

## *An Immense World Young Readers Edition* by Ed Yong

### Science Friday Book Club Discussion Guide

Welcome to the [SciFri Book Club](#), where science meets storytelling, and curiosity is a superpower. Each month, we explore a new title—nonfiction, sci-fi, biographies, poetry and more—and dive in deep with live events, expert chats, and intense nerdiness. All you need is an open mind... and maybe a good bookmark.

The SciFri Book Club is a program created by [Science Friday](#), a nonprofit media organization dedicated to making science and science news relatable and accessible to the public. The SciFri Book Club brings people together around all things science reading. Each month, we choose a book to read together, gather for events, host conversations with the author on our [YouTube](#) channel, [podcast](#), and [radio show](#), and lots more!

**We're publishing this discussion guide, built on a previous book we've featured, so that you can host a SciFri Book Club locally—in your library, at your school, or in your home.** It includes discussion questions for [An Immense World Young Readers Edition: How Animals Sense Earth's Amazing Secrets](#). We covered the adult version SciFri Book Club pick for [January 2024](#). This guide also includes additional content, such as interviews with author Ed Yong. Here are some tips to get you started:

- We offer one discussion question a week over the course of the month, for a total of four questions for each book. This gives everyone time to read the book while offering regular opportunities to share their thoughts and ask questions.
- We share our discussion questions online in our [book club community](#) (join us!) and then host a community meeting on Zoom at the end of each month. However, you can also host your club in whatever format makes sense for you.
- It helps to set expectations about book club behavior. We created a [Code of Conduct and Engagement Guidelines](#) (login required) to ensure everyone has the opportunity to connect. We suggest you create policies that make sense for your group.
- The SciFri Book Club has Captains who organize the group, direct discussion, and moderate the conversation. We suggest you have a clear host for your group, too.
- It's ok if folks don't read every book or if your club doesn't read every SciFri selection. Members are welcome to participate in whatever makes them feel most connected.
- Want to stay up to date on what books the SciFri Book Club is reading and get the chance to win free books? [Join our newsletter!](#)

You are free to use any of these materials to foster discussion with your own book club or for educational programs. We ask that you attribute the work to Science Friday. If you would like to host a local SciFri Book Club, please [partner with us](#) to help spread the joy of science to your community.

## About the Book

In “[An Immense World Young Readers Edition: How Animals Sense Earth’s Amazing Secrets](#),” science writer Ed Yong explores the weird and wonderful ways that animals experience the world through their senses. While humans rely on sight, hearing, smell, touch, and taste, there are many animals whose senses are far more powerful, or even completely different, from our own. From ants that follow invisible chemical trails to birds that see colors humans cannot to dolphins that echolocate in murky waters, each species experiences the world in wildly different ways.



As Yong explains, every animal lives within its own umwelt, or sensory bubble, which is shaped by the information it can pick up with its own unique set of senses. Every species, including humans, only experiences a sliver of the world around them, but by learning about remarkable animal senses, you are invited to imagine what the world might look like from countless perspectives. It may get you thinking about how human activity can affect the sensory worlds of the animals we share the planet with. You can get your copy from your local bookstore or [on Bookshop.org](https://www.bookshop.org).

## About the Author

Ed Yong is a science journalist and bestselling author who loves exploring the hidden worlds around us. He writes about animals, nature, and the surprising ways living things experience the world in which we live. He is the author of “An Immense World,” which explores how animals sense their surroundings, and “I Contain Multitudes,” a book about the tiny microbes that live in and around us. “An Immense World” has won major awards, including the Carnegie Medal for Excellence in Nonfiction. Yong has written for magazines like The Atlantic, National Geographic, and The New York Times, helping readers understand complex science in clear and exciting ways. During the COVID-19 pandemic, his reporting earned him the Pulitzer Prize for Explanatory Reporting. He lives in Oakland, California, with his wife, science communicator Liz Neeley, and their corgi, Typo.



## Discussion Questions

### Introduction: An Incredible Voyage

The book begins by asking you to imagine standing in a gym with many animals: an elephant, a mouse, a robin, a rattlesnake, an owl, a bat, a spider, and a mosquito. Even though you are all in the same place, each of you experiences the world in a different way. Jakob von Uexküll, a zoologist, called this an *umwelt*, the part of the world that an individual can sense and experience.

*What sense do you think you would use most to understand what is happening in the gym? Why? Which animal in the gym might notice something that you can't?*

### Chapter 1: Leaking Sacks of Chemicals

Ants use invisible chemical signals called pheromones to communicate with one another. In Section 2 of Chapter 1, Yong describes an experiment where scientists changed ants so they could no longer smell these pheromones. As a result, the ants became confused.

*What does this experiment tell us about how important smell is for ant societies?*

### Chapter 2: Endless Ways of Seeing

Throughout Chapter 2, we learn that animals can see the world in many different ways. For example, scallops can detect movement with hundreds of tiny eyes, cows can see almost all the way around their bodies, and the giant squid can spot faint flashes of light deep in the dark ocean.

*If you could try seeing the world the way any animal from this chapter does, which would you choose and why?*

### Chapter 3: Rurple, Grurple, Yurple

In Section 2 of Chapter 3, Yong explains that most birds are tetrachromats, while humans are trichromats. This means birds have four types of cone cells in their eyes, while humans have three. Because of this, birds can see colors that humans cannot. Some of these invisible colors appear in bird feathers, flower petals, and elsewhere in the natural world.

*Why do you think it might be useful for a bird to see these additional colors?*

### Chapter 4: The Unwanted Sense

In Chapter 4, Yong explains that scientists study how animals respond to painful experiences. In some experiments, fish stayed away from places where they had received a mild shock, even if it meant they would miss out on food. Additionally, hermit crabs were more likely to abandon their favorite shells after receiving a mild shock.

*Think about a time when you hurt yourself, like touching something hot or falling down. Did it change how you acted afterward? How might pain help animals learn to avoid danger in similar ways?*

#### Chapter 5: So Cool

In Section 3 of Chapter 5, Yong details his encounter with Margaret, the red diamond rattlesnake that he discovered in the Californian sagebrush. Yong points out that Margaret can use a pair of small pits just behind her nostrils to detect infrared radiation coming from his warm face and body, and says that he must look like a shining beacon against the cool morning sky.

*Did Yong's encounter with Margaret change how you think about snakes? If so, how?*

#### Chapter 6: A Rough Sense

The star-nosed mole can tell the difference between soil and a worm almost instantly using the sensitive tentacles, also known as rays, on its nose. Yong begins Chapter 6 by asking you to close your eyes and navigate the world by feeling everything with your hands, like the mole.

*How might moving through your home be different if you had to find your way using only touch, with your eyes closed? What challenges would you face? What might you notice with your eyes closed that you wouldn't if you were relying on your eyes? If you are blind or have low vision, how have you adapted your environment or your behaviors to navigate the world?*

#### Chapter 7: The Rippling Ground

In Chapter 7, Yong talks about the vibrational world beneath our feet. Vibrations are tiny shakes or movements that you can feel, like the way a guitar string trembles when you pluck it or how a floor shakes when someone is stomping nearby. Earthworms rush to the surface when they detect what could be the vibrations of a digging mole, hundreds of treehoppers gather on a single plant to “talk” to one another through vibrations, and spiders can adjust their web like an instrument.

*Why might sensing vibrations be a helpful way for an animal to detect danger? If you suddenly gained the ability to sense vibrations like a spider, what kinds of things do you think you might notice with your new senses that you might have missed before?*

#### Chapter 8: All Ears

Ears are the tool that you use to hear sound, and in Chapter 8, Yong introduces you to a lot of incredible animal ears, from the owl's ears to the elephant's ears.

*What animal ear did you find most amazing? Which animal ear from this chapter would you most like to try? What kinds of sounds do you think you might hear with it?*

### Chapter 9: A Silent World Shouts Back

In Chapter 9, Yong introduces you to two wildly different mammals that both use echolocation: bats and dolphins. In both cases, the animals send out sounds and then listen for echoes that bounce back to understand their surroundings.

*Why might echolocation be especially helpful for bats, which often fly in darkness, and dolphins, which move through murky or deep water?*

### Chapter 10: Living Batteries and Compasses

Electroreception and magnetoreception are two senses that humans do not have, or at least do not experience strongly. Electroreception helps animals like sharks and platypuses use electrical signals to locate prey, while magnetoreception allows animals like birds to sense Earth's magnetic field. These senses may sound rather strange because humans don't experience them strongly, if at all!

*Which of these two senses would you rather have, electroreception or magnetoreception, and why?*

### Chapter 11: Every Sense at Once

In Chapter 11, Yong introduces Ra, the octopus. Up to this point in the book, you have been exploring senses one at a time. Now, Yong asks you to consider senses as part of a unified whole. For example, Ra can explore his surroundings with hundreds of suckers on his arms that can both feel and taste.

*What are some ways that your own senses can work together to help you explore the world around you?*

### Chapter 12: Save the Quiet, Preserve the Dark

In Chapter 12, Yong explains that human activities, bright lights, loud noises, and chemical pollution can interfere with the senses of the animals we share the planet with. These animals rely on their senses to find food, avoid danger, and communicate with others.

*What are some ways people could change their behavior to make the world easier for animals to live in? What is something you could do in your own neighborhood?*

## Livestream and Q&A with Ed Yong



Ed Yong will be in conversation with science journalist Arielle Duhaime-Ross on the multitude of ways life—from giant squid to the tiniest jumping spiders—uniquely perceive their environments, and how he sees our world differently since the book’s publication in 2022.

[Watch the Recording](#)

## More to Explore

[Expanding Our Umwelt: Understanding Animal Experiences](#) - Radio Segment

Writing about animals' sensory experiences in "An Immense World" changed author Ed Yong's own worldview—and hobbies.

[How Science Came To See Ultraviolet Light In Animals](#) - Book Excerpt

Ultraviolet perception is incredibly common in animals—just not in humans. Ed Yong dives into the history of how scientists saw the light.

[The World According to Microbes](#) - Radio Segment

In "I Contain Multitudes," author Ed Yong examines the connections between species and ecosystems—from a microbial point of view.

[The Microbes We Share](#) - Book Excerpt

Science writer Ed Yong describes the diverse ways that scientists and citizen scientists are studying our microbiomes.