International Society for Neuroethology
Young Investigator Awards

Tuesday, November 10, 2020
8 am PST (Los Angeles)/ 11 am EST (Boston)/ 4 pm GMT (London)/3 am +1day AEST (Sydney)
Register in advance: https://uqz.zoom.us/meeting/register/tZYudeivqj4jE9beogdzXFX_f0HfPvaEO6qD

Angie Salles, Johns Hopkins University, USA
Prediction of target motion by echolocating bats

Insectivorous bats hunt on the wing and, unlike other predators that use vision as their primary sensory system, they compute the 3D position of flying prey from discrete echo snapshots, dealing with the challenges of complex environments. What are the strategies bats employ to track and successfully intercept erratically moving targets from this discontinuous sensory information? We devised an ethologically inspired, behavioral paradigm to directly test the hypothesis that echolocating bats build internal prediction models from dynamic acoustic information to anticipate the future location of moving auditory targets. Collectively, our results demonstrate that the echolocating big brown bat integrates acoustic snapshots over time to build prediction models of a moving auditory target's trajectory and enables prey capture under conditions of uncertainty.

Rickesh Patel, University of Maryland, USA
Aquatic local navigation in a mantis shrimp

Mantis shrimp are marine crustaceans that commonly inhabit burrows. I investigated the navigational strategies these animals use to find their homes. By using a series of behavioral experiments that manipulated the positions of mantis shrimp in space and by altering potential sensory cues used for orientation, I showed that mantis shrimp use path integration, a vector-based navigation strategy, reliant on the sun, celestial polarization patterns, and self-motion cues for orientation. I also found that mantis shrimp enacted stereotyped search patterns when path integration did not lead them directly home. Finally, by comparing foraging paths in the presence and absence of a movable landmark placed near the burrow, I showed that mantis shrimp navigate using landmarks in parallel with their path integration system. My work uncovered the robust navigational toolkit mantis shrimp rely upon to find their homes while underwater.

Pauline Fleischmann, University of Würzburg, Germany
Neuroethology of desert ant compass systems

At the beginning of their outdoor careers, Cataglyphis ants have to acquire all information necessary for navigation as foragers later on. During their initial learning walks (LWs), naïve ants look back to the nest entrance. Since it is invisible from their perspective, they have to rely on a reference system: the geomagnetic field (GMF). Systematic alterations of the horizontal component of the GMF induce predictable changes in gaze directions. Cataglyphis foragers mainly use celestial cues for path integration. They perform re-learning walks (re-LWs) when the panorama around the nest has been changed. Re-LWs are similar to initial LWs, but include additional features. Furthermore, foragers do not only rely on the GMF as a reference system during their re-LWs. We hypothesize that magnetoreception in Cataglyphis is an active sensing process in the antennae. Ants erect their antennae conspicuously during LWs, but they move them differently under experimental magnetic field conditions.

Jerome Beetz, University of Würzburg, Germany
Linking brain and orientation behavior - from echolocation to long-distance migration

To move along a chosen course and avoid collision with obstacles, the animal`s position needs to be continually updated in the brain. Hereby the stimulus history and the behavioral state (e.g. quiescent vs. flight) of the animal are important to understand the neuronal mechanisms underlying orientation behavior. My research on the orientation system of echolocating bats and the migratory monarch butterfly show the need to study the neural coding of orientation cues in the optimal temporal and behavioral context.

Organizers: Melissa Coleman (Chair), Miriam Henze (Co-chair), Sara Wasserman