

Your Body's Accelerometer

Teacher Notes for Years 7-10



This video examines the vestibular system in our bodies, and the reasons why we can sense our balance and acceleration.

Video Summary

Ollie explains to us that we have many more than five senses. He focuses on a set of organs in the ear comprising the vestibular system.

The vestibular system includes three semicircular canals oriented in three different directions, giving us the ability to sense rotational movement of our head.

When your head turns, thick fluid moves within the semicircular canals, bending a cluster of hairs located at the base of each canal. The bending of these hairs transmits signals to your brain. A second organ, the utricle, uses a similar system of fluid and hairs to give us the ability to sense acceleration.

Vanessa demonstrates how you can make your own device that works on the same principle these organs use to sense acceleration.

As Vanessa accelerates on the Segway, the fluid moves the cork and string in the opposite direction. When she reaches a constant speed, the cork and string bend back to being vertical. Measuring of the angle of the string can give you an idea of the direction and amount of acceleration.



Figure 2: Homemade accelerometer. This object simulates the action within the utricle.

Science Understanding (Year 7, 8, & 10)

Biological sciences

Multi-cellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce. (Year 8)

The semicircular canals and the utricle are examples of specialised organs. They are a part of the larger vestibular system which contributes to our balance and sensing the movement of our head.

Students could compare and contrast this system in humans to similar systems found in a fish. Are there any similarities in how fish and humans detect their balance and movement? What are the differences? How have the environments where these creatures evolved influenced the development of these systems?

Physical sciences

The motion of objects can be described and predicted using the laws of physics. (Year 10)

Velocity is the speed at which an object moves. Acceleration is the speed at which the velocity changes. An object at constant velocity has an acceleration of zero.

This notion can be explored using equations of motion, and also demonstrated using the homemade accelerometer.

Students could make the connection that the cork moves proportionally to the amount of acceleration. A more challenging task is getting the students to calibrate their accelerometer.

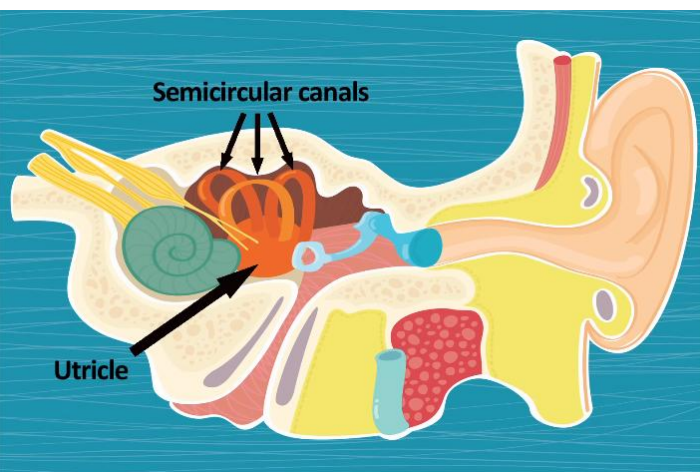


Figure 1: Inside the ear. The semicircular canals and the utricle.