

THE FUTURE OF SENSATION

Presenter: Jade Gent

May 2, 2018

SUMMARY

1
TYPES OF
SENSATION

3
ADVANCED
ANIMALS

5
REFERENCES

4
THE FUTURE

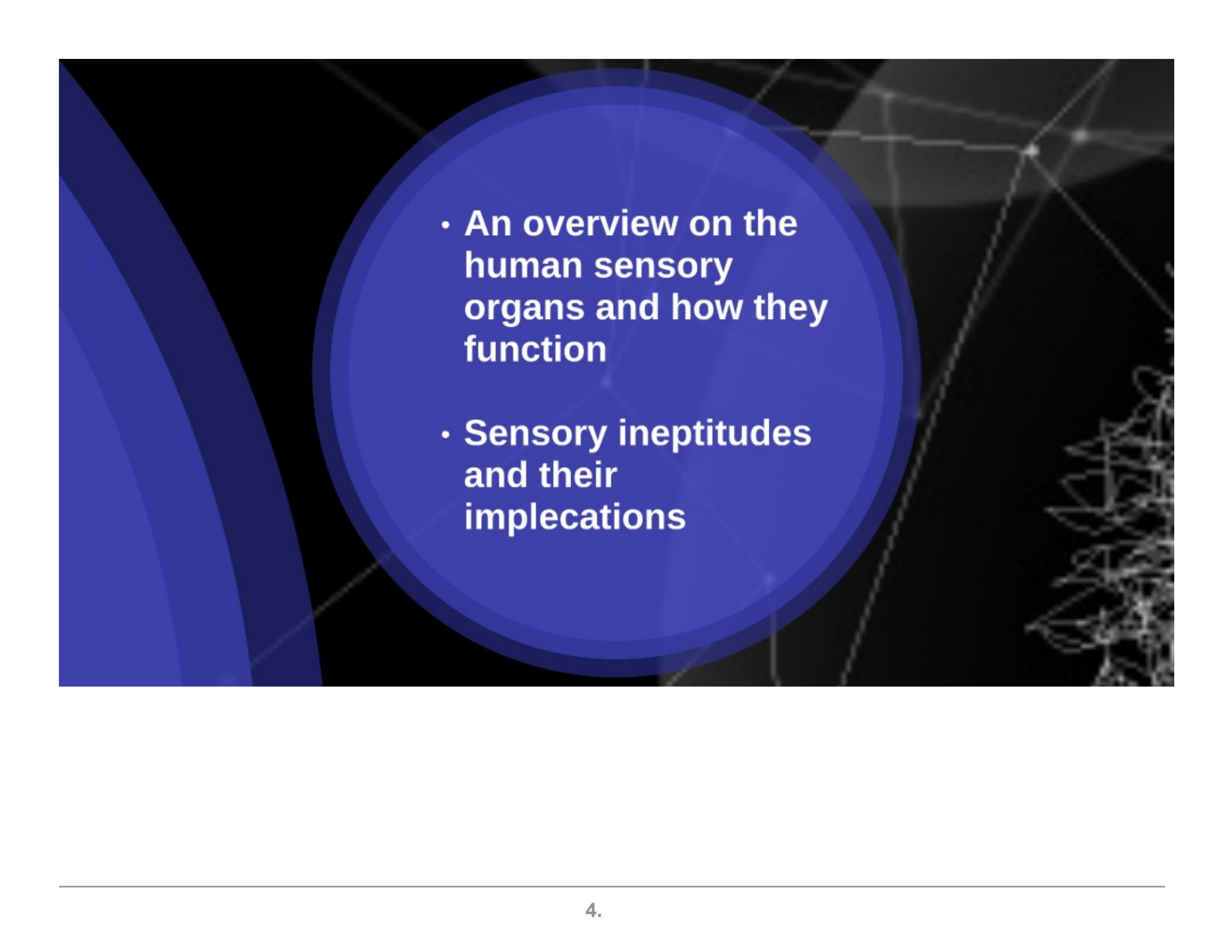
2
WHAT IF
SCENARIOS

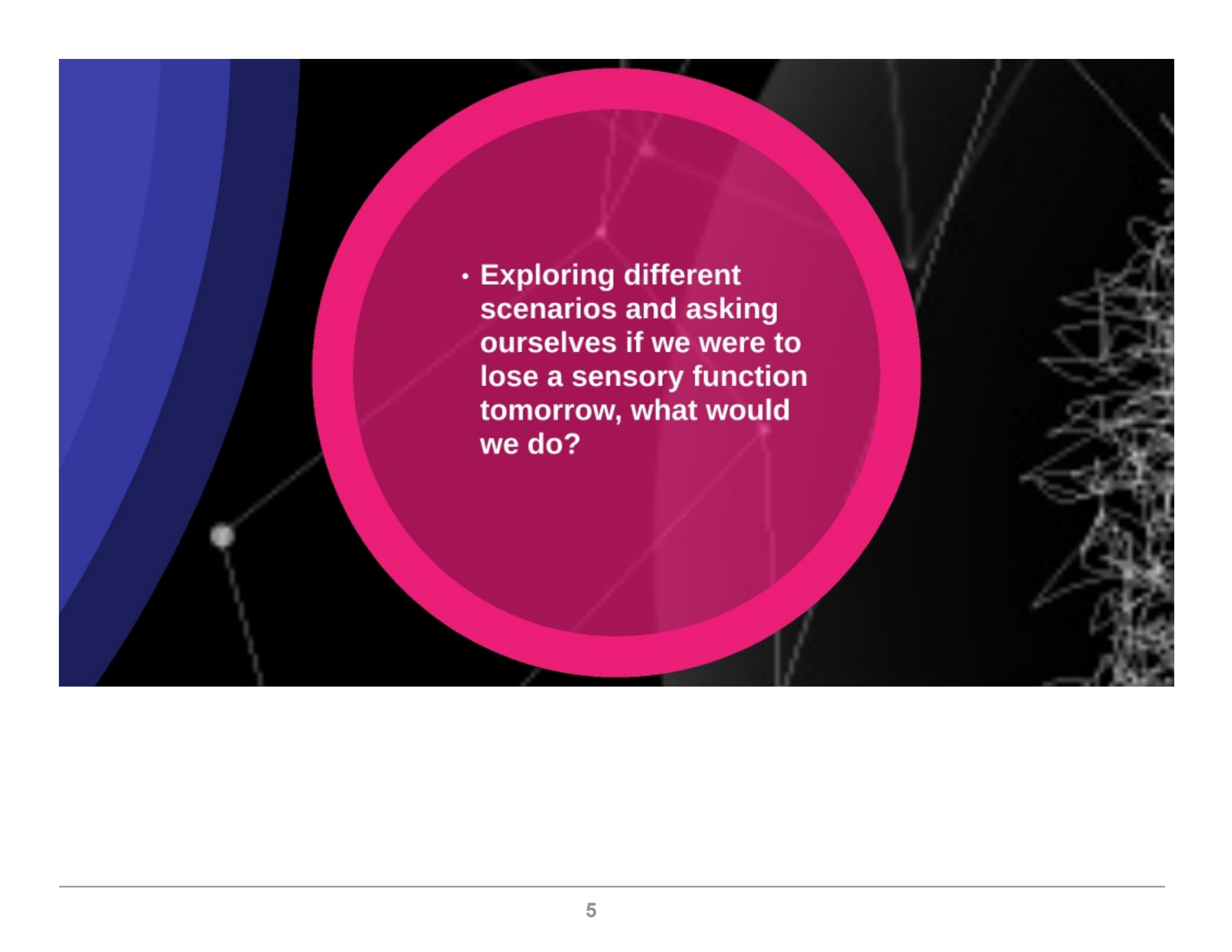


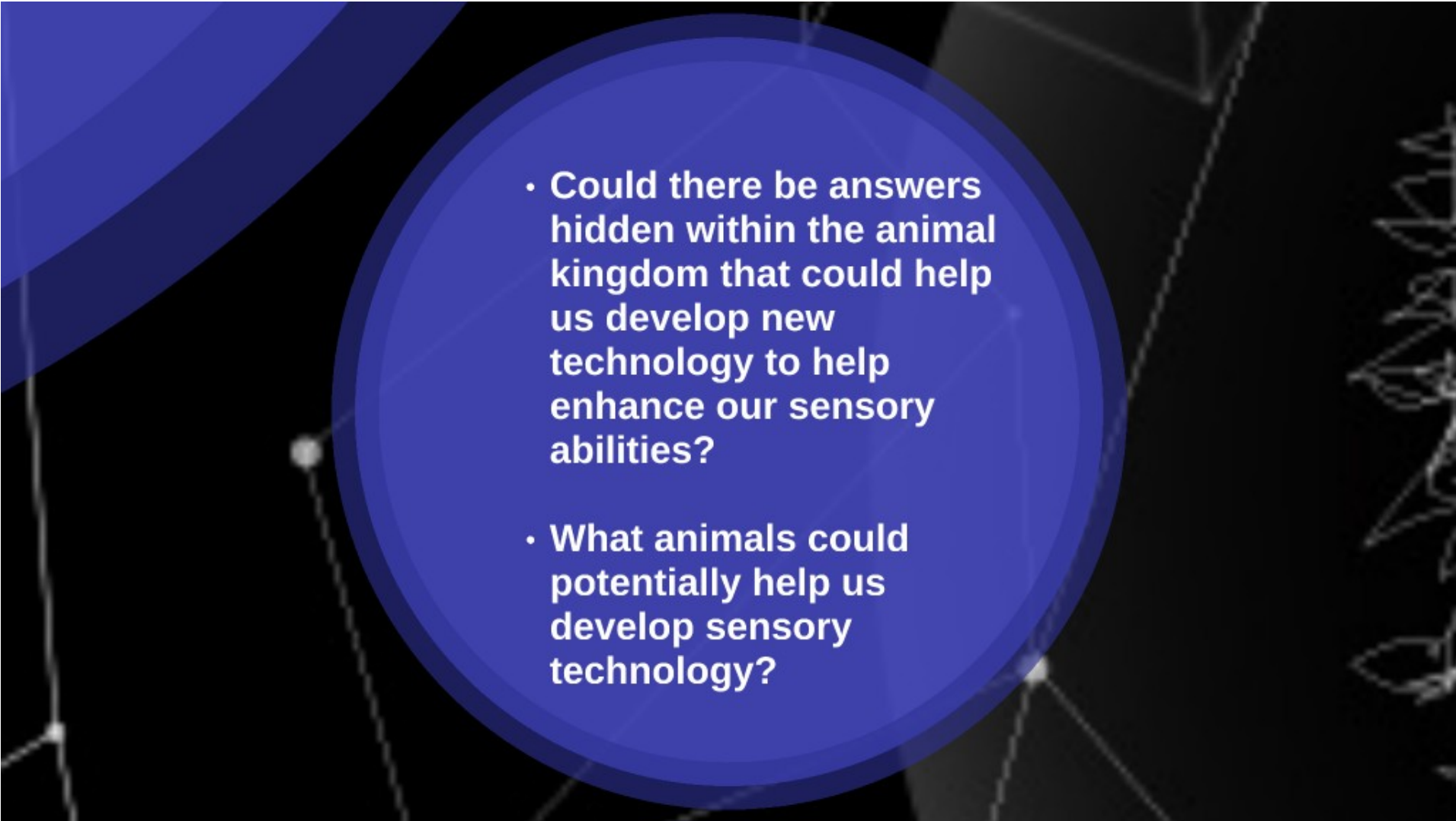
SUMMARY

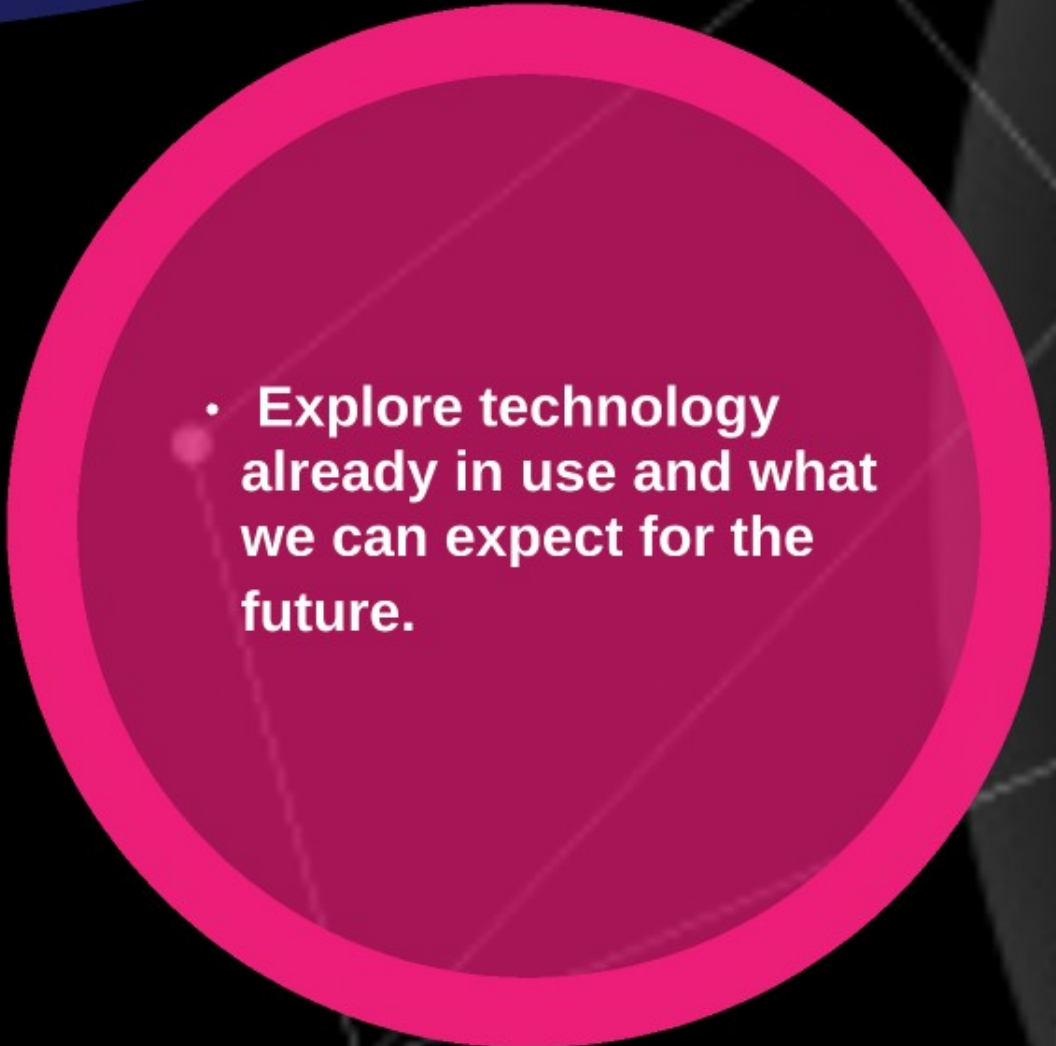
TOPICS



- 
- **An overview on the human sensory organs and how they function**
 - **Sensory ineptitudes and their implications**

- 
- Exploring different scenarios and asking ourselves if we were to lose a sensory function tomorrow, what would we do?

- 
- Could there be answers hidden within the animal kingdom that could help us develop new technology to help enhance our sensory abilities?
 - What animals could potentially help us develop sensory technology?

- 
- Explore technology already in use and what we can expect for the future.

DIFFERENT TYPES OF SENSES

SIGHT

HEARING

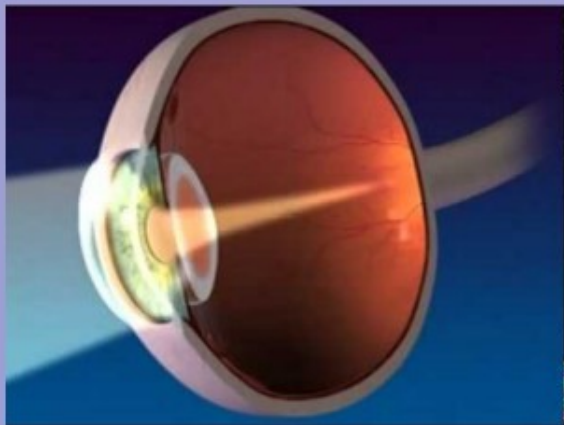
TASTE

TOUCH

SMELL

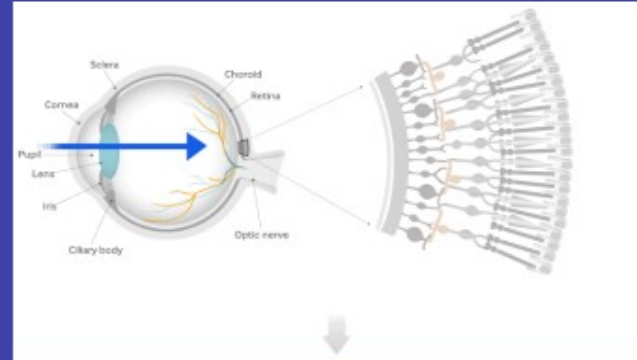
SIGHT

Anatomy and Fuction of the Eye



How do we see?

- Light, reflected from an object, enters the eye, gets focused, is converted into electrochemical signals, delivered to the brain, and is interpreted, or "seen," as an image.



Key Vitamins for healthy eyes (ACE):

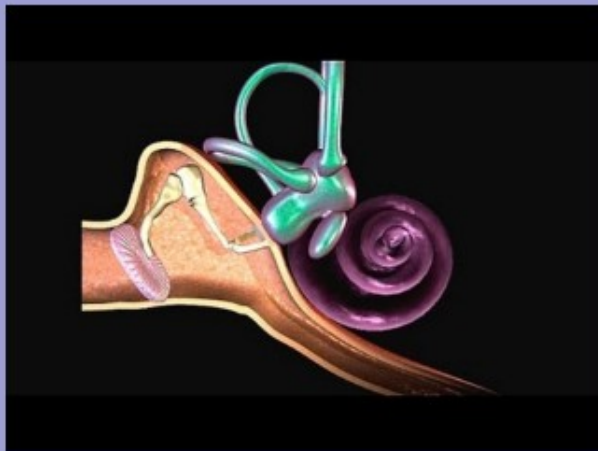
Vitamin A
Vitamin C
Vitamin E



The human eye facts, functions, structure and problems. Retrieved from <http://www.organsofthebody.com/the-human-eye/>
Vitamins for Eyes. Retrieved from <http://www.organsofthebody.com/health/vitamins-for-eyes.php>
Vision Basics: How Does Your Eye Work? Retrieved from <https://www.webmd.com/eye-health/amazing-human-eye>

HEARING

How Hearing Works:

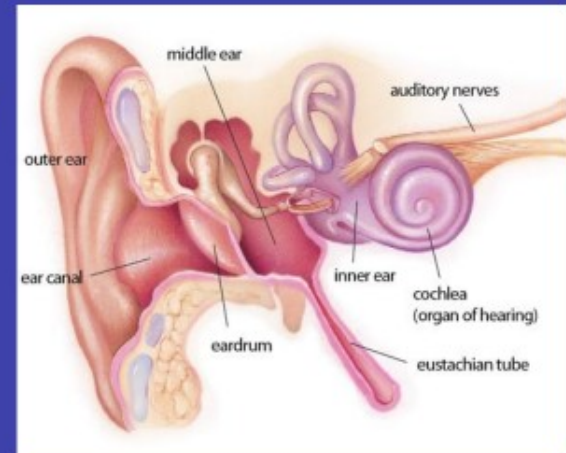


How do we hear?

- Sound funnels into the ear canal and causes the eardrum to move.
- The eardrum vibrates with sound.
- The sound vibrations move through the ossicles to the cochlea.
- Sound vibrations cause the fluid in the cochlea to move and the fluid movement causes the hair cells to bend.
- Hair cells create neural signals which are picked up by the auditory nerve.
- The auditory nerve sends signals to the brain where they are interpreted as sounds.

Minerals for preserving good hearing:

- Potassium
- Folic Acid
- Magnesium
- Zinc



How hearing works. Retrieved from <http://www.medel.com/us/how-hearing-works/>

Brande Plotnick, MS, MBA. Foods that boost hearing: Be mindful of your minerals. Retrieved from <https://www.healthyhearing.com/report/51181-Boost-your-hearing-with-these-power-foods>

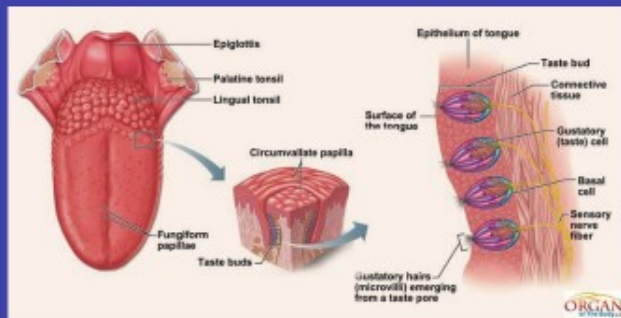
TASTE

How does taste work?



How does taste work?

- Gustatory cells are clustered in the taste buds of the mouth and throat.
- These taste buds react to food or drink mixed with saliva. Many of the small bumps that can be seen on the tongue and they contain these taste buds.
- These surface cells send taste information to nerve fibers, which send messages to the brain.



Important Vitamins for Taste:

- Folic Acid
- Vitamin B-12
- Thiamin
- Zinc

Barbara Quinn (February 15, 2009) Vitamin deficiencies can alter your taste buds. Retrieved from http://articles.chicagotribune.com/2009-02-15/features/0902110331_1_taste-sensations-taste-buds-folic-acid
Smell & Taste Retrieved from <http://www.entnet.org/content/smell-taste>

TOUCH

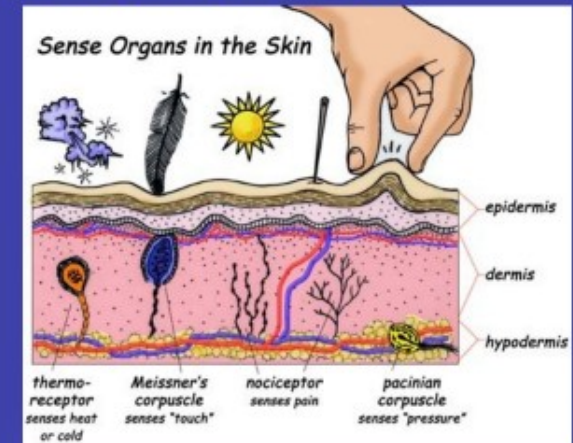
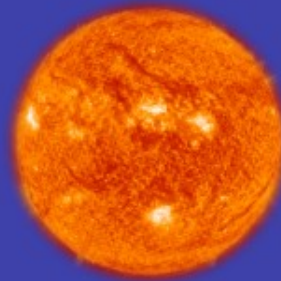
How Sense of Touch Works:



Sense of Touch

- Regulated by sensory receptors that monitor the internal state of the body and the external environment
- These are a group of mixed neurons that are responsible for sending information about the state of the body.
- The sense of touch is considered a general sense due to its distribution throughout the body

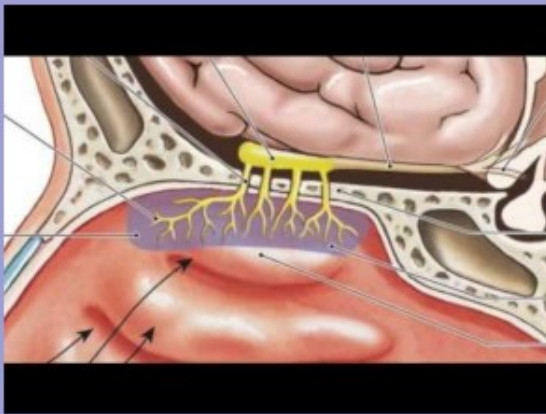
Remember to
always wear
SUNCREAM!



Sense of Touch. Retrieved from <https://learning-center.homesciencetools.com/article/skin-touch/>
Baz Luhrmann (1997). Everybody's free (to wear sunscreen). Retrieved at <http://www.metrolyrics.com/everybodys-free-to-wear-sunscreen-lyrics-baz-luhrmann.html>

SMELL

The Science Behind Smell:

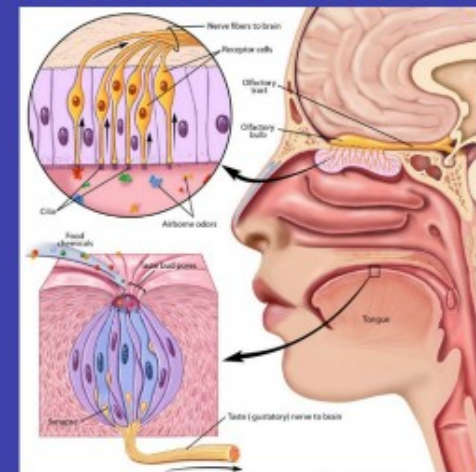


Sense of Smell

- Your sense of smell is part of your chemosensory system, or the chemical senses.
- The ability to smell comes from specialized sensory cells, called olfactory sensory neurons.
- These neurons are found in a small patch of tissue high inside the nose and connect directly to the brain

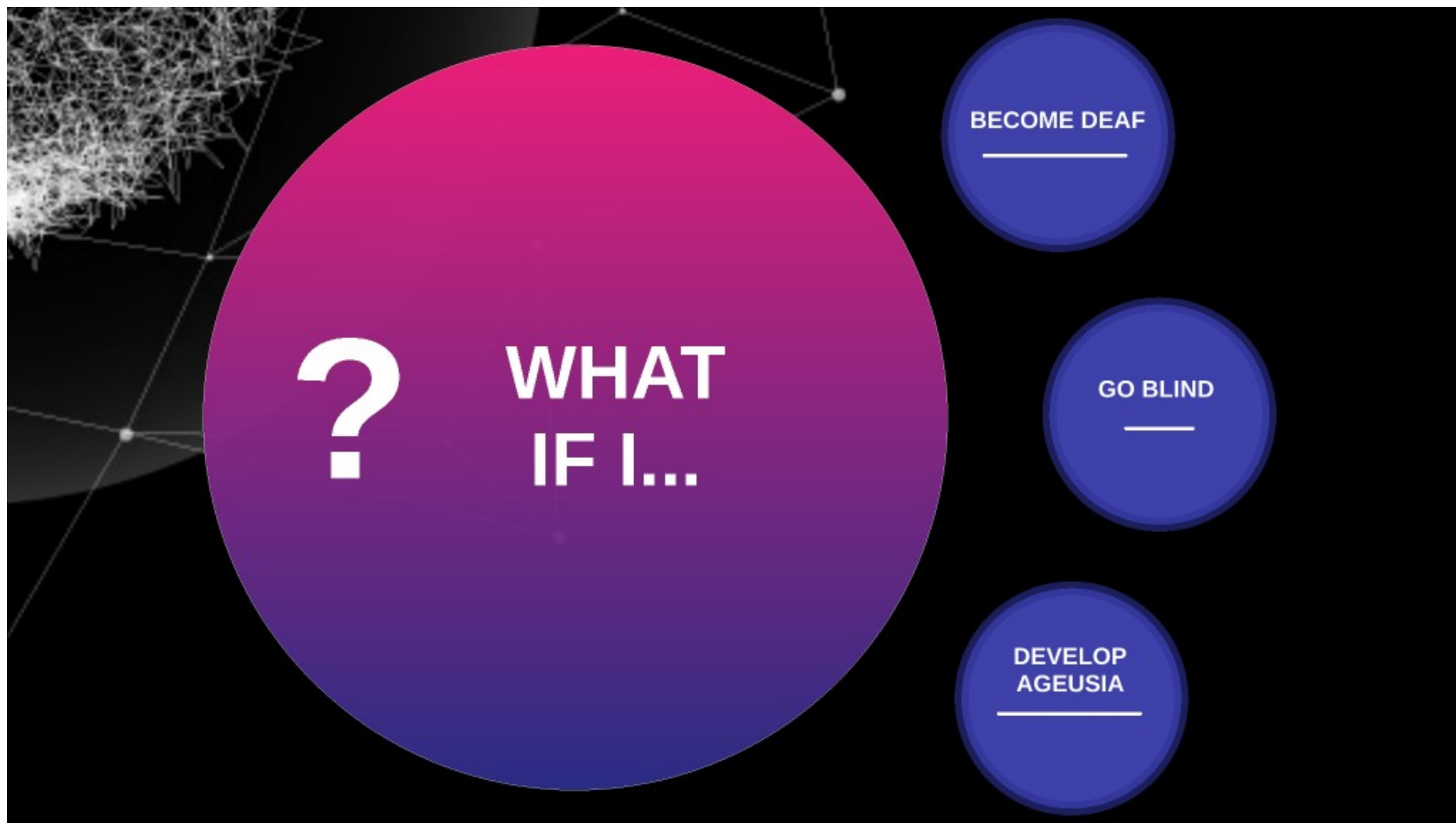
Vitamin deficiencies that could hinder your sense of smell:

- Vitamin B-12
- Vitamin E



Smell Disorders (May 12, 2017). Retrieved here <https://www.nidcd.nih.gov/health/smell-disorders>

Sylvie Trmblay, MSC (October 3, 2017) Loss of Smell & Vitamin Deficiency. Retrieved here <https://www.livestrong.com/article/517337-loss-of-smell-vitamin-deficiency/>



SCENARIO #1



National Association of the Deaf



Find help here: <https://www.nad.org/>

Alex has just finished his last exam of the semester. After handing in his exam paper he heads over to his car and starts his journey home. He can wait to tell his parents how well he did on the test. He takes out his phone and starts texting while driving.

CRASH.

After months of recovery in hospital, Alex has to come to terms with the fact that he is now deaf due to the head injury caused by the crash.

What would you do?

SCENARIO #2



Find help here: <https://nfb.org/>

After graduating college, Blake was lucky enough to get a job on wallstreet as a junior stock broker. One night after a long day, Blake's co-workers invites him out for a drink after work. As the night goes on, the co-worker offers Blake cocaine. Blake feels pressured and tries the drug.

10 years later...

Blake is now a senior broker making endless amounts of money. He is addicted to cocaine. After years of abuse, he starts feeling discomfort in his eyes, his doctor says he is going blind due to corneal ulcers.

What would you do?

SCENARIO # 3

What it's like to have no
sense of taste or smell



Peter started smoking when he was 20 years old.

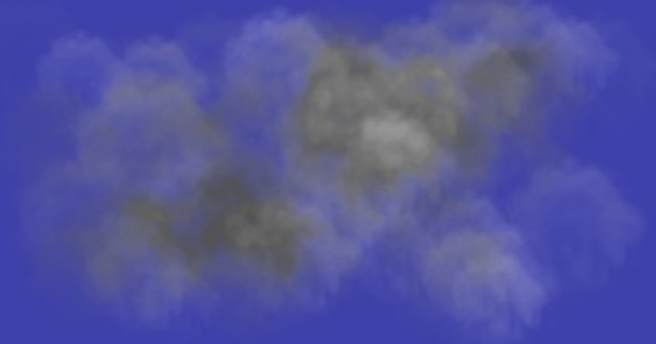
30 years later...

Peter is now 50 years old and has started to realize he can't taste the sweetness in his favorite chocolate cake anymore.

Peter goes to the doctor and is diagnosed with Ageusia.

Now image your favorite food and think about never tasting it again.

What would you do?



* Ageusia - is the loss of taste functions of the tongue, particularly the inability to detect sweetness, sourness, bitterness, saltiness, and umami.

?
**WHAT
ANIMAL
HAS
THE
BEST...**

VISION

HEARING

SENSE OF
TASTE

SENSE OF
SMELL

THE EAGLE

How Animals and People
see the world Differently



Interesting Facts:

- While human eyes take up 5% of the head, eagle eyes occupy 50%.
- If you had eagle vision, you would be able to see someone writing on their Iphone on the ground from the roof of a 10 storey building.
- The back of the eagle eye is flatter and bigger, allowing a larger image to be formed.
- They see colors more vividly than we do, can discriminate between more shades, and can also see ultraviolet light.



Eagle Eyesight: How Do HawkEye See? Retrieved here <https://www.improveeyesighthq.com/eagle-eyesight.html>

THE WAX MOTH



Interesting Facts:

- The greater wax moth's hearing goes up to about 300 kilohertz, nearly 100 kHz higher than the hearing of some bats (The human ear can hear sounds up to just 20 kHz).
- This is the animal with the highest frequency sensitivity yet recorded, there's no other animal that can hear such a high frequency.
- A moth's ultrasonic hearing could help it evade their predators in many environments.

Tia Ghose (May 8, 2013). Moth with Ultrasonic Hearing Discovered Retrieved here <https://www.livescience.com/29416-moth-with-ultrasonic-hearing-discovered.html>

CATFISH

How Do Catfish See The World?



- The Entire body of catfish is covered with taste buds that can detect chemicals in the water and respond to touch. Greatest concentration of sensory organs is located on the whiskers, also known as barbels.
- Most species of catfish have smooth skin (without scales) covered with mucus. Some species of catfish are able to breathe through their skin.
- They produce sounds by rubbing together body parts or by inducing vibration of the swim bladder.
- Catfish typically have more than 100,000 taste buds. Some large catfish can have as many as 175,000. Humans only have about 10,000 taste buds.



Remy Melina. What Animal has the Best Sense of Taste? (January 31, 2011) Retrieved here <https://www.livescience.com/32970-what-animal-has-the-best-sense-of-taste.html>

THE BEAR

The Smell of a Bear



- A bear's sense of smell is said to be even better developed than a dog's.
- Their large muzzles have a huge inner surface area covered tens of millions of olfactory nerves.
- A Polar bear can smell a seal that is at a distance of 20 miles away from it.
- Polar bears always move crosswind to find their prey. This helps in picking up smell from long distances.
- A bear's sense of smell is so good that most of the time it relies only on it rather than its other senses of hearing and sight.

Bear Senses. Retrieved here <http://www.all-creatures.org/bear/b-bearsenses.html>

How Far Can a Polar Bear Smell – Polar Bear Smell. Retrieved here <http://zoologist.com/how-far-can-a-polar-bear-smell-polar-bear-smell/>



TECHNOLOGICAL ADVANCES AND HUMAN ADAPTION IN...

Human
Adaptations

Technology

Electronic Eye

SONAR

BLIND BOY SEES WITH SOUND:



BLIND MAN USES ECHOLOCATION LIKE A DOLPHIN:



THE BOY WHO CAN SEE LIKE A BAT:



Blind boy sees with sound

- Sam is 8 years old and is learning how to echolocate.
- When he clicks his tongue he can hear echos off walls and objects.
- Echolocation is helping Sam become fully integrated into normal school.

Daniel Kish - How I use sonar to navigate the world

- Daniel lost his eyesight at birth due to a tumor.
- While many blind children withdrew under the protection of their parents, Daniel Kish went exactly the opposite way and studied the possibilities of echolocation.

Echolocation Kid

- Ben Underwood had cancer in both eyes before becoming blind.
- He discovered a way to beat his blindness at the age of 6.
- He started "clicking" and realized that the sound made with his tongue bounced off things around him, giving him an idea what was there.

John Kreiser (September 6, 2006). A Teen Who Sees With Sounds Retrieved here <https://www.cbsnews.com/news/a-teen-who-sees-with-sounds/>
Daniel Kish (March 2015) How I use sonar to navigate the world Retrieved here https://www.ted.com/talks/daniel_kish_how_i_use_sonar_to_navigate_the_world/transcript

CREATING NEW SENSES

Paul Bach-y-Rita and Neuroplasticity



David Eagleman demonstrating his concept



- Sensory substitution refers to feeding information into the brain via unusual sensory channels, and the brain just figures out what to do with it.
- In 1969, a scientist named Paul Bach-y-Rita put blind people in a modified dental chair, and he set up a video feed, and he put something in front of the camera, and then they would feel that poke in the back with a grid of solenoids. So if you wiggle a coffee cup in front of the camera, they are feeling that in their back, and amazingly, blind people got pretty good at being able to determine what was in front of the camera just by feeling it in the small of their back.
- The most modern incarnation is called the brainport, and this is a little electrogrid that sits on your tongue, and the video feed gets turned into these little electrotactile signals, and blind people get so good at using this that they can throw a ball into a basket, or they can navigate complex obstacle courses. They can come to see through their tongue.
- David Eagleman, a neuroscientist created a concept where as he speaks, the sound is captured by a tablet, and then is mapped onto a vest that's covered in vibratory motors. The vibrations are translated into dynamic patterns.



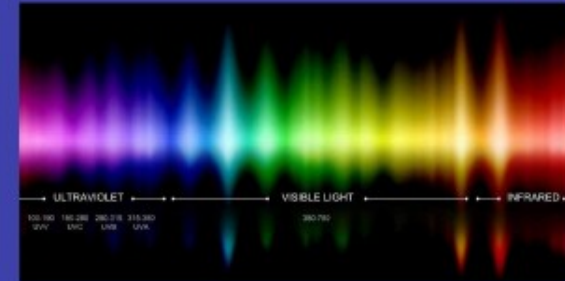
David Eagleman (March 2015). Can we create new senses for humans? Retrieved here https://www.ted.com/talks/david_eagleman_can_we_create_new_senses_for_humans/transcript

LISTENING WITH COLOR

Neil Harbisson - I listen to color



- Neil was born with a rare visual condition called achromatopsia, which means he is totally color blind.
- At the age of 21 instead of seeing color, he started hearing color.
- He has a color sensor that detects color frequency in front of him and then sends the frequency to a chip installed at the back of his head.
- In the beginning he had to memorize the names we give for each color and remember the notes associated with these colors.
- After some time, all this information became a feeling and he even started to dream in color.
- Later on he began to see infrared and ultraviolet rays on his color to sound scale and therefore now he can hear colors that the human eye cannot perceive.



Neil Harbisson (June 2012) I listen to color, Retrieved here https://www.ted.com/talks/neil_harbisson_i_listen_to_color/transcript

REFERENCES

The human eye facts, functions, structure and problems. Retrieved from <http://www.organsofthebody.com/the-human-eye/>

Vitamins for Eyes. Retrieved from <http://www.organsofthebody.com/health/vitamins-for-eyes.php>

Vision Basics: How Does Your Eye Work? Retrieved from <https://www.webmd.com/eye-health/amazing-human-eye>

How hearing works. Retrieved from <http://www.niedel.com/us/how-hearing-works/>

Brandt Plotnick, MS, MBA. Foods that boost hearing: Be mindful of your minerals. Retrieved from <https://www.healthyhearing.com/report/51181-Boost-your-hearing-with-these-power-foods>

Barbara Quinn (February 15, 2009) Vitamin deficiencies can alter your taste buds. Retrieved from http://articles.chicagotribune.com/2009-02-15/features/0902110331_1_taste-sensations-taste-buds-folic-acid

Smell & Taste Retrieved from <http://www.entnet.org/content/smell-taste>

Sense of Touch. Retrieved from <https://learning-center.homescience.tools.com/article/skin-touch/>

Baz Luhrmann (1997). Everybodys free (to wear sunscreen). Retrieved at <http://www.metrolyrics.com/everybodys-free-to-wear-sunscreen-lyrics-baz-luhrmann.html>

Smell Disorders (May 12, 2017). Retrieved here <https://www.nidcd.nih.gov/health/smell-disorders>

Sylvie Trmblay, MSC (October 3, 2017) Loss of Smell & Vitamin Deficiency. Retrieved here <https://www.livestrong.com/article/517337-loss-of-smell-vitamin-deficiency/>

Eagle Eyesight: How Do HawkEye See? Retrieved here <https://www.improveeyesighthq.com/eagle-eyesight.html>

Tia Ghose (May 8, 2013). Moth with Ultrasonic Hearing Discovered Retrieved here <https://www.livescience.com/29416-moth-with-ultrasonic-hearing-discovered.html>

Remy Melina. What Animal has the Best Sense of Taste? (January 31, 2011) Retrieved here <https://www.livescience.com/32970-what-animal-has-the-best-sense-of-taste.html>

Bear Senses. Retrieved here <http://www.all-creatures.com/hearing-bearsenses.html>

How Far Can a Polar Bear Smell – Polar Bear Smell. Retrieved here <http://zoologist.com/how-far-can-a-polar-bear-smell-polar-bear-smell/>

John Kreiser (September 6, 2006). A Teen Who Sees With Sounds Retrieved here <https://www.cbsnews.com/news/a-teen-who-sees-with-sounds/>

Daniel Kish (March 2015) How I use sonar to navigate the world Retrieved here https://www.ted.com/talks/daniel_kish_how_i_use_sonar_to_navigate_the_world/transcript

David Eagleman (March 2015) Can we create new senses for humans? Retrieved here https://www.ted.com/talks/david_eagleman_can_we_create_new_senses_for_humans/transcript

Neil Harbisson (June 2012) I listen to color. Retrieved here https://www.ted.com/talks/neil_harbisson_i_listen_to_color/transcript