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Amazing Animal Senses

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Senses, Learning and Memory: Amazing Animal Senses

Student Edition

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STEMTaught® **Grade 4**

Next Generation Science

4-LS1-2 From Molecules to Organisms, Structures and Processes: Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.

We can senses things all around us

All animals, including you, have senses that communicate with the brain about the world around you. Your eyes tell your brain about what you see. After your eyes see something, your brain tells you, "That's a red light. Stop!" Or, "That looks sharp. Don't touch it!" We use many different senses to discover the world around us.

Smell

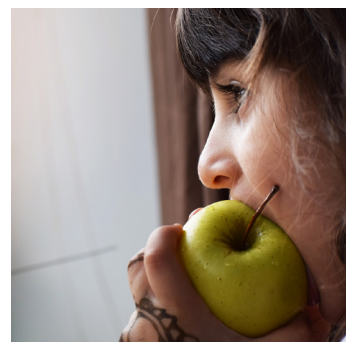
You can smell a flower with your nose.

Feel

You can feel soft fur with your skin.

Hear

You can hear a funny joke with your ears.



Taste

You can taste an apple with your tongue.

Sight

You can see with your eyes.

Does your body have any other senses?

Hawks see with a zoomed-in view

Hawks have extraordinary vision which allows them to see with a zoomed-in view. Their sight is magnified 4 to 8 times stronger than the average human. A hawk can spot a moving rabbit from about 3.2 kilometers away! These birds have an astonishing 1,000,000 photoreceptors per square millimeter in the eye. The human eye has only 200,000 photoreceptors per square millimeter. Hawks can see with amazing accuracy and with a zoomed-in view.

This is one square millimeter!

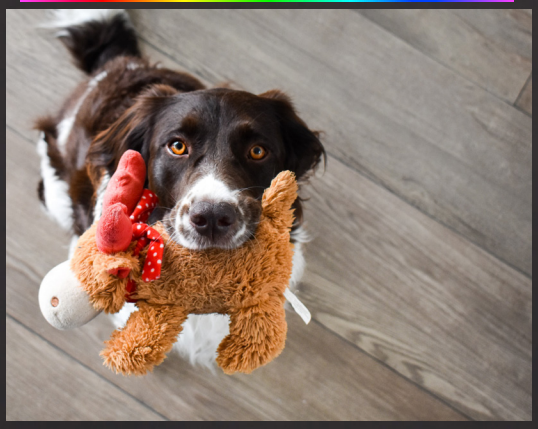
How and why do hawks see differently than humans?

Dogs cannot see as many colors as humans

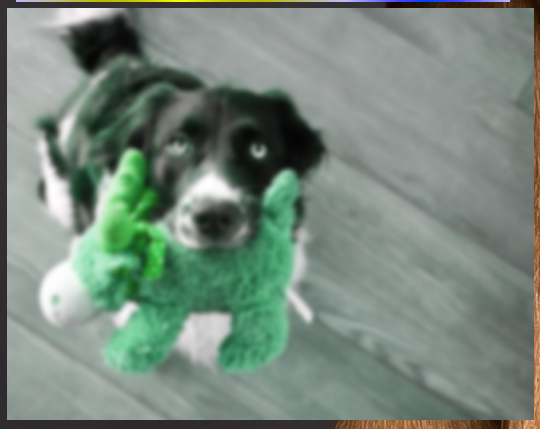
The back of the eye is covered in two types of light receptors called cones and rods. Cones help us to see colors and rods help us see in dim light. Humans have three types of cones that detect the colors red, green and blue. Sensing these three primary colors allows us to see all the colors of the rainbow.

Dogs and horses have only two types of cones—one that sees blue and one that sees yellow. This causes them to only see color combinations of yellow and blue—so, dogs and horses can't see the color red.

How a human sees the world.



How a dog sees the world.



Dogs cannot see the color red and cannot see as clearly as humans because they only have 29,000 cones per square millimeter. Humans have up to 200,000 cones in the same area.

Bees can see ultraviolet light

Bees also have light receptors called cones—however, theirs detect the sun's ultraviolet light which we cannot see. They see the world differently! Red apples appear black, and green trees look red.

Bees see pollen as bright specks and can see beautiful, bright patterns on flowers which are invisible to the human eye. Bees have additional color cones that allow them to see ultraviolet light.

Ultraviolet light is very useful for a bee because it helps them find flowers which reflect ultraviolet. This orchid glows a bright white arrow to direct the bee to the pollen.

How and why do bees see differently than humans?

Raccoons and owls see in the dark

Animals that are most active at night are called nocturnal animals. Owls and raccoons are nocturnal and can see well in the dark. Light sensing cells that detect dim light at night are called rods. Owls have 1,000,000 rods per square millimeter on the back of their eyes. Humans only have 200,000 per square millimeter. Owls can see very well during a night that would appear totally dark to a human.

How and why do owls see differently than humans?

Raccoons have a reflective layer on the back of their eyes made of mirror-like cells containing microscopic crystals. The reflective layer helps them see better in the dark.

Snakes sense heat using a super sense

Similar to us, snakes have eyes and can see. In addition to sight, snakes have another sense that we do not have—therml imaging! Snakes have a heat sensing organ called a pit organ. Pit organs are located on the snake's face between the nose and the eye and are able to sense warmth given off by an animal. This sense comes in especially handy when looking for warm-blooded animals like mice, rats and birds.

How do snakes "see" differently than humans?

Snakes can see the heat emitted from other animals using sensory organs in their heads.

Prey animals have eyes on the sides of their heads. This gives them a large field of view so they can see in front of them, to the sides and even behind them. This wide view helps them avoid being caught.

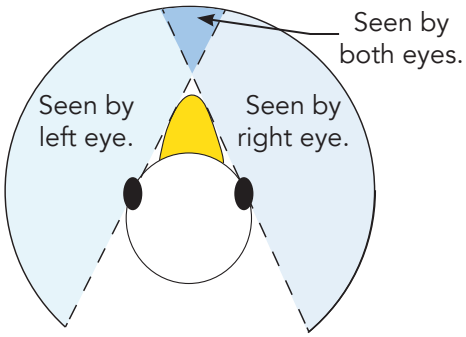
How do predators see in 3D?
How could this help them?

Predator and prey animals see differently

Prey animals see with a wide field of view that helps them spot predators. Predatory animals see with a narrower field of vision. The brain of a predator can process slight differences in the overlapping view of each eye to make a 3D view. This gives them depth perception so they can effectively catch prey that is running away quickly.

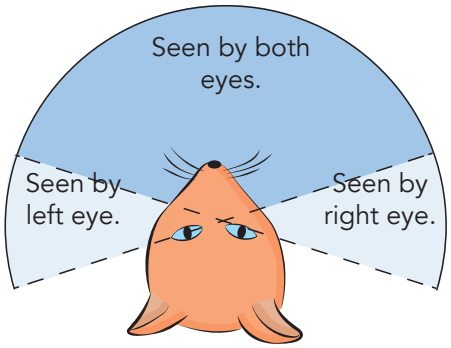
Prey Animals (Duck)

Eyes on the sides of the head



Predatory Animals (Fox)

Eyes facing forward



Catfish have an amazing sense of taste

We know ice cream is sweet and a lemon is sour because we have taste buds. You have about 10,000 taste buds on your tongue. Your taste buds are sense receptors that send messages to your brain to help you know what you are eating. You can taste sweet, sour, bitter and salty. Do animals have taste buds too? Yes, they do.

Lions have about 450 taste buds. They don't need many to help them choose foods because all they eat is meat. They just need to recognize whether meat is rancid or not.

Cows are excellent tasters! They have about 25,000 taste buds. Cows need lots of taste buds in order to distinguish between poisonous plants and non-poisonous plants.

Which animal has the best sense of taste? The catfish! Catfish have 175,000 taste buds, not only on their tongue but also all over their body. Catfish live in muddy water. They use taste buds to find foods around them that they cannot see.

Bears can smell very well

Smell is a very important sense in the animal kingdom. To smell, scent receptors in the nose detect microscopic particles in the air. Bears have the most scent receptors of any animal and have been known to travel up to 20 miles in a straight line towards a food source.

Why is the sense of smell important to animals?

Moles find their way in the dark using touch

The organ we use to sense touch is the skin. Touch receptors in the skin communicate with the brain to give information about the objects we touch such as hardness, softness, smoothness and even temperature. Animals use their sense of touch for many different reasons. They can feel if a branch is safe to walk on or if it might break under their weight. One foot on a slippery rock might warn the animal that it needs to find another rock to walk on. Many animals can use touch to find a soft place to rest for the night.

The star-nosed mole has a sensitive, pink nose that looks like a star. The mole uses its nose to feel its way through dark underground tunnels. Moles have poor eye sight, but a mole can navigate quite well with its super-star nose!

Credit: Gordon Ramsay flicker, Creative Commons

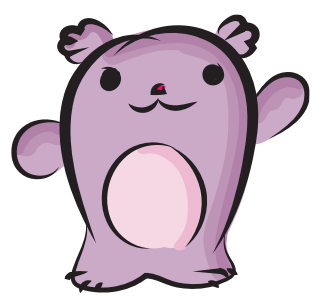
One of the most important ways many animals use touch is to bond with each other. Just like you enjoy getting a hug from someone in your family, cuddling helps animals form bonds of trust that will help them keep each other safe in the future.

Dolphins use sound to see objects around them

Most animals have sense receptors in the ear that can detect sounds to hear. Sound vibrations can travel through air or water. Some animals have a special sense that allows them to see using sound waves instead of light. This process is called echolocation.

When dolphins squeak underwater, their sound waves bounce off nearby objects and return back as an echo. The echoes are picked up by sense receptors in the dolphin's head. The complex signals they detect are processed by the brain to allow the dolphin to see using sounds. They can see in murky water, find where their food is, and tell which direction the food is moving with echolocation. Whales, orcas and bats also use echolocation.

Bats also use echolocation.



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