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How animals are adapting to cope with their noisiest neighbours – humans

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Human noise is forcing animals around the world to go through changes, unknown and invisible to most of us. It will be another case of the survival of the fittest: some species will adapt and thrive; others will struggle to survive.

Our loud lives matter as sound is crucial for many animals. Songs, grunts, roars or cheeps can be used to keep in contact with others, to warn of danger or defend territory, to attract a mate, or to beg for food from a parent. But cities interrupt these communications. Our road traffic or construction sites, even our talking, fill their ears with low-pitched noise. So how do animals living in cities adapt?

From eavesdropping to echolocation

The fringe-lipped bat, of Central and South America provides one example. Using robotic, inflatable frogs and a large cage with microphones and speakers, a team led by Wouter Halfwerk recently revealed how these bats have adapted their hunting to noisy conditions. Their study is published in the journal Science.

A fringe-lipped bat foraging above the forest floor. Alex Lang

Most bats use echolocation – a series of ultrasonic chirps – to find their prey. The fringe-lipped bat, however, along with a group including Europe's long-eared bat, normally hunts by listening for lower frequency sounds that humans could also hear. In this case, the researchers focused on the loud, croaking, mating calls produced by some species of frogs.

In the wild, the movement of the frog's vocal sacs as they inflate before they croak can be picked up by echolocation, so the bats could use both listening (eavesdropping) and echolocation for hunting. In the cage they set up for the experiment in Panama, scientists used pressurised air to inflate the robot's vocal sacs thus mimicking the wild frogs.

These are not the frogs you are looking for. Rachel Moon

Halfwerk's team wanted to find out what happened if the mating calls were obscured by background noise, so they arranged the robot-frogs in such a way that some could only be detected by their croaking while others could also be detected by bats using echolocation. Would the bats change their hunting strategy if they could not hear the croaking above the high ambient sound played through the loudspeakers in the cage?

When the team flooded the cage with low-level, ambient, natural noise, both the non-inflating and the inflating robots were hunted in equal numbers. The bats heard the croaking and homed in on the robot frogs. However, when the volume of the ambient noise was turned up to obscure the sound made by the robot-frogs, the bats hunted only the robots which were having their vocal sacs inflated. In noisy conditions, the bats sent out twice as many echolocative calls as when it was quieter. The bats had switched to using echolocation to find their prey.

The real meal. Rachel Moon

This change in behaviour is an example of what scientists call phenotypic plasticity – the ability of an organism to respond to changes in their environment with adaptations to their physique, behaviour or life cycle. These changes can occur very quickly and may or may not be permanent throughout their lifespan.

Of course, bats aren't the only animals to exhibit such plasticity of course, and other examples show how many species are adapting to live alongside their noisy human neighbours.

Sing louder, and higher

Nightingales raise the volume of their song in response to traffic noise and it also appears that they sing louder on weekday mornings than at weekends. Male song sparrows shift their song into higher frequencies, so it is not obscured by the lower rumble of cities. Similar observations have been made in great tits and it was also found that the songs of urban great tits were shorter and faster than those of their forest-dwelling cousins.

Such responses are not confined to birds: mammals, amphibians and insects have all responded in similar fashion. Whales in noisy harbours and shipping lanes sing louder but less often. Californian ground squirrels shift their calls to higher harmonics where there are noisy wind turbines. In response to traffic noise, the southern brown tree frog from Australia and the bow-winged grasshopper in Germany shift their acoustic signals to a higher pitch.

Turn up the volume to drown out those pesky humans. Chris Roe

While singing louder and at a higher pitch are common responses, they are not the only adaptations that have been seen and several urban birds have started singing at different times. For example, European robins now sing at night in areas that are noisy during the day.

But what does all this mean for wildlife in the cities of the Anthropocene? It is clear that some species are able to adapt to noisy environments. These are the species that exhibit phenotypic plasticity, the generalists that can thrive in a wide range of environmental conditions and make use of different resources. More specialised species, those that are not able to adapt, face becoming locally extinct.

The generalists, the adaptors, are the species with the survival kits for the 21st century, the species many city-dwellers will see every day. Our noisy lives have unwittingly given these animals a helping hand.