

What can bats learn from eavesdropping?

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Abstract

Can you think of a sound that tells you that you're about to get your favourite food? Maybe a friend opens a bag of chips, or you hear corn popping. Listening helped you get a snack! Some animals are very good at listening, too. If you have a dog or a cat, they'll probably appear when they hear you pick up their food bowl.

Some bats also use sounds to find their favourite things to eat. But we didn't know how much information they

get from listening to their prey. We played sounds from different frogs and toads to see how fringe-lipped bats responded. We found that adult bats reacted more to species that were good to eat. In contrast, juvenile bats responded strongly to some poisonous species of toads. All the bats responded to acoustic signals related to size. Experience seems to help bats learn which sounds to tune into for a chance at a good meal.

Introduction

There are many ways that animals find enough food to survive. Some use a strong sense of smell to sniff out their food. Others have sharp eyesight to spot prey from great distances. Others, like some bats, have good hearing.

But just because you can hear something doesn't mean that it is food you can eat. Predators have to identify their prey to figure out if it is worth hunting. **Eavesdropping** is the solution some **auditory** predators use. They listen for sounds that prey use for other things, like attracting mates.

Fringe-lipped bats are a great example of eavesdropping predators. They eat frogs and toads. But some frogs and toads are too big to eat. They might even eat a bat if given the chance. Some are even **poisonous** and can make a bat sick. Big and poisonous frogs and toads are **unpalatable** prey. **It's helpful for bats if they can get information about possible prey before trying to attack.** We know that some bats listen to the **mating calls** of different **species** of frogs and toads to get more information.

We wanted to know what information bats actually get from these mating calls. Can they figure out if frogs and

toads are unpalatable? Can they distinguish between prey species? We also wanted to know if these abilities change as bats get older. Do **juvenile** bats react differently to calls?



A fringe-lipped bat, *Trachops cirrhosus*, catches a frog. **Photo:** Grant Maslowski.

Methods

To answer our questions, we looked at the behavior of fringe-lipped bats in Panama. We caught 20 adults and 19 juveniles. Then we performed an experiment to see how they reacted to different prey sounds.

We put each bat into their own enclosure. We then played a series of mating calls from frogs and toads. These were potential prey in the area.

- We used calls from 12 palatable species and 4 unpalatable species. We noted the **acoustic** features of each call.
- We also played a recording of white noise. This was our **control**.
- We presented the calls in a random order to each bat.

We video-recorded each bat's reactions to the sounds. To show how interested the bats were in hunting, we scored their behavior from 0 to 5 (Figure 1).

We figured out if the average bat scores for each sound were different than those for the control. Then we looked at the following:

- Responses to palatable and unpalatable species of prey.
- Differences between adult and juvenile responses.
- If the bats' behavior changed depending on the acoustic features of the calls.

At the end of the experiment, we released the bats back into the wild.

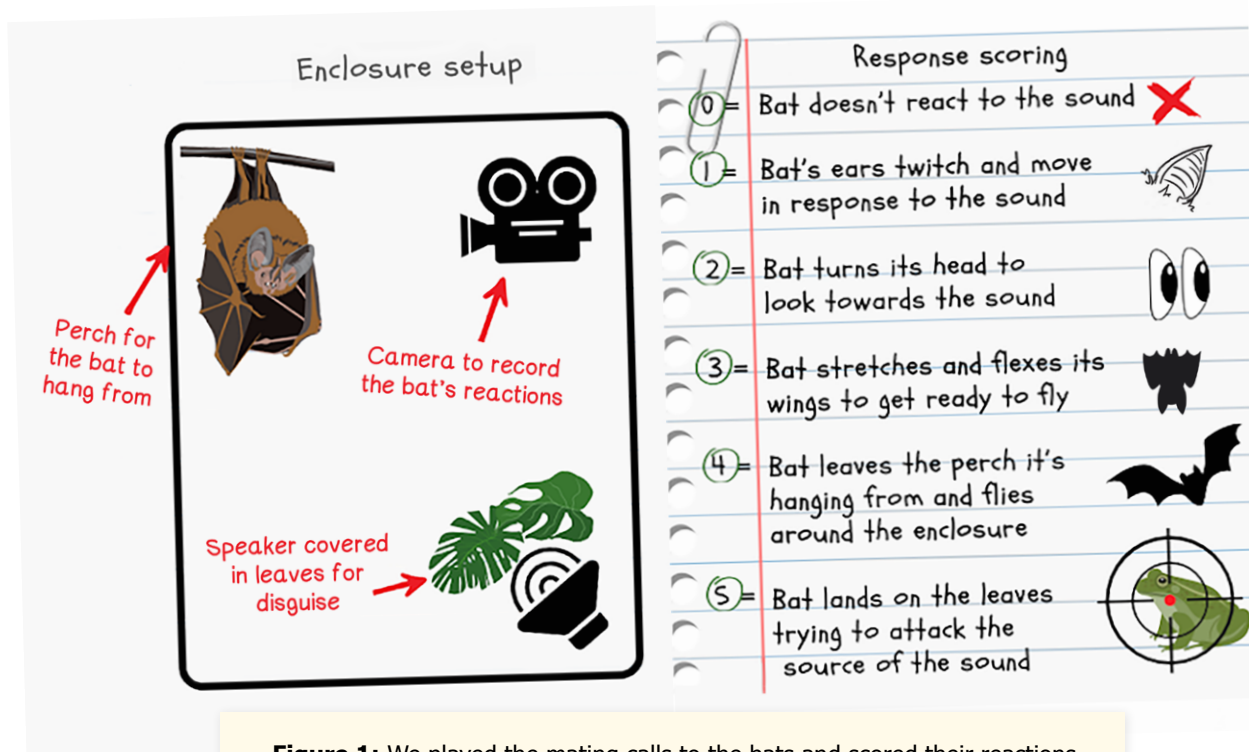


Figure 1: We played the mating calls to the bats and scored their reactions.

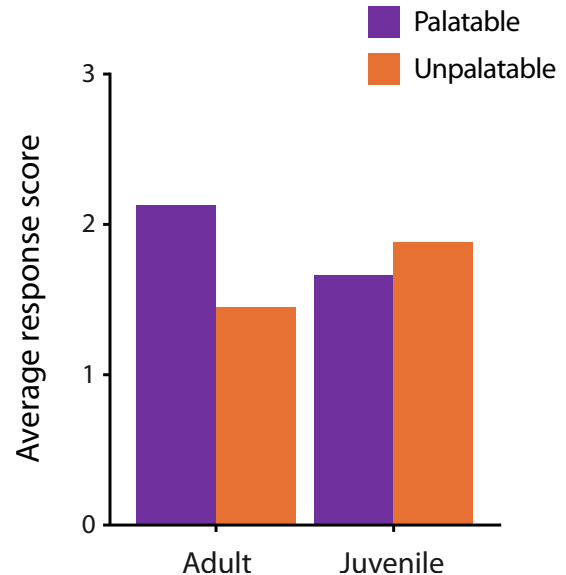
Results

- We found that adult fringe-lipped bats had higher scores when they heard the mating calls of palatable species than unpalatable ones (Figure 2).
- Juvenile bats didn't have a clear preference for either type of call overall. But they did score highly in response to two species of poisonous toads.
- We discovered that juvenile bats responded strongly to specific acoustic features. These included longer calls, lower frequencies, and calls that took longer to get loud. The calls of unpalatable species had these features more often.

Please see Figure 2 on page 3

Which group of bats was better at telling the difference between palatable and unpalatable prey?

Figure 2: We scored the bats' responses to the mating calls.



Discussion

Our results suggest that bat prey preferences change over time. As bats get older, they tend to prefer more palatable prey. This is probably learned. Our data show that juveniles respond more strongly to unpalatable prey than adults do. They also respond to specific acoustic features. We think they are responding to the acoustic information about body size. We know that the calls of larger species of frogs and toads have a lower frequency because of their size. Larger frogs and toads make a bigger meal. It takes experience

to learn that the largest frogs and toads are too much of a mouthful. Maybe there is some truth to the saying "older and wiser" after all!

Identifying prey is an important skill. If a bat chooses poorly, it could get ill or worse, the chosen prey might eat it! Every hunting attempt also uses up valuable energy. This energy is wasted if bats don't catch their prey and eat a meal. Fringe-lipped bats that can correctly identify prey before they hunt are likely to stay healthy and live longer.

Conclusion

Our results suggest that juvenile bats learn to identify good prey and hunt through trial and error. Humans also learn through trial and error sometimes. Imagine a toddler learning which foods they like to eat. They need to put different foods into their mouths to taste them. There's no

way they are going to believe their parents that broccoli tastes good. What have you learned by trial and error? Maybe you can learn a new skill or how to navigate a new experience!

REFERENCES

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Glossary of Key Terms

Acoustic - related to sound. How sound is made, how it travels, and how we hear it.

Auditory - to do with listening or hearing.

Control - a setup scientists use to make sure their results are real and not just due to chance. It shows what happens without the experimental treatment, so they can compare.

Eavesdropping - listening in on sounds made by other animals to learn useful information, like finding food or avoiding danger. For humans, this means secretly listening to someone else talking without them knowing.

Juvenile - an animal before it is fully grown and developed into adult form.

Mating call - a sound made by an animal to attract another animal that is similar to itself to reproduce with.

Palatable/unpalatable - something that is palatable is edible and a good source of nutrition. Unpalatable food might cause harm, or it might just not taste very nice!

Poisonous - describes something that can harm or make you sick if you eat it, touch it, or sometimes even breathe it in.

Species - groups of living things that have similar characteristics and can reproduce with other members of their own group.

Check your understanding

- 1 What kind of sound does a fringe-lipped bat listen out for to hunt for frogs and toads?
- 2 What is the difference in hunting behavior between adult bats and juvenile bats, and what might be the cause of this?
- 3 Why did we play white noise to the bats in our experiment?
- 4 Imagine you have some friends coming over, and you would like to make some food for them. Make a list of the ways you can check if the food you plan to prepare is good for them to eat.
- 5 Fringe-lipped bats listen in to mating calls to identify their prey. Research other animal species that have a good sense of hearing. Pick one and create a short presentation, focusing on the use of sound.

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