Wernicke's areas involved with?

For more information visit http://www.cogsci.boun.edu.tr

Cognitive Science MA Program, Boğaziçi University

Readings (General)

Here are some readings that cover different aspects of cognitive sciences at different levels. Some of these are popular science books (e.g. Damasio, Dennett), which should give a basic idea about the topics in an accessible fashion. Some are collections of detailed expositions in different topics (Stillings, Posner), which are much more in-depth. Others are classics in the field (Vygotsky), or representative works of a special school of thought (Elman).

1. Cognitive science: an introduction / Neil A. Stillings et al., Cambridge, Mass.: MIT Press, 1995.
2. The mind's new science: a history of the cognitive revolution / Howard Gardner, New York: Basic Books, 1987.
3. Philosophy of mind / Jaegwon Kim, Boulder, Col.: Westview Press, 1996.
4. Rethinking innateness: a connectionist perspective on development / Jeffrey L. Elman et al., Cambridge, Mass.: MIT Press, 1998.
5. Descartes' error: emotion, reason, and the human brain / Antonio R. Damasio, New York: Bard/Avon Books, 1995.
6. Mind: a brief introduction / John R. Searle, Oxford; New York: Oxford University Press, 2004.
7. Brainchildren: essays on designing minds / Daniel C. Dennett, Cambridge, Mass.: MIT Press, 1998.
8. Hinkle, D., Wiersma, W., & Jurs, S. *Applied Statistics for the Behavioral Sciences* (5th edition), Boston: Houghton Mufflin.
9. Posner, M. I. (1989). *Foundations of Cognitive Science*. Cambridge: MIT Press.
10. The New Psychology of Language: Cognitive and Functional Approaches to Language Structure. Ed. M. Tomasello, Lawerence Erlbaum. 1998.
11. An introduction to language / Victoria Fromkin, Robert Rodman, Nina Hyams, Boston: Thomson/Heinle, 2003
12. Tomasello, M. (1999). The cultural origins of human cognition. Cambridge, MA: Harverd University Press.
13. Vygotsky, L. (1978). Mind in Society. Harvard.
14. Carlson, N. R., & Birkett, M. A. (2016). Physiology of behavior. Pearson Higher Ed.
15. Purves, D., Brannon, E. M., Cabeza, R., Huettel, S. A., LaBar, K. S., Platt, M. L., & Woldorff, M. G. (2013). Principles of cognitive neuroscience (Vol. 83, No. 3, p. 757). Sunderland: Sinauer Associates. Vision science: photons to phenomenology / Stephen E. Palmer, Cambridge, Mass.: MIT Press, 1999.
16. Chomsky, N. 2000. The Architecture of Language.
17. Chomsky, N. 2007. Language and Cognition.
18. Swaab, D. F. (2015). We are our brains: from the womb to Alzheimer's. London: Penguin Books

Cognitive Science MA Program, Boğaziçi University

Readings (Focused)

Here are some readings that cover different aspects of cognitive sciences at different levels. These readings represent a subset of the research foci of several Cognitive Science faculty members. The readings below are suggested for students looking to dive deeper into cognitive sciences.

Artificial Intelligence

- McCulloch, W. S., & Pitts, W. (1943). A logical calculus of the ideas immanent in nervous activity. *The bulletin of mathematical biophysics*, *5*, 115-133.
- Huang, J., & Chang, K. C. C. (2022). Towards Reasoning in Large Language Models: A Survey. *arXiv preprint arXiv:2212.10403*.
- Littman, M. L., Ajunwa, I., Berger, G., Boutilier, C., Currie, M., Doshi-Velez, F., ... & Walsh, T. (2022). Gathering strength, gathering storms: The one hundred year study on artificial intelligence (AI100) 2021 study panel report. *arXiv preprint arXiv:2210.15767*.

Philosophy

- Bickhard, M. H. (2009). The interactivist model. *Synthese*, *166*, 547-591.
- Clark, A. (2015). *Surfing uncertainty: Prediction, action, and the embodied mind*. Oxford University Press.
- Bickhard, M. H. (2016). The anticipatory brain: Two approaches. *Fundamental issues of artificial intelligence*, 261-283.
- Van Gelder, T. (1995). What might cognition be, if not computation?. *The Journal of Philosophy*, *92*(7), 345-381.

Psychology

- Frisby, J. P., & Stone, J. V. (2010). *Seeing: The computational approach to biological vision*. Mit Press.
- Zanker, J. (2010). *Sensation, perception and action: An evolutionary perspective*. Bloomsbury Publishing.
- Snowden, R., Snowden, R. J., Thompson, P., & Troscianko, T. (2012). *Basic vision: an introduction to visual perception*. Oxford University Press.
- Jeannerod, M. (2006). *Motor cognition: What actions tell the self* (Vol. 42). OUP Oxford.
- Bruce, V., Green, P. R., & Georgeson, M. A. (2003). *Visual perception: Physiology, psychology, & ecology*. Psychology Press.
- Piaget, J. (2013). *The construction of reality in the child* (Vol. 82). Routledge.
- Smith, L. B., & Thelen, E. (2003). Development as a dynamic system. *Trends in cognitive sciences*, *7*(8), 343-348.
- Spelke, E. S., & Kinzler, K. D. (2007). Core knowledge. *Developmental science*, *10*(1), 89-96.
- Gibson, J. J. (2014). *The ecological approach to visual perception: classic edition*. Psychology press.

For more information visit http://www.cogsci.boun.edu.tr

Cognitive Science MA Program, Boğaziçi University

Readings (Focused)

Linguistics

- Jackendoff, R. (2007). Linguistics in cognitive science: The state of the art.
- Marantz, A. (2005). Generative linguistics within the cognitive neuroscience of language.
- Hunter, T. (2019). What sort of cognitive hypothesis is a derivational theory of grammar?. *Catalan journal of linguistics*, 89-138.
- Ferdinand, V., Kirby, S., & Smith, K. (2019). The cognitive roots of regularization in language. *Cognition*, *184*, 53-68.
- Lieberman, E., Michel, J. B., Jackson, J., Tang, T., & Nowak, M. A. (2007). Quantifying the evolutionary dynamics of language. *Nature*, *449*(7163), 713-716.

Neuroscience

- Luo, L. (2021). Architectures of neuronal circuits. *Science*, *373*(6559), eabg7285.
- Carter, M., & Shieh, J. C. (2015). *Guide to research techniques in neuroscience*. Academic Press.
- Kandel, E. R., Schwartz, J. H., Jessell, T. M., Siegelbaum, S., Hudspeth, A. J., & Mack, S. (Eds.). (2000). *Principles of neural science* (Vol. 4, pp. 1227-1246). New York: McGraw-hill.

These readings lists are not fully exhaustive, and the students are strongly encouraged to explore the research studies of Boğaziçi University Cognitive Science faculty members as well. We expect applicants to have, at the very least, an acquaintance with recent research works of the faculty members they intend to work with during their studies.