Applied Psychology Seminar
M1308.001100-001
Psychology of Human-AI Interaction
Seoul National University, Fall 2020

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Class Time: Wednesday 14:00-16:50
Class Format: Zoom based

"We need to switch from a technology-centric view of the world to a people-centric one. We should start with people's abilities and create technology that enhances people's capabilities: Why are we doing it backwards? We have our priorities completely wrong." – Don Norman, *Why bad technology dominates our lives.*

Course Description:
Advances in artificial intelligence enable a variety of AI-infused systems and provide opportunities as well as challenges for user interface design. As automated inferences are standard under uncertainly, AI-infused systems may demonstrate unpredictable behaviors causing many levels of problems. The Human-Computer Interaction (HCI) communities have developed principles of human-centered design for several decades. With increased automation and decision-making capabilities in the AI-infused systems, it is crucial to understand human behavior interacting with intelligent systems. In this course, we will review topics in psychology, HCI, and AI technologies that are relevant to develop human-centered systems designs.

Class discussion Contribution to class will be worth 50% of your final grade. Students will be required to generate 2-3 discussion questions per article (it should be a full description of the issue instead of a simple question) and major issues from each article prior to each class. Students will also take responsibility for leading the discussion. Leading the discussion will entail the followings: 1) summarizing the key points to be gleaned from the articles, 2) using the discussion questions posted by other students to facilitate in-depth discussion. Leading the discussion (or we can call it presentation) will be worth 20% of your grade.

Final Paper (Proposal) Constituting 30% of the final grade, students will write a paper of their chosen topic within the field Human-AI Interaction. The paper should have a proposal format, evaluating current body of research and proposing a new study. Papers should be double-spaced with 1-inch margins and 11-pt standard font, and recommended to be about 8-10 pages long.

Tentative Class Schedule (subject to revision)

Week	Date	Topics and Readings
1	Sep 2	**Introduction**
2	Sep 9	**Human Centered AI** • Amershi, S., Weld, D., Vorvoreanu, M., Fourney, A., Nushi, B., Collisson, P., ... & Teevan, J. (2019, May). Guidelines for human-AI interaction. In *Proceedings of the 2019 chi conference on human factors in computing systems* (pp. 1-13). • Xu, W. (2019). Toward human-centered AI: a perspective from human-computer interaction. *Interactions*, *26*(4), 42-46. • Sundar, S. S. (2020). Rise of Machine Agency: A Framework for Studying the Psychology of Human–AI Interaction (HAII). *Journal of Computer-Mediated Communication*, *25*(1), 74-88.

3	Sep 16	**Embodiment** • Anderson, M. L. (2003). Embodied cognition: A field guide. *Artificial intelligence*, *149*(1), 91-130. • Lakoff, G. (2012). Explaining embodied cognition results. *Topics in cognitive science*, *4*(4), 773-785. • Li, J. J., Ju, W., & Reeves, B. (2017). Touching a mechanical body: tactile contact with body parts of a humanoid robot is physiologically arousing. *Journal of Human-Robot Interaction*, *6*(3), 118-130. • Szigeti, B., Gleeson, P., Vella, M., Khayrulin, S., Palyanov, A., Hokanson, J., ... & Larson, S. (2014). OpenWorm: an open-science approach to modeling Caenorhabditis elegans. *Frontiers in computational neuroscience*, *8*, 137.
4	Sep 23	**Emotion and Behavior** • Damasio, A. (1985). Decartes' Error: Emotion, Reason, and the Human Brain. Chapters 1-2 • Dai, X., Brendl, C. M., & Ariely, D. (2010). Wanting, liking, and preference construction. *Emotion, 10*(3), 324-334. • Wald, C. (2008). Crazy money. *Science, 322,* 1624-1626. • Kahneman, D. (2003). A perspective on judgment and choice: mapping bounded rationality. *American psychologist*, *58*(9), 697.
5	Sep 30	**Intelligence** • Gardner, H. (1995). Reflections on multiple intelligences: Myths and messages. *Phi Delta Kappan*, *77*, 200-200. • Mayer, J. D., & Salovery, P. (1993). The intelligence of Emotional, *Intelligence, 17, 433-442.* • Cox, M. T. (2005). Metacognition in computation: A selected research review. *Artificial intelligence*, *169*(2), 104-141. • Deroy, O., Spence, C., & Noppeney, U. (2016). Metacognition in multisensory perception. *Trends in cognitive sciences*, *20*(10), 736-747.
6	Oct 7	**Social Behavior and Empathy** • Woolley et al. (2010). Evidence for a collective intelligence factor in the performance of human groups. *Science, 330,* 686-688. • Pronin, E. (2008). How we see ourselves and how we see others. *Science, 320(5880),* 1177-1180. • Decety, J., & Jackson, P. L. (2004). The functional architecture of human empathy. *Behavioral and cognitive neuroscience reviews*, *3*(2), 71-100. • Paiva, A., Leite, I., Boukricha, H., & Wachsmuth, I. (2017). Empathy in virtual agents and robots: a survey. *ACM Transactions on Interactive Intelligent Systems (TiiS)*, *7*(3), 1-40.
7	Oct 14	**Human-Robot Interaction** • Thrun, S. (2004). Toward a framework for human-robot interaction. *Human-Computer Interaction*, *19*(1), 9-24. • Waytz, A., Heafner, J., & Epley, N. (2014). The mind in the machine: Anthropomorphism increases trust in an autonomous vehicle. *Journal of Experimental Social Psychology, 52,* 113-117. • Duffy, B. R. (2003). Anthropomorphism and the social robot. *Robotics and Autonomous Systems*, *42*(3-4), 177-190.

8	Oct 21	**Learning** • Glimcher, P. W. (2011). Understanding dopamine and reinforcement learning: the dopamine reward prediction error hypothesis. *Proceedings of the National Academy of Sciences*, *108*(Supplement 3), 15647-15654. • Pessiglione, M., Seymour, B., Flandin, G., Dolan, R. J., & Frith, C. D. (2006). Dopamine-dependent prediction errors underpin reward-seeking behaviour in humans. *Nature*, *442*(7106), 1042-1045. • Kumaran, D., Hassabis, D., & McClelland, J. L. (2016). What learning systems do intelligent agents need? Complementary learning systems theory updated. *Trends in cognitive sciences*, *20*(7), 512-534.
9	Oct 28	**Affordance** • Norman, D. A. (2004). *Emotional design: Why we love (or hate) everyday things.* Basic Books, New York, NY. Chapter 1. • Hutchins, E. (2010). Cognitive Ecology. *Topics in Cognitive Science 2 (2010)* 705–715. • Lee, J. D., & See, K. A. (2004). Trust in automation: Designing for appropriate reliance. *Human Factors, 46(1),* 55-80. • Mieczkowski, H., Liu, S. X., Hancock, J., & Reeves, B. (2019, March). Helping not hurting: applying the stereotype content model and bias map to social robotics. In *2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI)* (pp. 222-229). IEEE.
10	Nov 4	**Decision-Making** • Fast, N. J., & Schroeder, J. (2020). Power and decision making: new directions for research in the age of artificial intelligence. *Current opinion in psychology*, *33*, 172-176. • Jarrahi, M. H. (2018). Artificial intelligence and the future of work: Human-AI symbiosis in organizational decision making. *Business Horizons*, *61*(4), 577-586. • Duan, Y., Edwards, J. S., & Dwivedi, Y. K. (2019). Artificial intelligence for decision making in the era of Big Data–evolution, challenges and research agenda. *International Journal of Information Management*, *48*, 63-71.
11	Nov 11	**Design for All** • Charness, N., & Boot, W. R. (2009). Aging and information technology use: Potential and barriers. *Current Directions in Psychological Science*, *18*(5), 253-258. • Hutchins, E. (2010). Cognitive Ecology. *Topics in Cognitive Science 2 (2010)* 705–715. • Yang, Q., Steinfeld, A., Rosé, C., & Zimmerman, J. (2020, April). Re-examining Whether, Why, and How Human-AI Interaction Is Uniquely Difficult to Design. In *Proceedings of the 2020 chi conference on human factors in computing systems* (pp. 1-13). • Mieczkowski, H., Liu, S. X., Hancock, J., & Reeves, B. (2019, March). Helping not hurting: applying the stereotype content model and bias map to social robotics. In *2019 14th ACM/IEEE International Conference on Human-Robot Interaction (HRI)* (pp. 222-229). IEEE.
12	Nov 18	**Neurogenesis**

		• Erickson, K. I., Voss, M. W., Prakash, R. S., Basak, C., Szabo, A., Chaddock, L., ... & Wojcicki, T. R. (2011). Exercise training increases size of hippocampus and improves memory. *Proceedings of the National Academy of Sciences*, *108*(7), 3017-3022. • Maguire, E. A., Gadian, D. G., Johnsrude, I. S., Good, C. D., Ashburner, J., Frackowiak, R. S., & Frith, C. D. (2000). Navigation-related structural change in the hippocampi of taxi drivers. *Proceedings of the National Academy of Sciences*, *97*(8), 4398-4403. • Shors, T. J., Miesegaes, G., Beylin, A., Zhao, M., Rydel, T., & Gould, E. (2001). Neurogenesis in the adult is involved in the formation of trace memories. *Nature*, *410*(6826), 372-376. • Gould, E., Beylin, A., Tanapat, P., Reeves, A., & Shors, T. J. (1999). Learning enhances adult neurogenesis in the hippocampal formation. *Nature neuroscience*, *2*(3), 260-265.
13	Nov 25	**Technology and Society** • Mitchell, T., & Brynjolfsson, E. (2017). Track how technology is transforming work. *Nature, 544,* 290-292. • Burns, L. D. (2013). A vision of our transport future. *Nature, 497,* 181-182. • Noveck, B. S. (2017). Five hacks for digital democracy. *Nature, 544,* 287-289.
14	Dec 2	Student Presentation
15	Dec 9	Student Presentation