course description

BISP 194/BGGN 285 Adv Topics in Modern Biology B00 Greenspan, Ralph W 12:00 PM Taught remotely.

"Neurobiology of Consciousness and Higher Cognition" Sp22 Syllabus

Week 1. Introductory lecture—What is consciousness? Theories and models.

Student presentations:

Week 2. Physiological correlates of consciousness –

Demertzi et al., (2019) Human consciousness is supported by dynamic complex patterns of brain signal coordination. Science Advances 5: 1-11.

Del Cul et al. Brain Dynamics Underlying the Nonlinear Threshold for Access to Consciousness**.** PLoS Biol. 2007 Oct;5(10):e260.

Week 3--MEG and binocular rivalry

Tononi et al., 1998, Investigating neural correlates of conscious perception by frequency-tagged neuromagnetic responses. PNAS 95: 3198–3203.

Srinivasan et al. Srinivasan et al., (1999) Increased Synchronization of Neuromagnetic Responses during Conscious Perception. J. Neurosci. 19(13):5435–5448.

Week 4--Trace vs. delay conditioning in humans

Carter et al., 2003, Working memory and fear conditioning. PNAS 100: 1399-1404.

Buchel et al., (1999) Amygdala–Hippocampal Involvement in Human Aversive Trace Conditioning Revealed through Event-Related Functional Magnetic Resonance Imaging. 19(24):10869–10876.

Week 5--Trace vs. delay conditioning in mice

Han et al., 2003, Trace but not delay fear conditioning requires attention and the anterior cingulate cortex. PNAS 100: 13087-13092.

Koukoli et al., (2016) Nicotinic receptors in mouse prefrontal cortex modulate ultraslow fluctuations related to conscious processing. PNAS 113: 14823–14828.

Week 6--AChR's and Ignition

Changeux, 2006, The molecular biology of consciousness investigated with genetically modified mice. Phil Trans R. Soc. B 361: 2239-2259.

Lopez-Ramos et al., (2018) Timing correlations between cerebellar interpositus neuronal fring and classically conditioned eyelid responses in wild-type and Lurcher mice. Scientific Reports 8:10697.

Week 7--Octopod problem solving

Richter et al., 2016, Pull or Push? Octopuses Solve a Puzzle Problem. PLoS One 1(3): e0152048.

Howard SR, Avargue`s-Weber A, Garcia JE, Greentree AD, Dyer AG. (2019) Symbolic representation of numerosity by honeybees (Apis mellifera): matching characters to small quantities. Proc. R. Soc. B 286: 20190238.

Week 8--Honeybee cognition

Giurfa et al., 2001, The concepts of 'sameness' and 'difference' in an insect. Nature 410: 930-933.

Howard et al., (2019) Symbolic representation of numerosity by honeybees (Apis mellifera) matching characters to small quantities. Proc. R. Soc. B 286: 20190238.

Week 9--Jumping spider maze solving

Tarsitano and Andrew, 1999, Scanning and route selection in the jumping spider *Portia labiata*. Animal Behav. 58: 255-265.

Japyassú-Laland_2017_Extended Spider Cognition. Anim Cogn 20: 375–395.

Week 10 – Fruit fly cognition.

van Swinderen, B. and Greenspan, R.J. (2003) Salience modulates 20-30 Hz brain activity in *Drosophila*. Nature Neuroscience 6: 579-586.

Grover et al., (2022) Differential neural mechanisms underlie visual trace and delay conditioning in *Drosophila*. Nature. https://doi.org/10.1038/s41586-022-04433-6

FINAL: There will be no final exam .

GRADING:

75% for your presentation

25% for your participation in class discussions