Science Journeys

JESSLEEN (JESS) KANWAL

presents

Nature's Tango: How Insects Dance for Survival

Continue THE Conversation

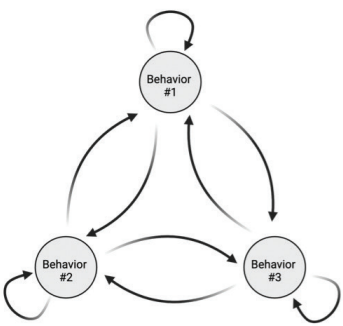
Activity: Build Your Own Ethogram

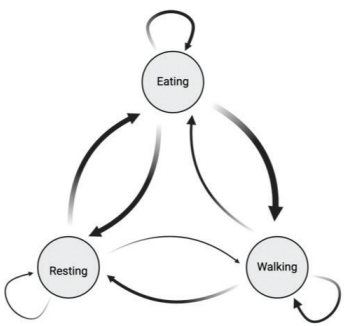
Ethograms are a tool used by scientists to determine patterns of behavior in animals. To build your own ethogram, first choose an animal to observe. This can be a pet, a backyard insect, a zoo animal, or one from a video online.

Watch the animal for a few minutes and then list and describe three behaviors you see. Some examples include eating (chewing food), resting (no movement), fleeing (running away from another animal), hunting (chasing prey), and grooming (cleaning itself). Which behaviors do you predict the animal will perform most frequently? Why?

Over the course of 10 minutes, record what the animal is doing every 30 seconds. You have now created an ethogram. Which behavior occurred most frequently, and how does it compare to your expectations?

To further identify patterns in the animal's behavior, create a visual representation of your data by filling in the diagram below. Adjust the thickness of the arrows based on how many times you observed the animal transition from one behavior to the other (an example is provided below on the right). What patterns do you notice? What might explain these results?





LEARN MORE ABOUT BRAINS

Caltech Science Exchange Neuroscience Explainer for School-Age Scientists
scienceexchange.caltech.edu/NeuroForStudents

MEET

Jess Kanwal

NEUROBIOLOGIST

Jess Kanwal is a neurobiologist fascinated by brains, bugs, and behavior. She is a postdoctoral scholar and L'Oreal Women in Science Fellow at Caltech, in the lab of Professor Joe Parker.

She currently studies social interactions between beetles and other species, examining how the beetle brain combines sensory information to rapidly distinguish friend from foe. Prior to her postdoctoral work, Jess completed her PhD in neurobiology at Harvard University, studying how the larval fruit fly brain combines smell and taste to perceive flavor. Jess enjoys learning about different animals, and she also dabbled in research on honeybee navigation, bug detection in salamander eyes, leech prey sensing, and fruit fly personality.

Jess grew up in northern Virginia and spent much of her time outside of school dancing and reading science fiction and fantasy books. Her love for dance and storytelling continue to inspire her scientific work and experiences beyond the lab. Jess is passionate about science outreach and collaborates with performing artists to provide workshops at the intersection of neuroscience and dance. She enjoys observing and practicing the ways in which the sciences and arts weave together to improve our understanding of the world. In addition to dancing to the Bhangra beat, Jess enjoys hiking and experiencing new flavors, foods, and cultures.

Explore THE Science

Ecology • Evolution • Insect behavior • Neuroscience

Social interactions shape the lives of all animals, from humans to insects. In nature, these interactions are an elaborate and ever-changing dance, where each movement is a form of communication between organisms. Whether avoiding predators, hunting for prey, or navigating their complex ecosystems, animals must constantly interpret and respond to the movements of others, adjusting their steps in the intricate dance for survival.

But how do animals decide when and how to interact with other creatures? The answer lies in the nervous system, which includes the brain. The nervous system integrates sensory information—such as smell, sound, and touch—to rapidly recognize and respond to other organisms. Just as dancers synchronize their movements through cues from music and their dance partners, animals rely on the precise coordination of sensory signals to guide their responses during social encounters.

To better understand how the nervous system orchestrates this dance of interaction, Jess studies tiny insects called rove beetles. These beetles engage with many other species in the wild, making them an excellent model for studying how animals detect and respond to social cues. Their behaviors are easy to observe and measure in the lab, and scientists can manipulate their nervous systems to see how neural circuits drive their decisions. By examining the way rove beetles combine information from multiple senses to interact with other species, Jess aims to uncover fundamental principles of how animal brains work and the evolution of these interactions over time.

Join Jess to explore the hidden rhythms of insect interactions and see how her background in dance shapes the way she investigates the science of movement and sensory communication between animals.

Terms TO Know

Ethogram
A list or "dictionary" of an animal's behaviors. An ethogram describes what the animal does, how often, and for how long. Scientists use them to study behavioral patterns and understand how behaviors change in different environments and situations.

Adaptation
The process by which animals develop traits that help them survive in their environment.

Chemical Camouflage
When an animal uses smells or chemicals to blend in with its surroundings or trick predators or prey.

Action Selection
How an animal's brain decides what to do next, such as choosing between fleeing, feeding, or fighting.

Nervous System
Includes the brain, spinal cord, and a network of nerves that send messages between the brain and the rest of the body. The nervous system allows animals to sense their surroundings, make decisions, and control their movements.

Neuroethology
The study of how nervous systems generate natural behavior in animals.

Sensory Neurons
Special nerve cells that detect and carry information about a single type of sensory input—such as light, sound, touch, or smell—to the brain for processing. For example, the smell of freshly baked cookies activates sensory neurons in your nose, which send signals to the brain that help you recognize the delicious smell.

Olfactory Receptors
Tiny protein sensors in the nose that detect odor molecules and help identify different smells. These receptors are found in olfactory sensory neurons, which send smell information to the brain for processing.

Multisensory Integration
The brain's ability to combine information from different senses to better make decisions and respond to the world.

Genetic Engineering
DNA are the molecules inside our cells that contain instructions for how an organism develops. Every creature's DNA is unique. Genetic engineering is a process that uses laboratory techniques to change an organism's DNA. Scientists use genetic engineering for many different purposes, such as to study gene function, develop new medicines, or enhance crops.

MORE FROM SCIENCE JOURNEYS

WATCH Jess's talk, plus past events covering topics such as particle physics, underwater robots, and fossils

SIGN UP for the Science Journeys email list

Science Journeys | Caltech

Caltech.edu/ScienceJourneys