

[MUX IN]

Felix Poon: I'm actually gonna kick this off by telling you a story.

Nate Hegyi: Okay.

Felix Poon: So one day I got a text from a neighbor down the street. And she wrote: "Good morning! Decided to take an early walk and discovered a little baby squirrel in the street, in front of your house...used some boards to get it out of the road. Didn't want to leave it but also didn't want to scare the mom away.

Can you check on it but not get too close?"

Nate Hegyi: And then she also sent you a picture of a very cute baby squirrel, holding onto a little piece of wood.

Felix Poon: I feel like it looks almost like um...you know in Titanic, when what's her name, Rose is like, grasping onto a little door for dear life.

Nate Hegyi: Yeah, yeah exactly!

[MUX OUT]

Felix Poon: So what I did was I called a wildlife rehabilitator and they told me to keep it warm and hydrated. So I put it in a little shoebox with some hand towels, and a little dish of water.

[ambi in]

Nate Hegyi: Oh and you made a video, there's the squirrel, trying to get out of your nice little shoebox shelter.

[ambi out]

Felix Poon: so my hope, or our hope was that the mom squirrel would find this baby squirrel. But...you know, I was checking in on them throughout the day, and the mom never came.

Nate Hegyi: Uh oh.

Felix Poon: So then finally I called the wildlife rehabilitator again for advice, and like, the mom's not coming, what do we do?

And they're like, okay, there's this one thing you can try. It's a long shot. But basically if you put a bluetooth speaker next to the baby squirrel and play a Youtube video of a crying squirrel at the highest volume, the mom squirrel might hear that, and then come to that noise, find the baby, and carry it back to the nest.

Nate Hegyi: No way.

Felix Poon: Talk about how wild this is like, we're kind of highjacking the natural communication between a mom and a child right?

Nate Hegyi: Yeah. Okay, so you did it, you had to have done it!

[ambi in]

Felix Poon: So, here's the video of what happened. We did what was recommended by the wildlife rehabilitator.

[Bluetooth speaker sounds]

Felix Poon: here we are playing the Youtube clip of a crying baby squirrel.

Nate Hegyi: So, across the street, grainy zoom in.

And...is that the mother squirrel?

Felix Poon: It worked

Nate Hegyi: Going into the box?

And grabbing the baby squirrel?

[wind sounds]

Felix Poon: Did it grab it?

Lani: Yes! Yes!

[wind sounds]

Nate Hegyi: It worked!

[gasp sound]

[MUX IN]

Nate Hegyi: There she goes! She got her baby back!

Felix Poon: Yeah like, that was... it was very satisfying, it was a very satisfying ending.

Nate Hegyi: That is a very satisfying - I'll be kind of honest with you Felix, I did not expect the mother squirrel to come back, I was like, this is just gonna be kind of a sad ending. But i can't believe it actually worked.

[MUX SWELL]

Nate Hegyi: I'm Nate Hegyi, here with producer Felix Poon, and today, we've got another edition of the Outside/Inbox. And our theme for this set of mailbag questions is aptly communication and the natural world.

[MUX OUT - STINGER IN]

Felix Poon: We've got stories about how sharks smell underwater, and whether plants are actually talking to each other?

[MUX SWELL AND OUT]

Nate Hegyi: So since you kicked us off with a story about wildlife communication between parent and child, let's move on to a related question, which was answered by Outside/In producer, Jeongyoon Han.

Jeongyoon Han: The question reads, How do birds, whales and other migratory animals communicate to younger generations about how or where to migrate?

Nate Hegyi: This sounds like a Pixar movie, right? Like like the Finding Nemo sequel. I imagine that's not how that actually usually goes. So the thing.

Jeongyoon Han: Is, there's actually a lot we don't really know about migration in general, let alone how animals communicate to their little wings throughout.

Nate Hegyi: It. Little things. I love that. It's also tough because there are so many different species that migrate from fish to crustaceans to mammals, amphibians, reptiles, insects. So there won't be one universal answer to this question, right?

Jeongyoon Han: Some animals to it's more instinctual. And then for others, it's more of a learned behavior.

Nate Hegyi: What do you mean by that?

Jeongyoon Han: Well, for example, I talked with Patrick Beecham, who's a lecturer at the Novia University of Applied Sciences in Finland. He's a population ecologist who specializes in bird research. He says in many species, the young just follow along. But others simply know where to go without ever having done it before and without following a flock or anything.

Patrik Byholm: Like cuckoos, for example. The parents don't communicate in any way cuckoos lay eggs in other bird's nests, and then the young have to migrate on their own.

Nate Hegyi: So some some birds don't even have to travel with their parents.

Jeongyoon Han: That's right. Another example of animals that don't communicate explicitly about migration are the monarch butterflies. When they travel from across the US westward and down to Mexico.

Nate Hegyi: So how do they know where they're going?

Jeongyoon Han: Well, monarchs navigate using the sun, and there's also some evidence that they have a sort of magnetic compass built into their antennae so they can go in the right direction, even if it's cloudy. Some whales and birds have similar magnetic senses, too. But again, that doesn't mean there isn't a learned component to it if that makes sense.

Nate Hegyi: Yes. Yeah, it sounds like it's a really hard area to research, right?

Jeongyoon Han: I mean, there are some pretty interesting behaviors that we've observed, though. Patrick and his team published a paper last year about this one Bird Caspian terns before they did the study. No one really knew much about how the birds migrated, but they used GPS trackers to observe their migration journey from northern Europe to Africa.

Patrik Byholm: And it turned out it seemed to be in this species. At least then the males or the fathers, it was on their responsibility to learn the young the secrets of migration.

Jeongyoon Han: So what he told me is that male terns exhibit what researchers call teaching behavior. What that means is they lead the way in showing their young where to rest and where to feed. And for the most part, the young birds use the same stopover sites for future migration journeys to cool. The research also showed that young terns who did not follow an adult male to learn how to migrate had a higher mortality rate than the ones that did.

Nate Hegyi: That goes to show you listen to your parents, listen to your older generations.

Jeongyoon Han: They know stuff. They know some things.

Nate Hegyi: And this is pretty new research, right?

Jeongyoon Han: Yeah. This is all stuff that researchers never knew about before. And while Patrick is still figuring out more of the nitty gritty of how this migration process works, he sees it as a nice reminder of how much more there is to learn and discover about how animals behave.

Patrik Byholm: We believe that we know something, but then when you actually start digging into these questions, you really realize how little you know.

[Mux in]

Nate Hegyi: Sounds like being a journalist learning every day.

Jeongyoon Han: That's what we do.

[Mux out]

Nate Hegyi: Okay, so, now to leave the animal kingdom completely, let's talk about plants. Felix, you answered this next question we got about plant communication.

Felix Poon: Yeah, it's from Jenna, in Cupertino, CA

Jenna: I'm calling to ask how do plants communicate with each other and how is this communication defined within the human world? Could it technically be considered talking?

Felix Poon: Let's start with the fact that plants are constantly sensing the world around them. They have special receptors that sense light, touch, even gravity. And they have ways to communicate by releasing and sensing volatile organic compounds also known as smells.

Richard Karban: Plants don't have noses, but they are also extremely sensitive to chemicals in their environment.

Felix Poon: So this is Richard Karban, who studies plant communication at the University of California, Davis, and he says anytime a bug munches on some leaves or even when you mow the grass, those damaged tissues can release a smell that signals danger to other nearby plants. And when those nearby plants catch a whiff, they're like, Uh oh, everybody to your stations.

Richard Karban: The plants can produce more things that we think are defensive, such as chemicals that reduce the nutritional value of those plants or chemicals that act as toxins and interfere with the physiological processes of the insects.

Nate Hegyi: That's some pretty cool self defense.

Felix Poon: Yeah, totally. And plants can also communicate underground through their roots, like the roots of one plant can emit chemicals that stop the root growth of other plants around them.

Nate Hegyi: They're like, Hey, I got here first. This is my spot.

Felix Poon: Yeah, and plants can also be cooperative. I found this one study where they put pairs of plants close together in a lab. One was watered and the other was dehydrated to simulate stress from a drought. And if the two plants root systems were touching, then both plants would conserve water by closing the pores on their leaves.

Nate Hegyi: Even in the plant that was watered.

Felix Poon: Yeah, but if the two root systems weren't touching, this didn't happen.

Nate Hegyi: So maybe this is a good segue into our listeners question. I mean, can this be considered talking?

Felix Poon: Richard Karban doesn't think so.

Richard Karban: I think that maybe a better analogy would be to say that they're eavesdropping on what's happening to their neighbors.

Felix Poon: Or one could say their leaves dropping couldn't help myself.

Nate Hegyi: So Richard is saying it's more of a mechanical reaction than it is talking like I'm a plant. There's chemicals in the air and in the soil. And these chemicals set off some reaction in me that helps me survive and reproduce.

Felix Poon: Right? But recently, a group of scientists recorded the sounds that tomato and tobacco plants make when they're stressed by dehydrating them or cutting them.

Nate Hegyi: It's a cool beat.

Felix Poon: Normally we can't hear these noises because they're outside the frequency that humans can hear. But theoretically, bats, rodents in some insects could hear them. But the big question is, can other plants respond to these sounds? There is an older study that showed that they can. Specifically, they showed that the roots of young corn plants will bend toward the sound that other corn plants make when they're grown in water. That kind of.

Nate Hegyi: Feels like talking or maybe whispering.

Felix Poon: There are scientists who would call this talking. Like the author of the Corn Roots Experiment,

Richard Karban still disagrees, but it doesn't seem to diminish the sense of admiration he has for plants.

Richard Karban: We're learning that plants are, in fact, capable of really sophisticated behaviors. And the extent of those behaviors is, you know, really not very well known. That's a cutting edge of of what we know about.

[mux in]

Nate Hegyi: You know, plants are really good at Felix giving me allergies.

Felix Poon: Yeah, me too. That's why I'm stuffy. They're communicating to us. Stuff up your nose. Communicating up to human noses.

Nate Hegyi: If you've got a question about the natural world, you can call us at 1-844-GO-OTTER, or record yourself on your phone and email it to us at outsideinradio@nhpr.org.

Or you can send us your thoughts and feedback on an episode you listened to.

Kaylin listened to our sound & silence episode, and wrote, "I spent months buying white noise machines, noise-canceling curtains, earplugs, you name it."

We also heard from Deborah, who wrote, "thanks so much for your recent episode about dog poop. It has helped settle a disagreement between me and my mother."

Deborah was leaving her dogs' poop in the woods, not knowing about its ecological harms until she listened to our episode. Now she says she picks them up religiously.

Send us an email if we can help you settle a family disagreement, we're at outsideinradio@nhpr.org.

Nate Hegyi: Still to come in the second half...can sharks smell underwater? We'll be back with that and more, after a break.

<<MIDROLL BREAK – SECOND HALF>>

Nate Hegyi: Welcome back to Outside/In, I'm Nate Hegyi here today with producer Felix Poon. And we're talking all about communication in the natural world.

Felix Poon: Nate, do you have any stories about communication and the natural world?

Nate Hegyi: I have a friend who made a whole movie about how whales communicate. It's on Apple TV, shameless plug.

Fathom, the movie is called Fathom.

Felix Poon: I feel like that's very much in the popular discourse these days...whales talking and-

Nate Hegyi: ramming boats, those orcas ramming boats, communicating to each other.

Felix Poon: Wearing salm- dead salmon on their heads as hats.

Nate Hegyi: that's my favorite. Look that up, y'all, look up the orca that wore a dead salmon for a hat.

Okay, anyway...

Felix Poon: Moving on...

Nate Hegyi: Let's move on to our next listener question answered by our very own Taylor Quimby.

Taylor Quimby: And today we've got a surprisingly deep question from person 50 on Instagram who asked us what makes an animal a pest? Do you have any pest problems, Nate?

Nate Hegyi: Not right now, no. Our dog kills mice.

Taylor Quimby: So interestingly, I discovered the word pest was not originally used for animals at all. It comes from pestis. The Latin word for plague.

Nate Hegyi: Ah, that makes. That makes sense.

Taylor Quimby: Yeah, but eventually, usage opened up, and we now refer to lots of things as pests. So to get a better sense of how it applies to animals specifically, I called up Bethany Brookshire, a science journalist and author of the book Pests How Humans Create Animal Villains.

Nate Hegyi: That's a great title.

Taylor Quimby: She says that simple definition of pest as an animal that bothers humans, but actually what.

Bethany Brookshire: Pests are is they're a reflection of us. They're a reflection of what we want and what we believe about our environments.

Nate Hegyi: What? I don't understand.

Taylor Quimby: Well, what she's saying is that, like whether an animal is or is not a pest has everything to do with people and very little to do with that animal. So let me give a couple examples. First one is pigeons, which I know you love.

Nate Hegyi: Yes, I do. Very impressed by pigeons.

Taylor Quimby: And once upon a time, lots of people loved pigeons. They were our most common domesticated birds. Really? Yeah. Oh, you know, there was messenger pigeons. We used their poo for fertilizer. We ate them. Their meat was called squab. But nowadays we've replaced all those uses for pigeons with other technologies and other foods. And now they are pests.

Nate Hegyi: Oh, bad rap for pigeons.

Taylor Quimby: There's actually a study that tracked mentions of pigeons in the New York Times from 1851 to 2006, and.

Bethany Brookshire: They go from starting as innocent, beautiful, charming to rats with wings. And it was only a hundred years.

Nate Hegyi: Oh, I feel like I feel like we kind of let pigeons down, you know? Yeah, that's a that's a sad story line.

Taylor Quimby: It is. Okay, so example number two, the Burmese python, which, by the way, is considered threatened in its native habitat. This is southern and Southeast Asia. But I don't know if you've ever heard pythons in the Florida Everglades.

Bethany Brookshire: Burmese pythons are invasive and evil and need to leave so badly that every year there is an organized hunt where they send hundreds of dudes, mostly dudes, out into the Everglades in trucks coated in floodlights trying to kill them.

Taylor Quimby: So again, geographically speaking, you're looking at the same animal, two different places in the world, very different labels that we stick on them. Right. Right. And my final example from Bethany is about pests versus pets. Both cats and rats can wreak havoc when they're introduced to ecosystems that aren't used to them. Right. And in fact, Bethany says that cats are at least partially responsible for the extinction of 63 species and counting. And, you know, when you have a cat as a pest, often we're trying to trap and neuter and return or adopt them out, right? But if it's a rat problem, we just poison them all and try and deal with it that way.

Bethany Brookshire: The difference between those two is not in what the animal is doing, right. The difference is in what we believe about those two animals.

Nate Hegyi: It's all in the mind of of the person who's looking at said animal like, we're buying this house in the Rocky Mountain Front. And we were going through like the kind of disclosures and everything. And there's a a line there that says, are there any pests in the property? And it said, Yes, gophers. And I was like, Oh, I don't really think of gophers as pests, but if you're a rancher, a gopher digs holes, it can trip up your cattle, everything else like that. And so to them they are pests.

Taylor Quimby: Right, exactly. So I asked Bethany, is there any animal that you found in doing the research for this book that is universally seen as a pest everywhere in the world? And she told me no, even rats.

Bethany Brookshire: There is, for example, a temple in. India where the black rat is worshiped.

[mux in]

Taylor Quimby: So there you go.

Nate Hegyi: Oh, man. All rats should go there. That's. That's their that's their safe space rats.

Taylor Quimby: Do we have a vacation spot for you?

[mux out]

Nate Hegyi: Alright, so for our last listener question today we've got producer Jessica Hunt...

Jessica Hunt: Well, this question comes from Instagram. And the listener asks, and I'm paraphrasing here, what are shark noses for? How do they work under water and what does it mean to smell something in the ocean?

Nate Hegyi: Jessica Honestly, I didn't know that sharks had noses. And I'm an environmental reporter. I'm supposed to know these things, right?

Jessica Hunt: I'm so glad to hear you say that, Nate, because I, too, was like, do they?

Nate Hegyi: That's what these are for. Let's. Let's find out. Let's find out. Why do they have noses?

Jessica Hunt: So the reason smell carries under water is because water is a fluid and air is a fluid medium as well. Odors can be transported on water currents just like through air currents, of course.

Nate Hegyi: Okay.

Jessica Hunt: All we're doing with smell is detecting and decoding chemical signals in the air or water. But say you're walking along and you smell smoke. You might not see it, but you have some sense whether it's near or far and you might be able to follow that smell right to the source. And you might even know whether it's a hamburger or a bonfire, some wood burning that's going on.

Nate Hegyi: Oh, yeah, like drive by a Burger King and any Burger King in America. And you get a whiff of that flame broiled burger.

Jessica Hunt: Right? But sharks, they've got different gear. So to learn more, I talked with Dr. Stephen Kajiura. He's a professor and head of the Shark Lab at Florida Atlantic University. Do sharks have whiskers?

Stephen Kajiura: They don't have whiskers, but they do have little nostrils. They're on either side of the head on the ventral surface, on the bottom side of the head or on the front of the head. And they're like little holes.

Jessica Hunt: So you know how sharks have to keep moving their whole lives, keeping the water flowing through their mouths to the gills?

Nate Hegyi: Yeah, yeah, yeah.

Jessica Hunt: Well, the water is also going in these special nostrils and they're called the in current naris. Then it flows over their olfactory organ and that gives them a constant flow of information.

Stephen Kajiura: It allows them to detect whether something smells good, something smells bad, or warns them that perhaps this is not a good environment.

Jessica Hunt: Remember how I said you can use your nose to follow the smell of a barbecue? Yeah, yeah. Sharks do the same thing in the water and they can

use their nostrils for direction because they're on either side of their heads. So smell coming from the left will hit their left nostril first, and they'll head in that direction if they're interested.

Stephen Kajiura: And if they have their nostrils spaced far apart like a hammerhead shark, for example, with the nostril spaced on either side of this big giant head that might give them better directional sensitivity, or if they're swimming in a zig zag pattern with this great sense of smell they can home in on the source of the odor.

Jessica Hunt: And shark noses are insanely sensitive. They can sense blood or animal smells up to a mile or more away.

Nate Hegyi: Wow.

Jessica Hunt: Yeah.

Nate Hegyi: So. So why is their sense of smell so acute?

Jessica Hunt: Because the ocean can sometimes be a murky habitat. And if they can't see their prey, they've got to rely on some other sense. They've survived a long time, in part because they're so good at detecting odor. Sharks are near the base of the vertebrate branch of the evolutionary tree.

Stephen Kajiura: The ability to detect odors in the water has been so important for animals throughout our evolutionary history. And we just transitioned to the point where we're the ones on land smelling

odors. We're the we're the unusual ones. We're the ones who've had to adapt to this terrestrial environment when in fact the original odor detectors were were aquatic.

[MUX IN]

Nate Hegyi: They got OG noses.

Jessica Hunt: Exactly. Exactly. That's what it seems to be like. They're sometimes called swimming noses because their sense of smell is so amazing.

[MUX SWELL]

Nate Hegyi: Felix is there any animal attribute you think is exceptionally amazing like a shark's nose?

Felix Poon: I mean fireflies.

[MUX OUT - THEME IN]

Nate Hegyi: Yeah, that is fascinating, hey-

Felix Poon: Luminescent butts?

Nate Hegyi: Do us a favor, send in a question about fireflies and their luminescent butts. 'Cause, I wanna know more about that.

[MUX SWELL]

Well that does it for today's episode about communication in, or about, the natural world.

If you liked the show, leave us a review on Apple Podcasts, or your podcast app of choice. Hit us up on social media, we're @ outsideinradio.

I'm your host, Nate Hegyi.

This episode was reported and produced by Felix Poon, Jeongyoon Han, Taylor Quimby, and Jessica Hunt.

It was edited by Taylor Quimby.

Our team also includes Justine Paradis.

Our executive producer is Rebecca Lavoie.

Felix Poon: Special thanks to Lani Asuncion (uh-soon-see-OHN) for saving a baby squirrel with me, and to Angus Murphy for talking to me about talking plants.

Outside/In's theme music is by Breakmaster Cylinder.

Additional music from Blue Dot Sessions.

Nate Hegyi: Outside/In is a production of New Hampshire Public Radio.