



Senses Re-Wired KS4 duration: 45 minutes

Illusions, demonstrations and audience participation reveal how our nervous system works to process sensory stimuli and create our sense of reality, how we have far more senses than we first thought and how our own amazing brains can sometimes lead us astray. We look at how other organisms can detect things we can't - such as UV, infra-red and magnetic fields, how our own 'neuroplastic' brains can be trained to extend our sensory range and how technology is opening new windows on the world around us, such as hearing with our skin, or seeing in sound.

Key Words:

Nervous system. Neurones. Senses. Brain. Psychology. Light. The eye. Behaviour. Perception. Cognition. Technology. Illusions. Adaptations. Haptics. Homeostasis.

Learning objectives:

- Stimuli generate electrochemical nerve impulses that are transferred to the brain via neurones
- The brain interprets sensory information, with different stimuli associated with specific regions of the brain
- Our senses help to keep us safe, healthy and connected to one another and we have far more than the familiar five
- Sensory information is important to homeostasis and responding to the external environment
- Our individual sense of reality is a result of how the brain processes nervous stimuli
- Our brains learn about the world and create a 'forward model' that help us predict what to expect
- Many illusions are based on the difference between real and expected sensory information
- Our brains continue to learn and can correct or update our view of the world
- There are limitations to the sensory range of humans
- Many other organisms (including plants) can sense stimuli that humans cannot, such as UV, IR and magnetic fields
- Devices old and new have enabled us to extend our sensory range, from canaries in coal mines to mobile phones
- 'Sensory substitution' involves training brain regions to process and understand novel information

Curriculum Links:

- Understand the uses and implications of science, today and for the future
- The links between structure and function in living organisms
- Relate scientific explanations to phenomena; start to use modelling and abstract ideas to develop and evaluate explanations
- Analysis and evaluation: interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions
- Sound waves: Frequencies of sound waves, measured in hertz (Hz)
- Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone diaphragm and the ear drum
- Auditory range of humans and animals

Content

- Learn about how our nervous system works to help us understand the world and create our own individual realities
- See how different brain regions handle specific stimuli and how these are related to perception and cognition
- Understand the importance of our many senses in keeping us safe, healthy, informed and connected
- Experience fascinating and memorable illusions and demonstrations that involve the whole audience
- Have their senses baffled in amazing and intriguing ways with distorting glasses and blindfolds
- Take part in live data collection using individual voting handsets to discover more about our perception of different stimuli
- Consider how our senses work together and how they can mislead us
- Have the opportunity to volunteer for a variety of on-stage activities and games
- Explore the limits of the human sensory world and contrast this with other organisms
- Learn about some of the historic and modern ways in which we have extended the human sensory range
- Experience how sensory substitution can be used to retrain our brains to experience the world in new ways

Potential Hazards and accessibility

Some loud sounds and sound effects; lighting effects