Notes for teachers

At a glance

This activity introduces students to exciting applications of a technique at the forefront of brain research, functional magnetic resonance imaging (fMRI). Researchers use this powerful imaging technique to pinpoint precisely which areas of the brain are associated with different activities, how the brain changes when it learns a new skill and how the brain compensates when someone recovers from brain damage.

The activity guides students in creating a scientific poster to report on a piece of scientific research carried out by researchers at the Centre for Functional MRI of the Brain (FMRIB) at Oxford University. They then use what they have learned to devise (but, unfortunately, not carry out) their own investigation into brain plasticity. The activity can be used to reinforce and extend understanding of the brain as a co-ordination centre, the idea of brain plasticity and to explore the role of technology in studying the brain.

A version of this activity that students can use independently is also available from Oxford Sparks.

Learning Outcomes

- Students develop their understanding of the areas of the brain associated with different tasks, and of brain plasticity.
- Students report on a piece of scientific research.
- Students devise an investigation to investigate brain plasticity.

Each student will need

- 1 copy of the pupil worksheet
- 1 copy of one of the three research reports (A, B or C)
- 1 copy of the PDF of the original research article (A, B or C) (optional)
- Access to the Internet
- High quality poster paper

www.oxfordsparks.net /mri
Possible Lesson Activities

1. Starter activity
   - Show the animation ‘A spin around the brain’ to the class.
   - Repeat the viewing, focusing on the section from 0:44 to 1:25, which explains how fMRI works.
   - Finally, focus on the section from 1:26 to 1:46, which shows the areas of the brain associated with different activities such as listening to music and watching a film.

2. Main activity
   - Display the PowerPoint slides. These reinforce how fMRI works and describe experiments using fMRI. Notes are included below the slides. The key points to reiterate are as follows:
     - An fMRI scanner detects changing blood oxygen levels in different brain areas. Areas with higher oxygen levels are more active.
     - The scanner records changes in signals at many different places in the brain. These must then be analysed statistically.
   - Distribute the worksheet to individuals or pairs. Ask students to read the background information on the left of this sheet.
   - Then give each individual or pair one of the Research reports (A, B, or C) and a copy of the research report template. Students use their research report to complete the tasks described in Stage 1 and Stage 2 of the task sheet.
     At this stage you might like to get higher attaining students to look at the original scientific papers, available as PDFs from Oxford Sparks. You might also like to ask students to look at online advice on creating scientific posters.
   - Give students time to look at, and discuss, posters created by other groups. What are the similarities and differences of the three research studies? What are the criteria for a good scientific poster?
   - Stage 3 involves students designing their own experiments, inspired by those they have studied earlier.

3. Plenary
   - Ask each student or pair to discuss their experiment with another student or pair. Can they suggest improvements?