Cognitive psychology: Sensation and Perception

Course Essentials

Course: SS 369
Location:
Time: F 9:00 11:50
Credits: 3

Required textbook:

E. Bruce Goldstein; James R. Brockmole
Sensation and Perception, 10th Edition
ISBN-10: 1-305-58029-X
ISBN-13: 978-1-305-58029-9

Instructor Info

Professor: Dr. Maria Kuvaldina
Office:
Email:
Phone: 646-770-7370

Office hours: *By appointment*

Course Description

This course will provide you with an introduction to the psychology, neuroscience, and philosophy of perception. Basically, we will explore how we see, smell, taste, hear, and feel the world. People tend to think, naively, that there is not much to this: with seeing, for example, we simply open our eyes and, hey presto, the world appears. However, there is a huge amount of complicated processing going on (most if not all of it unconsciously), and it is these processes, which have been discovered through empirical investigation, that we will look at. Hopefully, this course will make you question the nature of what is real and what is illusion, and cause you to wonder how we can ever be sure of the difference. It will make you think about the huge complexity of the brain and how it produces the world of experience. You will also be amazed at how much of a talent you have. As vision scientist Donald Hoffman writes in the introduction to his book "Visual Intelligence":

> *"Your visual intelligence constructs what you see…in the phenomenal sense: you construct your visual experience. When you look at this book, everything you see, i.e., everything you visually experience, is your construction: the thickness of the spine, the white color and rectangular shape of the pages, the black color and the curved shape of the letters…"*

Perception is our first contact with the world, and it could be argued very strongly, that anything else is an inference. Therefore, the study of perception is very important, as it is the starting point for the rest of scientific knowledge.

Student Learning Outcomes

Upon successful completion of the course students will be able to

1. Define perception and be able to explain the difference of perception from other cognitive processes.
2. Summarize the major tenants of the various psychological perspectives including the gestalt, ecological, biological and cognitive schools of thought.
3. Outline the steps of perceptual processing including the transferral of physical signal into a neuronal signal.
4. Identify the key brain structures described in the course as they relate to perception.
5. Describe the processes of color, depth, object and motion perception including different theoretical approaches towards them.
6. Identify the role attention plays in perception processes.
7. Identify the major perspectives on how hearing and speech perception occurs including relation of hearing to vestibular system and sense of vibration.
8. Identify the major perspectives on how gustatory and olfactory perception occurs.

Reading List and Course Outline

The primary text for the course is:

E. Bruce Goldstein; James R. Brockmole Sensation and Perception, 10th Edition

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Copies of the above text can be obtained at your bookstore. You can also find used copies here: amazon.com.

Other required readings will be posted in LMS.

Preliminary Course Timeline

*** *The classroom topics as well as the quizzes dates are subject to change. Check LMS regularly in order to see potential changes to the syllabus*!

Week	Dates	Topics	Readings	Assignments
		Friday 9:00 - 11:50		
1	**Sep 7**	Introduction to perception. Measuring perception. Can a robot perceive like a human?	Chapter 1	
2	**Sep 14**	Theoretical approaches to the study of perception. Stages of information processing.	Vision Science, chapter 2 (additional reading)	
3	**Sep 21**	Beginnings of perceptual process. Psychophisics.	Chapter 2	Essay #1: How does the study of perception influence our everyday life?
4	**Sep 28**	Neural processing. Cortical organization.	Chapter 3, Chapter 4	Quiz #1 Chapters (1-4)
5	**Oct 5**	Perceiving objects and scenes.	Chapter 5	
6	**Oct 12**	Attention.	Chapter 6	Essay #2: Do you think that artificial intelligence/robot will be able to perceive the same way as humans do? Which of the principles of object/scene perception is possible to reproduce in artificial system in your opinion? Which of the object/scene perception effects would remain only human in your opinion?

7	**Oct 19**	Perceiving color. Perceiving depth and size.	Chapter 9 Chapter 10	Quiz #2 Chapters (5-6, 9-10)
8	**Oct 26**	Hearing.	Chapter 11 Chapter 12	
9	**Nov 2**	Speech and music perception.	Chapter 13	Essay #3: Music as an organized sound is a peculiar perceptual phenomenon. We hear not just a succession of sounds, we hear a melody that is more than the sum of its parts. Analyze your favorite musical piece and trace different effects of musical organization. Which features of the sound help you favor this music?
10	**Nov 9**	Perceiving motion. Vestibular sensations	Chapter 8	Quiz #3 Chapters (11-13)
11	**Nov 16**	Cutaneous senses. Pain perception.	Chapter 14	
12	**Nov 21, WEDNESDAY**	Taste.	Chapter 15	
13	**Nov 30**	Olfaction.	Chapter 15	Essay #4: Think of any sense that humans do not have. Explain how this type of sense helps the animal/alien to adapt to the environment she lives in.
14	**Dec 7**	Guest lecture. TBA		
15	**Dec 14**	Course summary.		Quiz #4 Chapters (8, 14-15)

Additional Readings:

Week 1: Norman, D. (2013). The design of everyday things: Revised and expanded edition. Constellation.
Week 2: Palmer, S. E. (1999). Vision science: Photons to phenomenology. MIT press. Chapter 2
Week 3: Pelli, D. G., & Farell, B. (1995). Psychophysical methods. *Handbook of optics*, *1*, 29-1.
Week 4: Hubel, D. H., & Wiesel, T. N. (1962). Receptive fields, binocular interaction and functional architecture in the cat's visual cortex. *The Journal of physiology*, *160*(1), 106-154.
Week 5: Oliva, A., & Torralba, A. (2006). Building the gist of a scene: The role of global image features in recognition. *Progress in brain research*, *155*, 23-36.
Oliva, A., & Torralba, A. (2007). The role of context in object recognition. *Trends in cognitive sciences*, *11*(12), 520-527.
Week 6: Posner, M. I. (1980). Orienting of attention. *Quarterly journal of experimental psychology*, *32*(1), 3-25.
Week 9: Peretz, I., & Zatorre, R. J. (2005). Brain organization for music processing. *Annu. Rev. Psychol.*, *56*, 89-114.
Week 11: Apkarian, A. V., Bushnell, M. C., Treede, R. D., & Zubieta, J. K. (2005). Human brain mechanisms of pain perception and regulation in health and disease. *European journal of pain*, *9*(4), 463-484.

Expected Work and Grading

1. **Quizzes (40 points):** There will be four non-cumulative quizzes during the semester. Each quiz will consist of approximately 20 multiple choice questions. The dates of the quizzes included in the syllabus are tentative and the exact date will be announced in the class and posted online (and updated in the syllabus). Each quiz is worth 10 points. In order to perform well on the quizzes, make sure to study the PowerPoint slides based on the lectures updated on LMS, as well as the textbook. Make-up quizzes will be given only in the event of an emergency (family or medical emergency).
2. **Short essays (40 points).** When we discuss a major topic (like "Perception of motion" or "Hearing") you will be given a short essay assignment. There will be 4 such assignments, one every three weeks. Each assignment is worth 10 points. Usually it is given in a form of a question or a statement to agree or disagree. Your task is to provide response to the question and express your opinion on the topic. These responses should **be approximately 4-5 pages**, but may be longer if you would like. To support you opinion you are expected to use additional resources and articles that you can find in library and via https://scholar.google.com/. All essays are submitted and graded through LMS.

   Essays rubrics:

   8-10 points: Excellent. You show an understanding of the material and an appreciation of why it matters. You answered the essay question clearly and you obviously spent time planning your answer. You have excellent spelling, grammar, and punctuation. You demonstrate you have read the material, thought critically about the material, and have something intelligent to say that is informed by the readings, lecture, and media.

   5-7 points: Generally very good. You missed out some important information and, therefore, did not quite answer the question. Your spelling, grammar, and punctuation are generally very good, too. From your writing, I am not confident that you have spent as much time as you should getting to grips with the material.

   2-4 points: You haven't shown in your essay that you have read and understood the material. Your essay shows signs that you did it hurriedly and did not spend much time thinking about what you were going to write. Nevertheless, you occasionally mention a relevant point.

   B**elow 2 points**: This is not good. If you get less than 2 points, you need to think about how to go forward with your studying. If I give you anything below 2 points, your writing does not give me confidence that you have read and understood the material or are doing the required work.

3. **Attendance and Participation (20 points):** In order to perform well in the class, attendance, and active participation is necessary. Active participation (meaning being attentive, not being on your cellphone or talking to your classmates, taking notes, being responsive to questions, participating in classroom discussion) is expected and taken into account when computing your final grade.
4. **Extra Credit (maximum additional 10 points):** You may participate in a research study that will earn you extra 10 points. More information will be given in the class.

Grading Scale

Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	F
Points	100-93	92-90	89-87	86-83	82-80	79-77	76-73	72-70	69-67	66-60	59-0

Course expectations:

What I expect of you:

- Do the assigned readings and think carefully and critically about the material
- Go through the material in the PowerPoint presentations. In these presentations you will find links to demonstrations and videos. You should spend time playing with the demonstrations and watching the videos.
- Participate in the discussions – those set up by the professor and those set up by you and your fellow students.

- Complete the 4-5 page assignments and hand them in on time. I expect students to actively contribute to the discussions and to show in essays an interest in and engagement with the material. If you find supplemental material on the internet, use it judiciously (i.e. material from peer-reviewed articles is recommended – opinions on someone's blog are not!)

- Email me if you have any questions or problems regarding the course.

What you can expect of me:

- To make the course as interesting and informative as possible.

- To respond to your discussions.

- To grade your essays and quizzes and provide comments and feedback.

- To be available daily to respond to any questions you might have.