

Optical Illusions

Teacher Notes for Years 7-10



In the **Optical Illusions** video, we explore how the colour photoreceptors in the eye work through making afterimage illusions.

Video Summary

The Optical Illusions video shows a version of an after-image demonstration.

In a typical human eye, there are around 120 million rod cells and 6 million cone cells. Of the cones there are three different varieties that pick up different wavelengths of light: blue, green and red. The colours in the images that we see are made up of a combination of red, green and blue.

When we stare at the negative photograph featured in the video (figure 1), the photoreceptors cells in your eye responsible for colour vision (the 'cones'; figure 2) receiving the brightest part of the image start becoming less sensitive, and the signal from those cells starts to become weaker.

When the image is replaced with a black-and-white version, it initially appears correctly coloured. The now less sensitive cone cells are sending out a weakened signal; however the cones not simulated by the original image are sending a comparatively strong signal. Our brain is receiving a negative image of the original negative image, and so now appear naturally coloured.

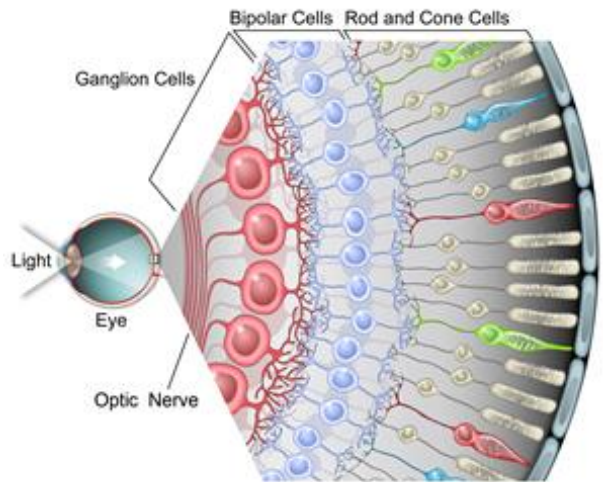


Figure 2: Illustrations of the human eye. A 'cone' cell is in the retina and is responsible for colour vision. Signals from the cones are sent to the brain which then translates these messages into the perception of colour.

Science Understanding (Year 8)

Biological sciences

Cells are the basic units of living things and have specialised structures and functions.

Rods and cones are two examples of human cells that have the specialised functions of detecting light brightness and colour.

Science as Human Endeavour (Year 10)

Nature and development of science

*Scientific understanding, including **models** and **theories**, are contestable and are refined over time through a process of review by the scientific community.* The model of the eye is a very established, and has been refined over hundreds of years of scientific progress.

Science Inquiry Skills (Year 10)

Processing and analysing data and information

*Use knowledge of scientific concepts to draw conclusions that are consistent with **evidence**.*

The after-image illusion is derived from what we know of how the eye detects light. The evidence is our perception of the colours that we see in an image and compare that to the after image. Using this knowledge, students could be challenged to come up with other ways that they eye could be 'fooled'.



Figure 1: The negative image featured in the video.

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