Lesson: “Why would a sea turtle eat a plastic bag?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hi. It's Jay from the Mystery Science Team. A few years ago, I got to go on a snorkeling trip. I was following some fish as they darted into some coral, when I turned a corner and came across something much bigger: a sea turtle. I was so excited because sea turtles are one of my all-time favorite ocean animals. I found out later that there are actually seven different kinds of sea turtles living in ocean waters all around the world. There's everything from hawksbill sea turtles, who love the warm, colorful waters of coral reefs, to these leatherback sea turtles, who can dive down into waters nearly 4,000 feet deep! These creatures live incredible lives. They hatch out of eggs buried in sandy beaches. Tiny hatchlings, only minutes old, race toward the water. Over time, some grow to about the size of a dinner plate, while others have been known to reach the size of a couch. And these creatures can live a long time. A healthy sea turtle might live for as long as 100 years! But in recent times, sea turtles around the world have been facing a new threat: these. Plastic bags that end up floating in the ocean can put sea turtles in serious danger. Why? Because sea turtles eat them. It's probably no surprise to you that eating a plastic bag can make a sea turtle really sick. But here's a question: why are sea turtles eating these plastic bags? I mean, if you were swimming and saw a plastic bag floating in the water, you wouldn't eat it. To help keep these creatures safe, we need to understand why so many of them keep doing something that hurts them. Why do you think a sea turtle might eat a plastic bag?

EXPLORATION VIDEO 2

Animals of all kinds can have behaviors that don't seem to make any sense. When you're trying to figure out what makes a sea turtle, or a cat, or a dog, or a parrot, or any animal behave the way they do, sometimes it can help to think about what makes you behave the way that you do. After all, even though we don't always think about it this way, humans are animals too. So why do you do the things you do? Let's imagine you walk into a kitchen, and a sweet smell hits your nose. What do you do next? Chances are, you'll keep using your senses to gather information. You get different information from different parts of your body. Your nose smells that scent coming from some objects on the kitchen counter. If you go over and put your hands out toward them, you feel warmth. If you pick one of the objects up, it feels flat, and round with sticky bumps. Do you have any idea what's going on here? This might help. If you look at the object with your eyes, you see this. Aha, these are freshly baked chocolate chip cookies. But how did you know that? How did you know that sweet smell, plus warmth, plus tan flat circles equals fresh baked cookies? To figure that out, you had to use your brain. Your brain is where your memories are stored. Your memories help you use your past experiences to understand what's going on now. Take a minute to think of your favorite sweet food. What does it smell like? Look like? Feel like? Sound like? Taste like? What memories do you have of that food?

EXPLORATION VIDEO 3

When you see something on a countertop and think that's a chocolate chip cookie, your brain is matching the sight and smell of the cookie in front of you with the sight and smell of cookies you've seen before. You recognize this as a cookie because you have memories of other cookies. But your memories don't just help you recognize that a cookie is a cookie. Memory also

influences what you do about it. If you see a chocolate chip cookie, and the first thing you think of is the delicious cookies you've eaten before, you might decide to have a bite of this one too. But maybe your memories aren't that nice. Maybe when you think about chocolate chip cookies, you remember, "I'm allergic to chocolate. The last time I ate chocolate, I felt sick." If you have a memory of getting sick from eating chocolate, you might do the exact opposite: get away from those cookies! When you choose what to do based on your memories, that's a learned behavior. It's a behavior that you learn to do based on what you've seen and done in the past. However, there are some behaviors you might not have to learn. Like, think about crying babies. Babies often cry immediately after being born. It's possible you cried in your first seconds of life. Nobody had time to teach you to do that. You were literally just born! Babies just do that. It's automatic. We call this instinct. Different animals have different instincts. When a baby sea turtle hatches from an egg, she doesn't have the instinct to cry like human babies do, but she does do something automatically without being taught. Check this out: this newly hatched sea turtle automatically moves toward bright light and sands that slope down, which takes her directly into the ocean. Nobody taught her to do this. That's a sea turtle instinct. Senses, instincts, and memories shape the behavior of many different kinds of animals, from sea turtles, to ants, to people. But it can be hard to figure out what these senses, instincts, and memories are when you're not experiencing them yourself. To understand how these things shape animal behavior, you kind of have to see inside of that animal's mind. You have to think like they do. Think about the animals you're most familiar with. What kinds of animals do you have near where you live? What do you know about their senses, instincts, and memories?

ACTIVITY INTRODUCTION VIDEO

In today's activity, you will go inside the mind of a raccoon to explore what shapes their behavior. You and your partner will think like raccoons and explore two mystery items just like a raccoon would. You will see what a raccoon sees, smell what a raccoon smells, and feel what a raccoon feels. Your job is to figure out what the mystery items are and what you will decide to do with the items. Since we don't have the real mystery items to explore in class today, you will use models, or a pretend version instead. You'll gather clues about the mystery items using some of your raccoon senses. Touch, sight, and smell. Then you'll compare the clues you gathered with your raccoon memories of similar things you've experienced in the past. Finally, you'll put all your clues and helpful memories together to figure out what each item is and what you want to do with each one. Will you eat them? Take them with you? Run away from them? Can you think like a raccoon to help you make decisions? We'll get you started step by step.

ACTIVITY STEP 1

In today's activity, you'll work with a partner. When you're ready to move on, click the arrow on the right.

ACTIVITY STEP 2

Get your starting supplies. You'll get more supplies later.

ACTIVITY STEP 3

Find your Raccoon Senses and Raccoon Behavior sheets. Fold them both in half on the thin black line, like this. You should have Mystery Item 1 on the front and Mystery Item 2 on the back. When you're done, put your two folded sheets off to the side.

ACTIVITY STEP 4

These are your raccoon memories. Some are related to your sense of touch. Some are related to your sense of sight. And some are related to your sense of smell. Work with your partner to cut all of the cards along the dotted lines. Then, stack the cards in three piles. All of the touch memory cards go in one stack, all the sight memory cards in another, and all the smell memory cards in another. Put your piles of cards off to the side for now.

ACTIVITY STEP 5

From now on, you're going to think like a raccoon. You'll have a raccoon's senses and a raccoon's memories. You'll use these to gather as much information about Mystery Item 1 as you can. The first sense you're going to explore as a raccoon is touch. In a moment, you're going to get an item in a bag. This item is similar to what the real mystery item would feel like. Once your teacher says go, you're going to feel the item inside the bag without looking at what it is. What shape is it? What does it feel like? Try to get as much information as you can from only feeling the model. Make sure both you and your partner have a chance to make your observations. Okay. Ready? You're going to get your supply now.

ACTIVITY STEP 6

Write down everything that you notice with your sense of touch in the "touch" box on your Raccoon Senses sheet. Make sure you're writing on the side that says, Mystery Item 1.

ACTIVITY STEP 7

All of the information you gather with your senses goes to your brain. These sheets are a model for your raccoon brain. Place your Brain Model in between you and your partner. Then tape the two sheets together with your label stickers like this. Stack each pile of cards on the matching memory box: touch memories, sight memories, and smell memories.

ACTIVITY STEP 8

Now, spread out your touch memory cards on your raccoon brain model. These are all of your raccoon memories related to what you've touched in the past. Some of these memories will be helpful for figuring out what the mystery item is, while others might not be. It's your job to sort through them. Read through the memories with your partner. Look for ones that can give you clues about what the mystery item is. Keep memories that seem helpful for figuring out what the mystery item is in your brain model. Put the ones that don't seem very helpful back in the Touch Memory card box face down.

ACTIVITY STEP 9

The item inside the bag is a model of what the mystery item feels like. Next, you're going to use your sense of sight to gather more clues. In a moment, you'll see the actual mystery item through a raccoon's eyes. Since raccoons can't see things far away very well, the item will look

blurry. Try to gather as many clues as you can about the mystery item by looking at it. Write down all the information you gather in the Sight box on your Senses sheet. Watch closely. We'll play the video a few times.

ACTIVITY STEP 10

Now that your brain has new information about how the mystery item looks, you remember more things. Spread out your sight memory cards on your brain, along with the touch memory cards that you kept. Read through the memories in your brain with your partner and sort through them. Keep memories that seem helpful for figuring out what the mystery item is in your brain model.Put memories that aren't very helpful back in the Sight Memory card box face down.

ACTIVITY STEP 11

Finally, you're going to use your sense of smell. Since you can't smell the mystery item through the screen, we're going to use lines like these to show what your raccoon nose is smelling. Different line shapes represent different smells. In a moment, we'll play the same video again. This time, though, you'll see some smell lines on the screen that represent what your raccoon nose is picking up. As you watch, pay close attention to what these lines look like and where they're coming from. Draw the shape of the lines you notice and write where they're coming from in the smell box on your Raccoon Senses sheet. Watch closely. We'll play the video a few times.

ACTIVITY STEP 12

Now that your brain has new information, you remember more things. Spread out your Smell Memory cards on your brain, along with the Touch and Sight Memory cards that you kept. Read

through your memories with your partner and sort through them. Keep the memories that seem helpful for figuring out what the mystery item is. Put memories that aren't very helpful back into the Smell Memory card box face down.

ACTIVITY STEP 13

Now it's time to put it all together. You've gathered information about the mystery item with your senses. Then you sorted through your memories related to that information. Now, it's time to decide what to do. Discuss with your partner: based on your memories, what do you think the mystery item is? As a raccoon, what do you think you should do? Then answer Questions 1 and 2 on your Raccoon Behavior sheet. Use evidence you gathered from your senses and memories to help support your answers.

ACTIVITY STEP 14

You're done thinking about Mystery Item 1. To get ready for the next mystery item, clear your brain. Sort the memory cards back into the original three piles: Touch Memory cards, Sight Memory cards, and Smell Memory cards. Then flip your Raccoon Senses and Raccoon Behavior sheets. It should now say Mystery Item 2 at the top.

ACTIVITY STEP 15

In a moment, you're going to get your touch model for Mystery Item 2. This item is similar to what the real mystery item would feel like. Once your teacher says go, you're going to feel the item inside the bag without looking at what it is. What shape is it? What does it feel like? Try to get as much information as you can from only feeling the model. Make sure both you and your partner have a chance to make your observations. Then write down what you notice in the

Touch box on the Mystery Item 2 side of your Raccoon Senses sheet. Okay. Ready? You're going to get your supply now.

ACTIVITY STEP 16

Spread out your Touch Memory cards on your brain. Read through the memories again with your partner and work together to find ones that you think will help you figure out what the mystery item is. Keep the helpful memories and move the others back to the Touch Memory card box.

ACTIVITY STEP 17

This time, you'll gather clues about the mystery item using your senses of sight and smell at the same time. In a moment, you'll see the actual mystery item through a raccoon's eyes and see some smell lines of different smells in the area. Try to gather as many clues as you can about the mystery item based on what you, as a raccoon, can see and smell. What shapes do you see? Is anything moving? What smells do you notice? If you're not totally sure what you're seeing and smelling, that's okay. Try to record as much information as you can in the Sight and Smell boxes on your Raccoon Senses sheet. Your memories will help you understand what you're seeing and smelling in a moment. Watch closely. We'll play the video a few times.

ACTIVITY STEP 18

Spread out your Sight and Smell Memory cards on your brain. Read through your memories with your partner and sort through them. Keep the memories you think are helpful for figuring out what the mystery item is. Put memories that aren't very helpful back in their memory card boxes.

ACTIVITY STEP 19

It's time to put everything together one last time. You've gathered information about the mystery item with your senses. Then you sorted through your memories related to that information. Now it's time to decide what to do. Discuss with your partner: based on your memories, what do you think the mystery item is? As a raccoon, what do you think you should do? Then answer questions 3 and 4 on your Raccoon Behavior sheet.

ACTIVITY STEP 20

How do you think this model is similar to how animals make decisions in the real world? How do you think it's different?

WRAP-UP VIDEO 1

In the activity, you explored what made one animal, a raccoon, act the way she does. Your raccoon felt something fuzzy with her paws, saw a small, moving thing with her eyes, and smelled a musky smell with her nose. When those senses reached the raccoon's brain, her memories and instincts helped her identify them. Your raccoon remembered that many of the small, musky, moving things she's encountered in the past were food. That helped her identify this small, musky, moving thing as food too. You might have an idea of what this thing is already. Let's look with human sight and find out. It's a mouse. If the raccoon had different information from her senses, she might have thought differently. If she smelled a musky smell, but the creature looked big, she might identify it as a predator, like a bobcat, something she'd want to avoid. But because the creature is small, she identifies it as a snack, a mouse. During the activity, you and your partner took several minutes to carefully sort through your raccoon senses

and memories. But in real life, this happens fast. In less than a second, a raccoon's brain puts all the information she has together. All her different senses, her instincts, and years' worth of memories. Just like that, she immediately knows what action to take: eat the mouse. Now I don't know about you, but when I see a mouse, I don't usually think, "yum, a snack, I should eat that." A person has really different memories and instincts than a raccoon does. Your raccoon remembers mice as food. You don't remember mice that way. Instead, maybe you remember watching someone jump back in fear when a mouse ran across the floor. So now, when you see a mouse, maybe you think "yikes, a mouse. I should get away from that." Those different memories lead you and the raccoon to really different behaviors. It's the same thing with the other mystery item we explored. Your raccoon felt something crinkly with her paws. Saw a roundish object with her eyes and smelled something like meat with her nose. Let's see what this item really is. It's a bunch of foil in a trash bin, but let's take a closer look at what's inside. It's a hot dog! A hot dog that's been sitting in the trash surrounded by other garbage might not be your ideal lunch. But think about it from a hungry raccoon's point of view. When a raccoon comes across a hot dog in a trash can and sniffs something that smells sweet and like meat, those are smells she remembers from foods she snacked on before. In her mind, this is a perfect opportunity for a meal. So, if looking at a raccoon's senses and memories can help us understand why she might eat something in a garbage can, could we use the same approach to figure out other mysterious animal behaviors? Like, remember how sea turtles are getting sick because they eat plastic bags in the ocean? Maybe thinking from a sea turtle's point of view could help us understand why they keep doing that. What memories might a sea turtle have from his daily life? We know he swims around the ocean every day. Scientists have observed sea turtles snacking on many different things, like algae and jellyfish. They've also noticed sea

turtles swimming away from big predators like dolphins and sharks. Could any of these memories give us clues about why a sea turtle might eat a plastic bag?

WRAP-UP VIDEO 2

To understand why sea turtles eat plastic bags in the ocean, scientists considered the situation from a turtle's point of view. First, they considered what information a sea turtle might gather from his senses when he spots a plastic bag in the water. Sea turtles generally have strong senses of sight and smell underwater. So, they probably do see the plastic bags they swim into -- they just decide to eat them anyway. Scientists put those senses together with the sea turtles' memories and instincts. As we saw before, different sea turtles eat many different things. One popular sea turtle snack? Jellyfish, like these. Now take a look at this jellyfish floating in the water next to a plastic bag floating in the water. Looks similar, right? If a sea turtle has lots of memories of eating delicious jellyfish, it might be easy to mistake this bag for a jellyfish. And it might not just be sight leading sea turtles to that mistake. Scientists have discovered that over time, tiny bits of algae start to grow on plastic floating in the sea. Algae is another favorite sea turtle meal. Sea turtles can smell this growing algae, and to them, it smells like food. Scientists think this might be why sea turtles sometimes eat plastic bags. They mistake them for foods they remember eating before, like jellyfish and algae. But this mix-up causes a lot of harm. Scientists think more than half of the world's sea turtles have eaten some kind of plastic. Which can cause long term health problems. Many species of sea turtles around the world are now considered endangered and plastic trash in the ocean is a huge cause. So, what can we do? We probably can't stop sea turtles from eating plastic bags. They think it's food, and they need food to survive. But by thinking from their point of view, we can start to understand their behavior. Knowing why they do what they do can help us come up with solutions. We may not

be able to change a sea turtle's behavior. But we can change our own behavior to keep sea turtles safe. By using fewer plastic bags and less plastic in general, we can make it less likely that a sea turtle will come across plastic in the water and less likely that they'll make a dangerous mealtime mistake. Of course, we're not sea turtles, so we can't ever know for sure what a sea turtle is thinking. Just like we can't really read an elephant's mind or see through an ant's eyes. Even our own minds and behaviors are sometimes hard for us to understand! But even when we find animal behaviors funny, bizarre, or just plain confusing, there's often a good reason that animal is doing that. The more we learn about what animals sense, and what memories and instincts animals have, the better we can understand what they know, what they do, and how we can help them. Try seeing the world through another animal's eyes -- and stay curious.