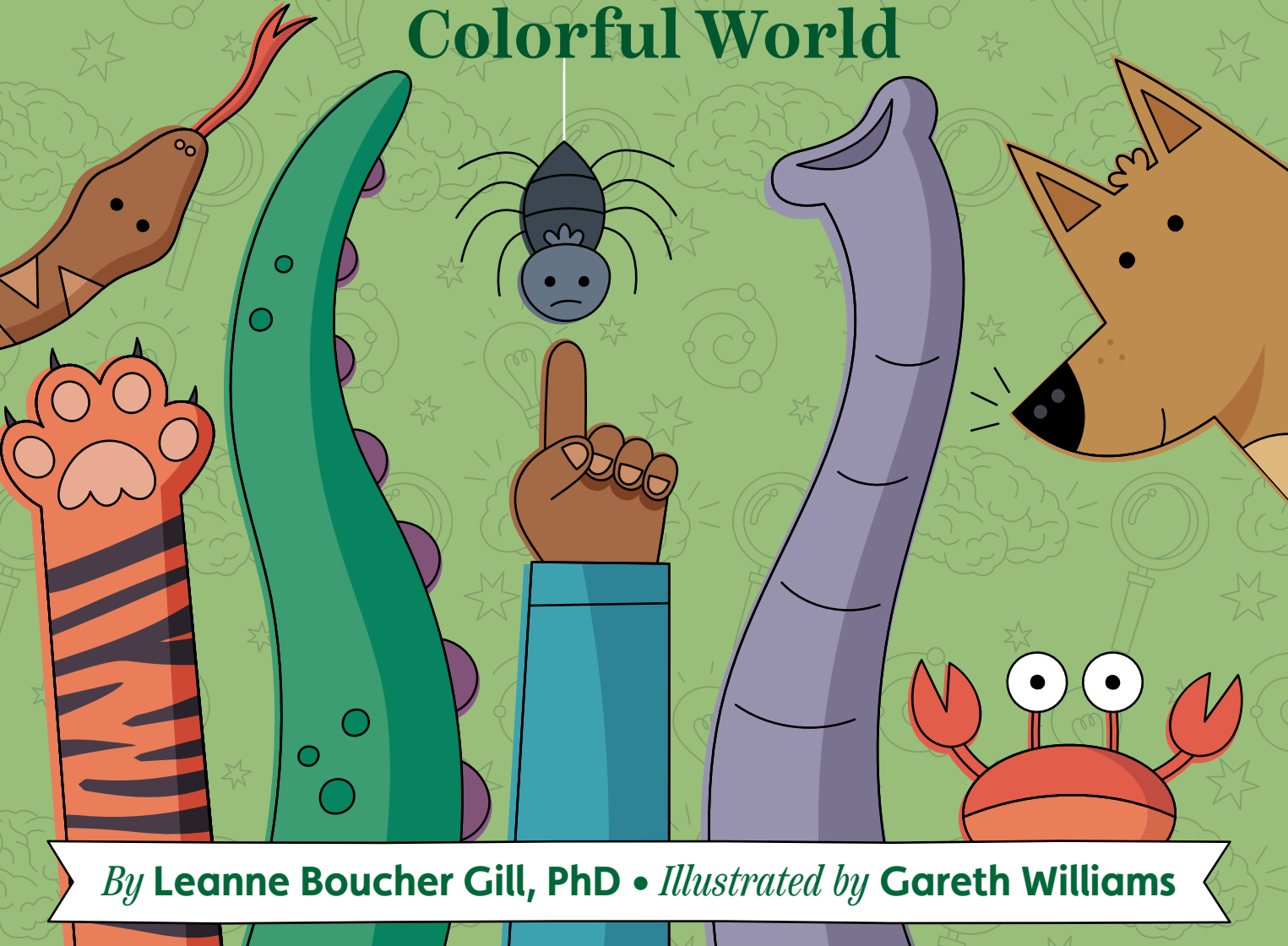


# SENSATIONAL ANIMAL SENSES

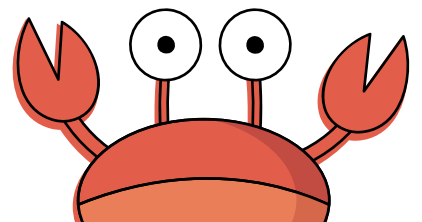


Living in a Noisy,  
Smelly, Tasty, Slimy, Tipsy,  
Colorful World



*By* Leanne Boucher Gill, PhD • *Illustrated by* Gareth Williams

# SENSATIONAL ANIMAL SENSES

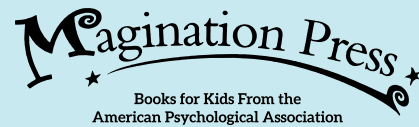


For my sisters, Tara Rose Boucher and Madeline LeBlanc,  
the most sensational animals I know!

And for my students—thanks for inspiring me every day  
to keep learning cool things!

—*LBG*

For my wife, Sinead, and my little daughter, Poppy—*GW*



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Colorful World

by **Leanne Boucher Gill, PhD**  
*illustrated by* **Gareth Williams**

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## Dear Reader,

I still remember the moment in college, sitting in a classroom, when I first discovered the amazing world of sensation and perception! I had always been interested in how the brain works, but I hadn't given much thought about how our brains got information from the outside world into our heads, that is, sensation. And I had given no thought about how our own life experiences and expectations could shape our interpretation of the world, that is, perception.

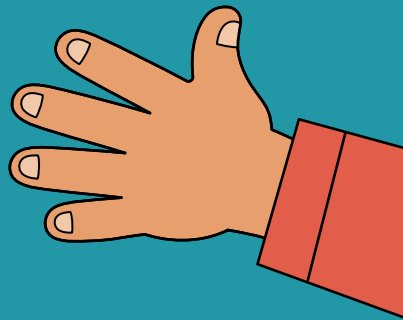
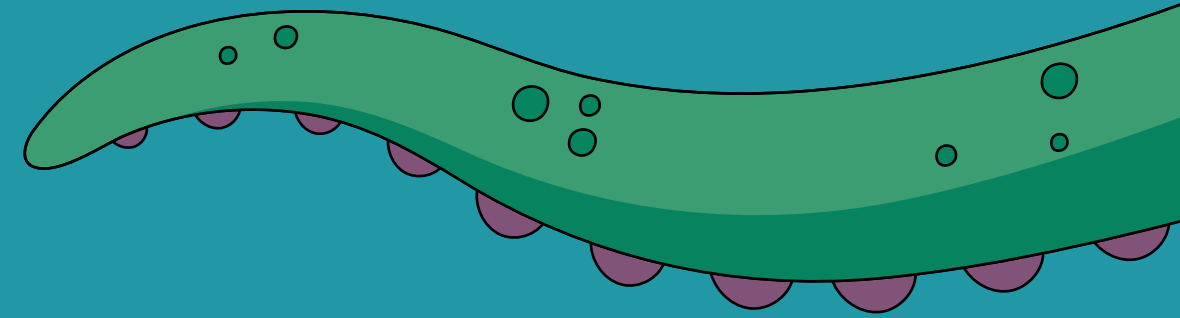
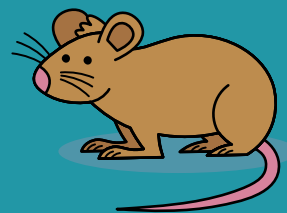
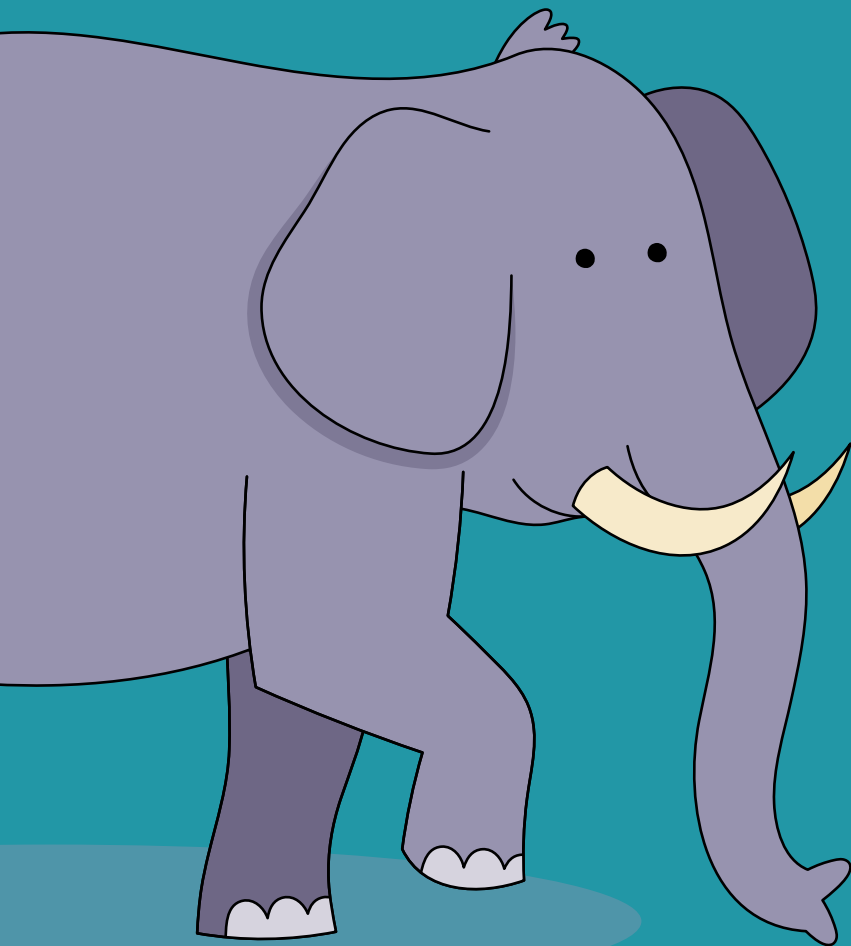
It's truly amazing to think that our brains do so much. It actually kind of gives me a headache to think about how our brains think! Our brains give us the ability to experience our world! We see beautiful rainbows, listen to lively music, taste delicious foods, smell wonderful scents, feel the warmth of hugs, and maintain our sense of balance (even when we get off a roller coaster!).

But some of our sensory experiences pale in comparison to some animals! We can't hear or feel the low rumbles of distant thunder, we can't see the ultraviolet colors that reflect off flowers, we can't smell with our tongues, and we can't taste with our feet! Even more amazing, some animals have senses that we do not, such as the ability to detect the Earth's magnetic fields or the gradients of electricity that come off all living things!

I hope that after reading my book, you too are filled with the sense of wonder that our senses and perception bring to our lives and that you learn to appreciate that humans, while awesome, can learn a thing or two from the animals that inhabit this world with us!

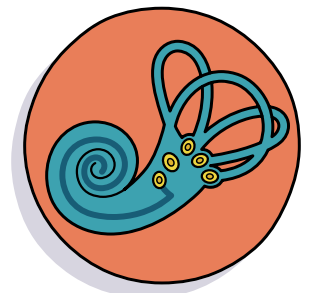
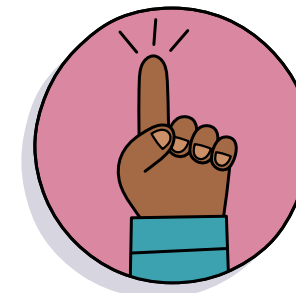
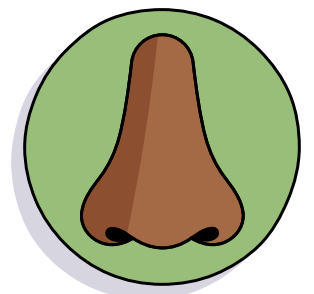
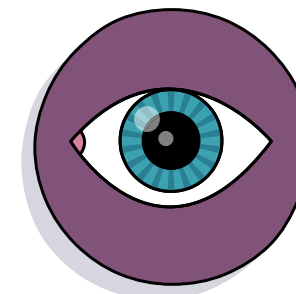
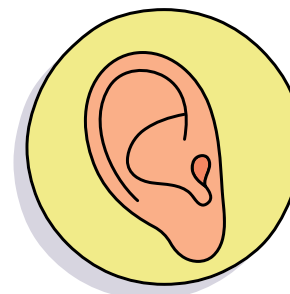
Sensationally yours,  
Leanne Boucher Gill

# PART 1



## UNDERSTANDING SENSATION AND PERCEPTION

# Your Sensational Senses!



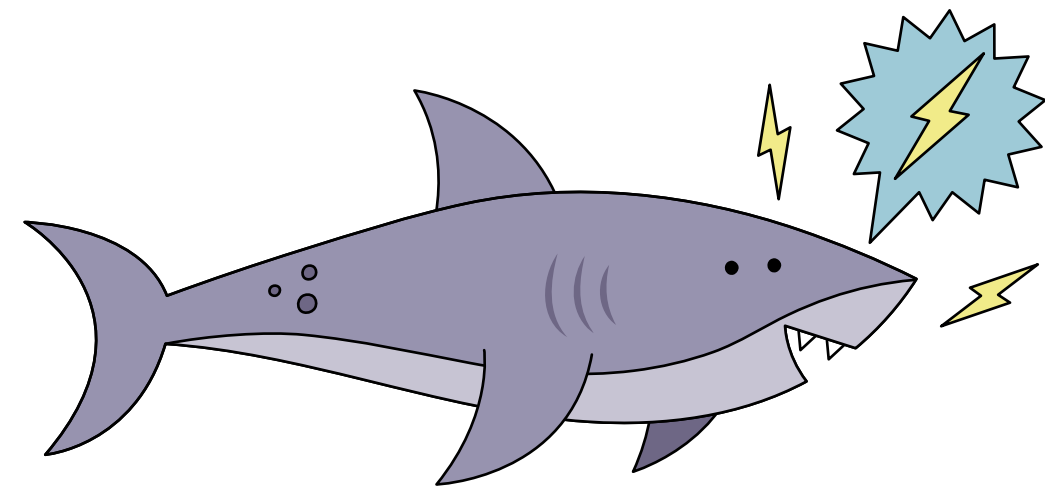
**H**ave you ever wondered how we experience the world around us? How do we see colorful rainbows, hear melodious birds, taste sweet chocolate, smell fragrant flowers, feel gentle touches, and detect which way is up? Each of our six senses—vision, hearing, taste, smell, touch, and balance (equilibrium)—allows us to interact with the world, to truly understand and be a part of it. To live within it fully. After all, what would a stop for a snack in the middle of a rainy hike be like without one of our senses? The answer is not necessarily awful. It would just be different.



We take for granted that all animals, including people, perceive the world as we do. When we take a deep breath and inhale the scent of lilies, we assume everyone experiences the same smell. When we look across a pasture and watch cows grazing and bees buzzing, we assume everyone sees the same greenery and hears the same animal and insects sounds exactly like we do. But it isn't true!

Sometimes differences occur because of conditions that affect senses, like blindness or deafness. As a result, folks with these conditions may experience the world differently. Some people compensate a sensory difference or loss by relying on other senses or by using aids, like a cane or a hearing aid. Others need no intervention and are perfectly content to live and experience the world their unique way. It is important to understand and remember that not everyone experiences the world in the same way, and that is okay.

Our sensory experiences aren't only different from other humans, they're different from other animals, too. Some animals have senses that allow them to perceive more or less of the world than we do. For example, cats' extraordinary sense of vision allows them to detect shadows we can't. And while dolphins can hear high-pitched sounds, they can't hear the same range of low-pitched sounds that we can. Other animals have senses that are completely different from humans. Sharks and stingrays can detect electrical signals their prey release in the water. And some birds and turtles have the ability to detect Earth's magnetic field, which they use for navigation. How cool is that?



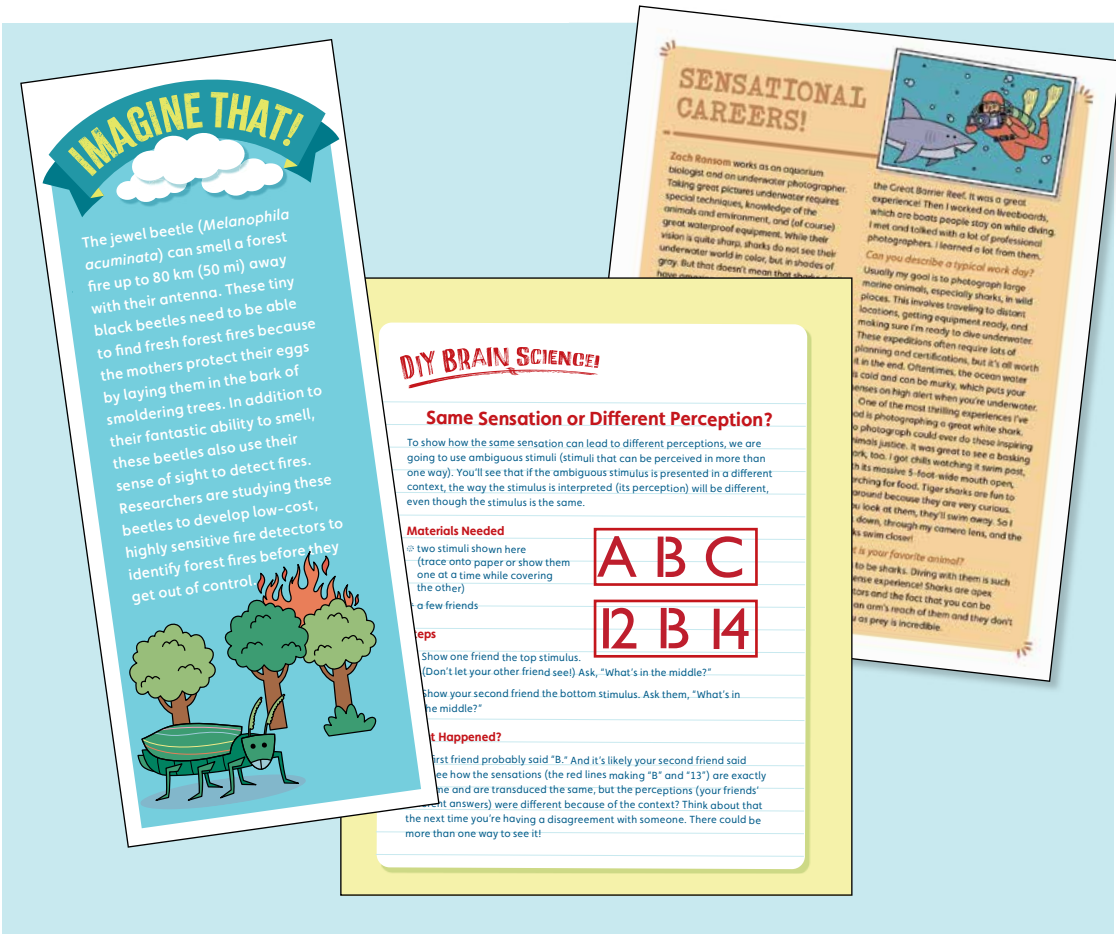
# Book Features

As you read, you'll find fun features, like:

**IMAGINE THAT!** Real world examples of science in action, connecting ideas and concepts to your environment.

**DIY BRAIN SCIENCE!** Simple experiments to help you discover how senses work (and how fun it is to test the limits of your sensory systems).

**SENSATIONAL CAREERS!** Discover people who work with and study animals, like park rangers, researchers, K9 police officers, doctors, and nonprofit workers. Love animals and science? It's never too early to consider how you can make a difference!


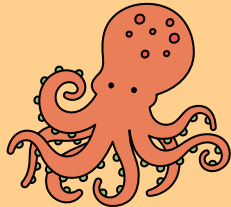





# Animal Naming

For the animals and insects talked about in this book, we are going to use both their common name and their scientific name. For example, the scientific name for humans is *Homo sapiens*. Every species on the planet is given a scientific name so that there is no confusion about which species someone is talking about.

Scientific names are given in italics and usually have two parts—a generic and a specific name. The generic name refers to what genus the animal belongs to and is always capitalized. The specific name is the species name. For example, we humans belong to the *Homo* genus and our species is *sapiens*. Sometimes only the generic name will be given because there is only one species that falls within that genera.

COMMON NAME	SCIENTIFIC NAME
<div>Common vampire bat</div> 	<div><i>Desmodus rotundus</i></div> <div>Genus Species</div>
<div>Giant Pacific octopus</div> 	<div><i>Enteroctopus dofleini</i></div> <div>Genus Species</div>
<div>Dog</div> 	<div><i>Canis lupus familiaris</i></div> <div>Genus Species</div>

# Scientific Units

In 1875, The Treaty of the Metre was signed in Paris, France by 17 countries and created an official organization that would standardize measurements throughout the world. Today, the International System of Units (SI) is the most widely used method of measurement in science and is based on the metric system. While most Americans are used to the Standard American English (SAE) or Imperial units of measurement, scientists all over the world use the metric system. Here are a few conversions of common units that you'll find in this book:

- 1 meter = 3.28 feet
- 1.6 kilometers = 1 miles
- 2.5 centimeters = 1 inch

# Wonder and Awe

Hopefully this book will give you a sense of wonder and awe about our world and how you perceive it—and how your perception compares to that of other animals. Studying how our senses are alike and different from animal senses can create a greater understanding of how we live and function together. And believe it or not, that understanding also allows us to create devices and aids that can help us all.

You'll discover some of those aids and strategies as you read. You'll learn how they were developed to help people recover some of their lost sensory function. And how knowledge about how animal senses work helped make it possible. For example, did you know medical tests for cancer and sophisticated fire alarms are connected to animal senses? Read on!