

Eat, prey, hunt: Sound the alarm

Podcast transcript

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Sophie: Hi, and welcome to another episode of *Eat, Prey, Hunt!* This episode is called “Sound the Alarm!” because it is all about animal alarm calls. My name is Sophie, and I’m a senior at Duke University studying evolution anthropology with a concentration in behavior, ecology, and cognition! Today, I have a special guest coming in who is curious about alarm calls, specifically in primates, and has brought in a few questions for us to answer! Let’s get started!

Hey [Kat], thank you for coming in! You told me you have a few questions regarding communication and alarm calls, correct?

Kat: [dialogue/banter response] My first question is just a basic what is communication, and what does it look like in the animal kingdom?

Sophie: Great question! A common definition used in the animal behavior world for communication is by Edward Wilson in his 1975 book. He defines communication as “the action of or cue by one organism, aka the sender, is perceived by and thus alters the probability pattern of behavior in another organism, aka the receiver, in a fashion adaptive to either one or both of the participants.” Basically, what he is saying is that the action of one organism towards another can alter the other organism’s response in a complimentary or beneficial way. Does that make sense?

Kat: yes it does!

Sophie: There are so many different forms of communication, such as language, gestures, and of course, alarm calls. In the animal kingdom, they have tons of different calls that can indicate pretty much anything under the sun. Alarm calls are noises or sounds an organism makes to indicate danger, like a predator nearby or a tree falling. Other calls could be food calls, which indicate that there is food nearby, and mating calls that try to attract potential mates.

Kat: [response/banter] I love lemurs and would like to hear more about alarm calls involving primates?

Sophie: Yes, primates are notorious for their alarm calls! I have a trio of papers by Zuberbüler that look at alarm calls in Diana monkeys and Campbell’s monkeys. Honestly, these are some of my favorite studies that I have read about in my four years at Duke, so I’m very excited to share these with you and for those listening. Before I dive into the papers though, I do want to cover a few general definitions and explain a few points so that you will fully understand what I am talking about later.

Kat: Great! Explain-away, haha.

Sophie: So to start off, does the word semantic mean anything to you?

Kat: [response]

Sophie: Semantic means relating to meaning in language or logic. So basically, if something is semantic, it has a meaning. Researchers are able to define whether a call is semantic based on the response from other neighboring organisms. For instance, alarm calls are semantic because they are telling those around them that there is danger nearby. If a monkey screeches and those around them don't respond in any way, it could be noted that it was simply just a screech and nothing more, aka not having semantic meaning.

Kat: [response]

Sophie: I also wanted to quickly discuss hunting tactics and how primates are able to discern the different calls. So for monkeys specifically, the four major groups of predators include leopards, large birds such as an eagle, chimpanzees, and humans. Leopards and eagles are ambush predators, meaning they rely on the element of surprise and silence to be able to capture their prey. Alarm calls are very helpful with these two predators because it notifies not only nearby monkeys of the danger, but also the predator itself and lets them know that they have lost their element of surprise, which in turn decreases the likelihood of an attack from actually happening. Chimpanzees and Humans are more pursuit hunters, meaning that they are able to follow the monkeys into the trees and for a longer distance. Alarm calls are actually more advantageous for the predator in this case than for the monkeys because it gives away the monkey's location.

One of the coolest things, at least in my opinion, about alarm calls is the fact that primates have different alarms for different predators. Since different predators elicit different responses, it only makes sense to have different alarms. For instance, if a leopard is approaching, the monkeys would climb into the canopies so that the leopard can no longer reach them. The opposite is true for eagles, where the monkeys climb down the trees, closer to the forest or jungle floor. So how do primates know which calls indicate which predators? Well, it's all about pitch and tone. I have a few audio recordings of ring-tailed lemurs and their different calls, all of which have distinct differences.

The first one is called a rasp and is an aerial predator alarm call. [plays call] Sounds a little like a pig, haha!

The next is a Yap and indicates a carnivore mobbing, like pumas. [plays call] You can hear a difference between this call and the last rasp in speed, pitch, and tone. The yap is much higher pitched and faster compared to the low and slow snort-like rasp call.

The last is called a Yip and is a basic call indicating mild fear, most likely a ring-tailed lemur deferring from a dominant. [plays call] Do you hear the difference between this call and the last two?

Kat: [response] So what are these papers you keep talking about ?

Sophie: Yes! So, to reiterate, Zuberbüler is an animal behavior researcher who conducted a three-part study on alarm calls in Diana monkeys and Campbell monkeys. Both of these species are old-world monkeys, meaning they come from the same family *Cercopithecidae*, and both live in the same west African regions (near Senegal, Gambia, Sierra Leone, etc.). In his first study done in 1997, Zuberbüler looked at the purpose of long-distance alarm calls and if they are intended for group members only or non-group members as well. He hypothesized that male Diana monkeys give long distance calls only to predators that rely on stealth and ambush AKA the leopard an eagle and not predators that can pursue them after being detected , AKA

humans and chimps. They used a technique called playback, which is when the researchers hide speakers near the monkeys and play recordings of predators, in this case leopard growls and eagle screeches, and record the responses of the monkeys to the recordings. They found evidence of specialized supra-laryngeal filtering and resonance effects, which basically means that the Diana monkeys changed their pitch in an abnormal way, specifically during a leopard call, and indicated intentionality in their unnatural vocal transitions. He also found that the Diana monkeys typically only sound off alarm calls for ambush predators and not pursuit predators. Zuberbühler could not necessarily conclude if the alarm calls were semantic signals to non-group members, so that is why he conducted the second study.

Kat: [response]

Sophie: In his second study (2000), Zuberbühler wanted to know if Diana monkeys could respond to alarm calls of a Campbell's monkey, as well as understand them. Using the same playback recordings, Zuberbühler found that Diana monkeys respond to Campbell monkeys alarm calls as if the predator was present, meaning that they understand the alarm call, and understand the same labels that the Campbell's monkeys have, as in they know the difference between a Campbell monkey leopard call and eagle call.

Kat: [response] That is so cool! ... What were the major differences between their calls?

Sophie: I am so glad you asked because that kind of goes into the last study! As Zuberbühler was conducting his last two studies, he noticed that the Campbell monkeys would sometimes add this "boom" sound to their calls and wondered if the Diana monkeys could comprehend the semantic changes. Experimenting a little with the order of predator alarm call and boom sound, he found that booms modify the alarm calls and change them into a more general distress signal. He also found that if a boom precedes a playback of a leopard or eagle alarm call, the Diana monkeys no longer responded with their own alarm calls. Since the Diana monkeys do not respond when a boom is added, it indicates that they understand that the boom makes the alarm call simply a distress call. A distress call does not need a response, typically, as they could be anything from a tree falling to a monkey simply in pain, but not due to a predator.

Kat: [response] So cool thank you for answering my questions!

Sophie: [response to kat] Of course, and thank you to all who are listening for tuning in! As a little treat for making it this far, I have a fun fact that I find so freaking cool that I want to share. So for those of you who do not know, Duke University has a lemur center here in Durham that houses the largest and most diverse population of lemurs outside of their native home in Madagascar. One of the species that they house is the red-ruffed lemur. They have found that these lemurs have created a venomous snake call for when a copperhead is present. Interestingly, they do not encounter venomous snakes in their natural habitat in Madagascar, so they created this new alarm call all on their own. Also, these red-ruffed lemurs understand the black and white ruffed lemur alarm calls, who live in a completely different region of Madagascar.

Thank you so much to Kat for coming in and giving me a chance to talk about something that I find incredibly interesting and am so passionate about, as well as to those listening. I hope y'all learned something today about alarm calls, and will see you on the next episode of *Eat, Prey, Hunt*.

References:

1. Zuberbühler, Klaus, et al. "Diana Monkey Long-Distance Calls: Messages for Conspecifics and Predators." *Animal Behaviour*, vol. 53, no. 3, 1997, pp. 589–604., doi:10.1006/anbe.1996.0334.
2. Zuberbühler, Klaus. "Interspecies Semantic Communication in Two Forest Primates." *Proceedings of the Royal Society of London. Series B: Biological Sciences*, vol. 267, no. 1444, 2000, pp. 713–718., doi:10.1098/rspb.2000.1061.
3. Zuberbühler, Klaus. "A Syntactic Rule in Forest Monkey Communication." *Animal Behaviour*, vol. 63, 2002, pp. 293–299.
4. Wilson, Edward Osborne. *Sociobiology: the New Synthesis*. Belknap Press of Harvard University Press, 1975.