Echolocation builds prediction models of prey movement

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Bats rely on acoustic information from the echoes of their own vocalizations to hunt airborne insects. By amalgamating representations of prey echoes, bats can determine prey distance, size, shape, and density, as well as identify what they are tracking. Credit: Angeles Salles

Bats are not only using their acoustical abilities to find a meal—they are also using it to predict where their prey would be, increasing their chances of a successful hunt.

During the 181st Meeting of the Acoustical Society of America, which will be held Nov. 29 to Dec. 3, Angeles Salles, from Johns Hopkins University, will discuss how bats rely on acoustic information from the echoes of their own vocalizations to hunt airborne insects. The session, "Bats use predictive strategies to track moving auditory objects," will take place Tuesday, Nov. 30.

In contrast to predators that primarily use vision, bats create discrete echo snapshots, to build a representation of their environment. They produce sounds for echolocation through contracting the larynx or clicking their tongues before analyzing the returning echoes. This acoustic information facilitates bat navigation and foraging, often in total darkness.

Echo snapshots provide interrupted [sensory information](#) about target insect trajectory to build prediction models of [prey](#) location. This process enables bats to track and intercept their prey.

"We think this is an innate capability, such as humans can predict where a ball will land when it is tossed at them," said Salles. "Once a bat has located a target, it uses the acoustic information to calculate the speed of the prey and anticipate where it will be next."

The calls produced by the bats are usually ultrasonic, so human hearing cannot always recognize such noises. Echolocating bats integrate the acoustic snapshots over time, with larger prey producing stronger echoes, to predict prey movement in uncertain conditions.

"Prey with erratic flight maneuvers and clutter in the environment does lead to an accumulation of errors in their prediction," said Salles. "If the target does not appear where the bat expects it to, they will start searching again."

By amalgamating representations of prey echoes, bats can determine prey distance, size, shape, and density, as well as identify what they are tracking. Studies have shown [bats](#) learn to steer away from prey they deem unappetizing.

Provided by Acoustical Society of America