Making Neuroscience Fun

A Brain Awareness Program for All Ages

Brain Health: It's SPECtacular

What to do TODAY
Grade 4 (A Cognitive Health Story)

All animals get information about the world around them and they use this information to modify their behaviors in a way that allows them to survive.

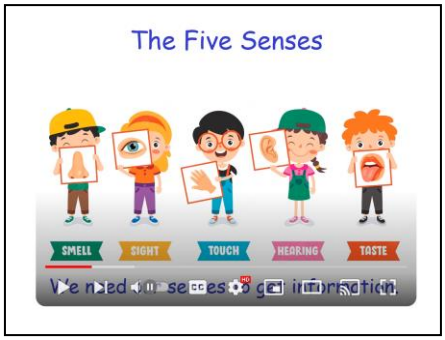
- The world as we know it is dependent on our sensory receptors.
- Humans are the only animals that are able to enhance their sensory systems to detect stimuli that they would not normally be able to detect. That gives humans a definite advantage as to what they can learn about the world.
- How our brains perceive the information that is obtained from our sensory systems depends on a number of factors. We need to understand that not only is the world around us constantly changing, but that our perception of the world also changes. What we know about the world allows us to choose behaviors that will allow us to not only survive – but, to thrive.

- For this presentation, you need to have the "The World As We Know It " Story Video. You will need to load the https://www.nhm.ac.uk/discover/how-do-other-animals-see-the-world.html website and practice moving the line all the way to the right to see how humans see the picture and to the left to see how the animal sees the picture.
- Start the story video and stop after the title slide.

The story today, "The World as We Know It!!!" is going to OPEN your eyes to how much our brain REALLY does to help us survive in this world.

Let's SEE…

- Continue playing the Story Video and stop after this screen.



Ok…so our senses give us INFORMATION about the world around us so that we can survive.

So, when you get up in the morning…HOW do you senses tell you how to dress so you won't be too hot or too cold – so you don't sweat or freeze to death? (Discuss – EYES may SEE snow, TOUCH (skin) can FEEL temperature)

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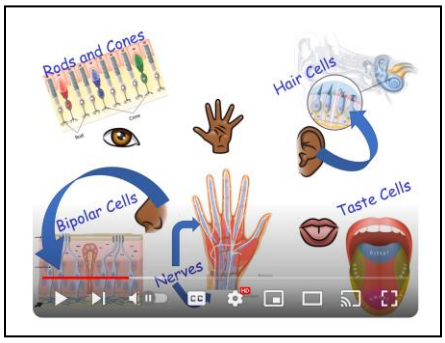
- Continue playing the Story Video and stop after this screen.

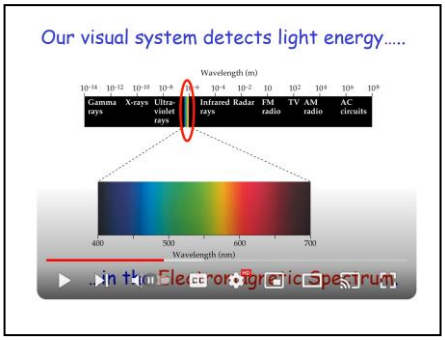


WHOA!!! That was a LOT of information!!!

Basically, what that all means is that your body – eyes, nose, mouth, ears and skin, CATCHES all kinds of things that are out in the world with special RECEPTORS.

We only know about the world around us because once those **receptors** CATCH the information, they SEND the information to our brains.

- Continue playing the Story Video and stop after this slide.



Ok..so our RECEPTORS in our eyes – called RODS and CONES – **catch** the **wavelengths** that let our see all the colors of the rainbow.

There are other wavelengths – along the **electromagnetic spectrum** (point to the line), the receptors in our eyes cannot catch them.

Think about it you tried to **catch** a football with a baseball glove…it doesn't work.

- Continue playing the Story Video and stop after this slide.

So, animals SEE the world differently based on the kind of **receptors** they have in their eyes. And, this is based on the kind of information their brains need to be able to SEE in order to survive.

So, the world that we SEE is **different** than the world other animals SEE.

Let's **see** what that would look like.

- Do the "Do You See What I See" demonstration. (There is still about 12 more minutes of the video – so watch your time. You can show the examples on the website and then you can show more examples in the powerpoint, if time permits at the end.)

Remind the students that all animals **see** the world differently because of the kinds (and number) of rods and cones – **receptors** – they have in their eyes.

Example #1 - Dogs

- Humans have 1 kind of rod and 3 kinds of cones (red, green and blue). These **receptors** let us see our world.
- Dogs – have one kind of rod and 2 kinds of cones (yellow and blue). So…dogs can't see the **red** ball in the picture. BUT, they CAN see yellow…maybe that is why they LOVE tennis balls.

- Oh…for those cat lovers…cats have 3 kinds of cones – so they see more color than dogs…but, their vision is blurrier.

Example #2 – Gecko

- Humans cannot see very well at night. They especially can't see color in the dark. This is because of the way their eyes are – NOT because of **receptors.**
- Geckos CAN see color in the dark and they have 3 types of cones just like humans – but geckos have color receptors that CAN see in the dark - unlike humans.

Example #3 – Garden Snail

- Garden snails mainly see in black and white and their eyes do not focus very well – which is why things are fuzzy.
- Some snails may have blue cones – but, most snail go towards the dark.

Example#4 – Giant Clam

- Clams CAN see colors – but, they don't have eyes that can focus to tell their brains about shape.
- Clam "eyes" are just lots of "pin pricks" along their body.
- Their see movement and then they either squirt water or close their shell.

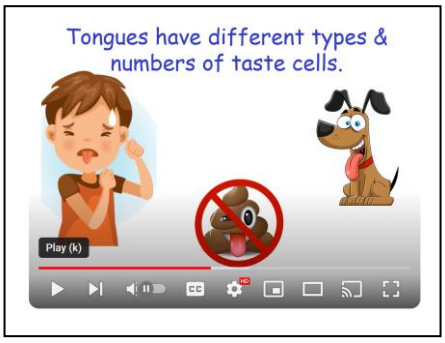
Example #5 – Spiders

- We know that most spiders have more than 2 eyes and lots of spiders actually have more cones than humans. Some can even see ultraviolet light.
- So humans see a yellow flower – but the spider sees a flower with yellow, pink, brown, etc colors.

So, you SEE (pun intended), how we see the world depends on the **receptors** we have in our eyes. Different animals **see** the world differently because they have different receptors. (If you get a color blind questions – tell the students that some people cannot see all the colors of the rainbow – this is due to differences in their **cone receptors**.)

Now, let's see about the receptors for the other senses.

- Continue playing the Story Video and stop after this slide.



The taste sense – or GUSTATORY system if you like big words – is a lot of fun. Mainly because you can actually see where the **taste receptors** are in your mouth.

We are going to do a quick experiment….

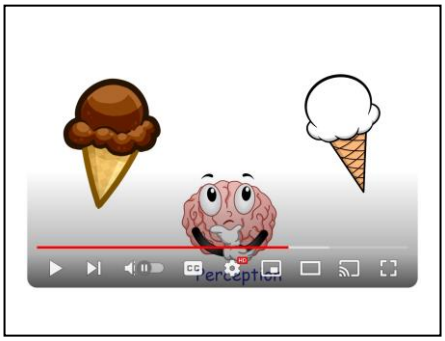
(Pair up the students, in groups of 2 or 3 if you have an odd number.)

Ok…I am going to tell you something that you don't hear a lot…STICK OUT YOUR TONGUE at your fellow student()s. Now, look at your friends tongue.

Do you see all those bumps, well those are **papilla** (another hard word) and on the papilla are the taste cells that allow you to taste all the yummy foods in the world.

- Now, different people have amounts of papilla on their tongues and those papilla can have different numbers and kinds of taste cells.
- This is why different people like or dislike different foods. Depending on their taste buds – foods taste different to different people.

- Continue playing the Story Video and stop after this point in the slide after the choc vs vanilla discussion.



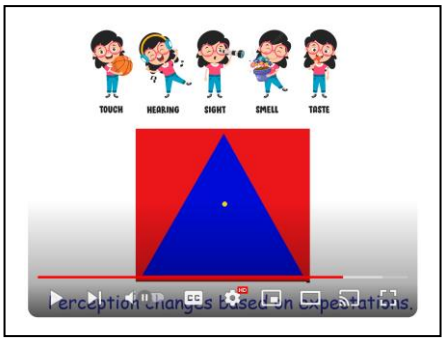
OK…Raise your hand if you like chocolate. (Don't forget to raise your hand too.)

Raise your hand if you like vanilla.

Raise your hand if you like both.

Why do you think some of us like chocolate, some of us like vanilla, and so of us like both? (Discuss, lots of reasons…number of taste cells, some people think chocolate is grittier, etc.)

- Continue playing the Story Video and stop at this point in slide after the question "What would you say?".



Ask…do you think the dot is closer to the top or the bottom?
(you can get the students to raise their hands…top? Or bottom)

- Continue playing the video until the end.

Tell the students that you had fun talking with them about how they actually learn about the world around them.

Remind the students that…

- Our sensory systems help us to learn about the world by using **receptors** to send information about the world to our brain.
- Because humans are more advanced in their thinking than other animals, we are able to enhance our sensory systems to get even more information.
- Based on a lot of different factors, we then perceive that information and make decisions on how to behave.
- Using your brain to do all this, helps your brain stay healthy and that is SPECtacular.

Be sure to thank them for listening and the Brain Health Team of JHU students will see them soon.