

## ***The Mistletoe Bough* (dir. Percy Stow, 1904)**

**Lesson by Amy Buchanan, Teach First**

### **Key Stage 2**

### **Science**

A lesson in which students will be required to apply their understanding of reflection to explain the 'Pepper's Ghost' illusion and learn about its use as a special effect within early theatre and cinema. Students will then have the opportunity to replicate the final 'ghost' sequence from *The Mistletoe Bough* using the technique. This lesson will familiarise students with special effect techniques deployed in early cinema and theatre prior to the use of computers and invention of CGI, and provide them with the opportunity to apply it to their own 'shoebox cinemas'. You can watch a demo of this trick here

[http://www.youtube.com/watch?v=MwB0QxawZE4&feature=player\\_embedded](http://www.youtube.com/watch?v=MwB0QxawZE4&feature=player_embedded).

### **Curriculum Links**

- That science is about thinking creatively to try to explain how living and non-living things work, and to establish links between causes and effects
- Think about what might happen, or try things out when deciding what to do, what kind of evidence to collect, and what equipment and materials to use
- Use observations, measurements or other data to draw conclusions
- Use their scientific knowledge and understanding to explain observations, measurements or other data or conclusions
- That light travels from a source
- That light is reflected from surfaces (for example, mirrors, polished metals)
- That we see things only when light from them enters our eyes

## Lesson Objective

To use knowledge about reflection to observe, explain and create optical illusions.

## You will need...

- **Trailer:** Candles, matches, glass sheet, cardboard screen/box, beaker, water, CD cases x 10
- **Main Attraction:** Access to the short film - *The Mistletoe Bough* (Optional: *The 39 Steps* (Alfred Hitchcock, 1935), *Metropolis* (Fritz Lang, 1927), illustrations of 'Pepper's Ghost' (useful ones here [http://en.wikipedia.org/wiki/Pepper's\\_ghost](http://en.wikipedia.org/wiki/Pepper's_ghost)), shoeboxes, scissors, black paint/card, torch, materials to make 'figures'
- **End Credits:** Flip camera or iPad



## Activities

### TRAILER:

Prior to the lesson, set up a table at the front of the classroom and place two candles either side of a sheet of glass, ensuring that they are an equal distance apart. The front candle should 'reflect' on to the rear candle. Use an opaque cardboard screen or a large box to obscure the front candle from view and light it - it should appear as though the rear candle is also lit.

- Once the lesson has started, ask the class what they can observe – they should only be able to see the glass and 'lit' rear candle. Position yourself behind the glass and try to blow the rear candle out - it should look as though it continues to burn. Repeat with extra effort – really huff and puff!
- Looking puzzled, ask the class: how else could we put out the flame? Students should hopefully identify water – provide prompts if necessary.
- Re-position yourself at the front of the table so that the equipment is blocked from view with your back turned, and submerge the rear candle in a glass of water. Ensure the front candle is still lit and step back – the rear candle should appear to be burning under water, creating an even spookier effect!
- Looking even more puzzled, stir the water with your finger to prove that it is real. Ask - what is happening?

Divide students into groups of three and ask them to solve the mystery as 'scientific detectives'. Using empty CD cases and tealights, challenge them to recreate these illusions and explain how they work. Let the students explore freely to see what ideas they are able to generate – encourage discussion and scaffold through open questioning.

- Feedback ideas and assess if any groups have discovered the need for a second candle and use of reflection. Remove the screen/box

and rotate the table so that the class can see how the effect has been achieved, and give students time to ask any questions. It will be necessary to explain that although glass is mostly transparent, it does reflect a proportion of the light that hits it although we often cannot observe this – however, when one side of the glass is much brighter than the other side, we notice a ‘reflection’ effect.

### MAIN ATTRACTION:

Watch *The Mistletoe Bough* (1904) and ask students to identify where in film this illusion might have been used. What does it produce?

- Note: multiple exposure was likely used to produce the ‘ghost’ seen in the film, but application of the technique explored in this lesson would have resulted in the same effect.

Display an illustration of ‘Pepper’s Ghost’ (see resources). Provide historical context and explain that this technique was first used in the Charles Dickens play *The Haunted Man* (1863). In early 20<sup>th</sup> Century cinema, the same effect is often referred to as the ‘Schüfftan process’ and can be observed in films such as *Metropolis* (1927) and Hitchcock’s *The 39 Steps* (1935).

- In order to achieve this effect, a large plate of glass was positioned at an angle between the stage and the audience, with an illuminated actor located below the stage in front of the glass where the audience could not see him, creating a ‘hovering ghost’ effect.
- A light source was brightened and then dimmed to make it look as though the ghost suddenly disappeared into thin air.

Divide students into mixed-ability groups and provide them with materials to create their own ‘shoebox cinemas’ to reproduce the ghost sequence in the *The Mistletoe Bough*, where the husband sees his wife disappear. Tell pupils they will need to ensure that:

- The inside of the shoebox is black



- They cut two holes: one for a viewing window and one for a light source
- The 'glass' screen is placed at an angle
- The husband can be seen the audience
  
- The 'ghost' wife cannot be seen by the audience

Give the class time to explore their own independent approaches, only providing more detailed guidance if necessary. The husband and wife can be represented with figurines, cardboard cutouts, or finger puppets.

- Ask pupils to experiment with ways of making the ghost appear and disappear by varying the strength of the light source.

#### **END CREDITS:**

Students can present their 'shoebox cinemas' to the rest of the class, either pre-filming a sequence or directly screening the interior onto the board by connecting a flip camera or iPad.

Get the class to compare and assess each group's application of the technique – which is the most effective and why?



## Extras

### Other Ideas

- This activity could be carried out over two lessons, with extended exploration of the set design and costume of *The Mistletoe Bough* to provide students with more time to create their shoebox cinemas. Students could compare different ways of constructing the characters (e.g. cardboard cut-outs, finger puppets, Plasticine figures) and compare which produces the strongest reflection, with consideration of the type of material used. The same could be applied to different set backgrounds to see which materials/colours enable the reflection to show up best.
- As part of an accompanying literacy lesson, the film could be compared to the Victorian ballad *The Mistletoe Bough* (1830) on which the film was probably based. The ballad ends with the discovery of the oak chest and the bride's "mouldering" skeleton, with no mention made of her ghost. This could provide an opportunity for students to extend the ballad to reflect the ending of the film and use this creative writing to narrate their shoebox sequences. As an extension, the science activity could be used as the basis for a new 'twist' ending, where students reveal the true origin of the bride's 'ghost' – e.g. a full-length painting of her reflected in a glass door – and use their understanding of reflection to explain the apparition.

### Read

- *The Mistletoe Bough* (1830) - lyrics by Thomas Haynes Bayly and music by Sir Henry Bishop
- *The Case of the Graveyard Ghost* by Michele Torrey (2009), to explore the use of 'Pepper's Ghost' within a mystery story that is solved by fifth-grade science detectives Drake Doyle and Nell Fossey.
- *Phantasmagoria: The Secret Life of the Magic Lantern* by Mervyn Heard for a historical account of ghostly projection as entertainment.

## Watch

- *Metropolis* (dir. Fritz Lang, 1927)
- *The 39 Steps* (dir. Alfred Hitchcock, 1935)
- 'Pepper's Ghost': Candle Illusion  
[http://www.youtube.com/watch?v=MwB0QxawZE4&feature=player\\_embedded](http://www.youtube.com/watch?v=MwB0QxawZE4&feature=player_embedded)