

SUPER SENSES

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MAKING SENSE OF THE WORLD

Imagine that a boy wakes up from a nap to find himself on a beach. How does he know he's on a beach? The answer to this question requires a complicated series of steps. His brain must receive and process information that will allow him to realize he's on a beach.

To do this, he uses his senses. His eyes take in the sand and the ocean. His ears hear the

crashing waves. He inhales and smells the salt air. He feels the sun warming his face, and he touches the tiny grains of sand.

All of these sensory perceptions are sent to his brain. Together, they allow him to realize that he's on a beach. It's an amazing process, and it all happens unimaginably fast—faster than the blink of an eye.



—THE SENSES—

Humans—like the boy on the beach—observe the world through their five senses: sight, hearing, smell, taste, and touch. Humans have specialized receptors—eyes, ears, nose, mouth, and fingers and skin—that allow them to take in sensory data, which their brains then process. People use this information to understand what is going on in the world around them and to guide their actions.

Other animals use their senses to observe the world, too. They also have specialized receptors. Sometimes, they have more powerful—or very different—sense receptors than people do. For instance, normal human vision is 20/20,* but many birds see a lot better than that. People can hear a wide range of sounds, but dolphins can hear much higher or lower sounds. Dogs can detect smells that a human nose would never pick up. People taste with their mouths, but one

animal, the catfish, can actually taste with its whole body.

Different animals have different specialized sense receptors that help them process information from their environment. These sensory perceptions, along with memories from previous sensory encounters, are what guide an animal's behavior.

Read on to learn more about some animals that have unusual or amazing receptors for each of the five senses.



*20/20—the ability to see clearly at 20 feet what would normally be seen at that distance



▲ Nocturnal, night-hunting raptors—such as owls—have amazing night vision.

—SIGHT—

Sight is the sense people use most often in perceiving the world. They're not alone. Birds rely on sight to perceive their environments, too. Some birds can see amazingly well.

For instance, eagles have excellent vision. Eagles belong to a group of birds known as raptors. One specialized sense that all raptors share is very keen eyesight.

HUNTERS FROM UP HIGH

A hawk can spot a mouse from 30 meters (100 feet) away. Once it spies the mouse, the hawk will swoop down, at over 193 kilometers (120 miles) an hour, and snatch it. Dinner is served!





WHAT BIG EYES!

Giant squid, which grow up to 18 meters (60 feet) long, have the largest eyes of any animal. Their eyes can be as big as 25 centimeters (10 inches) across. That's the size of a dinner plate!

Raptors can see up to eight times better than humans. These birds have highly specialized eyes that are large in proportion to their heads. According to the Peregrine Fund, "If our eyes were the same size as a raptor's in proportion to our skulls, we would have eyes as big as oranges." Bigger eyes mean more seeing power. Because a raptor's eyes are so big, the bird is not able to move them. The bird has to turn its entire head to look around.



Raptors also have eye muscles that can focus very rapidly on faraway objects. And unlike many mammals, birds can see color. Raptors also have an ability to sense depth very accurately. All of these specialized features help raptors hunt small animals, find places to live, and watch for enemies.



Bats use echolocation to navigate in the dark.

— HEARING —

Raptors, like almost all birds, use their excellent vision to navigate the world.

However, another type of flying animal needs a different sense

receptor to navigate. Most bats rely on a specialized kind of hearing, called echolocation, to find food and travel through their environment.

Sound is measured in units called hertz (Hz).
The more hertz, the higher the sound. ▼



infrasound
(can be heard by elephants)



audible frequencies
(can be heard by humans)

20 Hz

20,000 Hz

According to the Maryland Department of Natural Resources, “bats produce echolocation by emitting high-frequency sound pulses through their mouth or nose and listening to the echo. With this echo, the bat can determine the size, shape, and texture of objects in its environment. Bat echolocation is so sophisticated that these animals can detect an object the width of a human hair.”

High-frequency sound is pitched very high. This sound is usually too high for human ears to detect, but not for many animals. Bats are not the only animals that can detect high-frequency sound, also known as ultrasonic sound. Cats, dogs, and even mice can hear it. So can dolphins. Dolphins, like bats, use echolocation to navigate. However, they echolocate in the ocean, not on land.



WHAT BIG EARS!

An elephant's big ears allow it to hear sounds that are too low for human ears. This kind of low sound is called infrasonic sound. Elephants use infrasonic sound for long-distance communication. They send low, powerful sounds through miles of forest to locate family members or to warn others of danger.



◀ Dolphins use echolocation to figure out the size, shape, and location of other animals and objects in the water.

ultrasound
(can be heard by dolphins)

2,000,000 Hz

200,000,000 Hz