

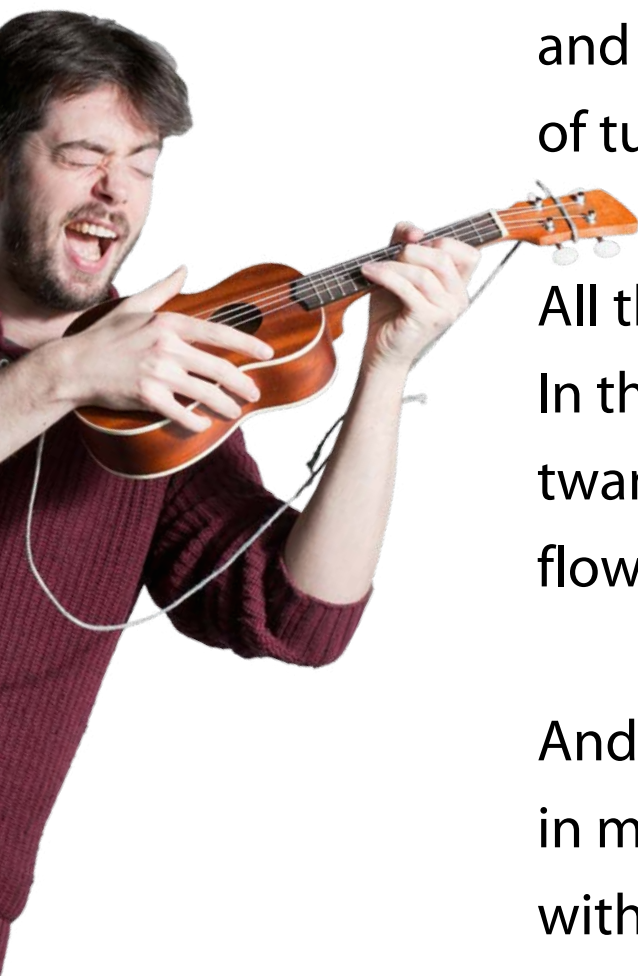


## Beneath My Ear

I stand in the street  
and in my ear  
I feel the vibrating  
and pulsating  
of tubes and strings

All the sounds in the room  
In the hall, in this theatre  
twanging and banging  
flowing and blowing

And the tubes and drum  
in my ears hum  
with rhythm and tune  
pulsating  
and vibrating  
in my ear  
in the street.








## Teachers' Guide: Sound Travels

<b>Topic</b> Sound and Hearing	<b>National Curriculum Reference</b> SC4 3f (until 2014)/ Year 4 'Sound (from 2014)
<b>Learning Outcomes</b>	
<ul style="list-style-type: none"> <li>• To recognise that sound can travel through solids, liquids and gases</li> <li>• To suggest ways to stop sound vibrations</li> </ul>	
<b>Poem Link</b>	
<p>Beneath My Ear... <i>'and the tubes and drum, in my ears hum, with rhythm and tune, pulsating, and vibrating, in my ear, in my street'</i>. Throughout these activities the children can think about how sound reaches their ears, and how they could use materials to stop the sound vibrations.</p>	

## Activities

Activity Type	Running Notes	Resources
 <b>Quick Fire</b>	<p>Show the children the animal pictures (slide 1).</p> <p>Ask the children "What sound does the howler monkey/whale/elephant make?" (Play sound clips from the internet if necessary.)</p> <p>"How does the sound travel from animal to animal?"</p>	
 <b>Hands On</b>	<p>Ask the children to be very quiet and then to tap their desk.</p> <p>Now ask the children to repeat this but this time to place one ear on the desk. What difference do they notice? Through what did the sound vibrations travel in order to reach their ear?</p> <p>Ask the children to try out the mini experiments (see below for details) and then to record their observations in a table (slide 2).</p>	<p>Biscuit tin containing a stone</p> <p>Bowl of water with two stones</p> <p>Tuning fork</p> <p>String telephone (two plastic cups connected by a length of string)</p>
 <b>Extended</b>	<p>The Homemade Orchestra like to rehearse at all hours but the noise is disturbing their neighbours. Ask the children to design and make a model design of a sound proof studio for the musicians (slide 3).</p> <p>Demonstrate how to use a decibel app to measure volume of sound.</p> <p>Remind the children how to set up a simple buzzer circuit where the buzzer is located inside a box.</p> <p>Support the children in carrying out an investigation in which they use different materials to reduce the volume of sound detected a certain distance outside the box.</p>	<p>Battery, buzzer, wires and clips for basic buzzer circuit plus box</p> <p>Access to tablet, i-pod or similar with a decibel AP uploaded</p> <p>Selection of materials to sound proof the box (e.g. fabrics, card, cotton wool, bubble wrap, tissue, carpet...)</p> <p>Scissors, sticky tape</p>



## Science Background

### Quick Fire Activity

Howler monkeys hold the record for the loudest animal and their howls can travel up to about 5 km across the forest. The vibrations of their vocal chords makes the air vibrate. These vibration pass through the air to the ears of other howler monkeys in different parts of the forest. Sound vibrations can travel through air (a gas).

Elephants also make sounds using their vocal chords but these vibrations can be modified by their trunk producing the well known trumpeting sound. These vocal vibrations can travel about 15 km. However elephants make vibrations another way. A running or charging elephant produces vibrations in the ground that can be detected by other elephants over 30 km away. Vibrations travel faster through solids than gases.

Whales can also make sounds although the mechanism is different to humans and varies between whale species. Whale 'song' can travel hundreds of kilometres and before the advent of modern shipping and the accompanying noise pollution scientists think that whale 'song' could be heard over thousands of km. Sounds travel through liquids too.

### Hands On Activity

#### Stone in biscuit tin

The sound vibration of the stone hitting the tin must pass through the solid metal sides of the tin before travelling through the air (a gas).

#### Tuning fork

The sound of the tuning fork can travel through the air (a gas) but also, if children put an ear onto the desk, through the a solid.

#### Bowl of water

When the two stones hit each other under the water the sound vibration pass through the water (a liquid) and then through the air (gas).

#### String telephone

The sound vibrations pass along the string (solid) before travelling through the small volume of air in the cup at the end.

### Extended Activity

When sound travels through a material the vibrations pass from particle to particle. In a solid the particles are in fixed positions and close together. This makes it easy for the vibrations to pass from one particle to the next. A layer of air can also help with sound proofing. Sound vibrations pass less easily through a gas than a solid because the particles are further apart and moving around (e.g. in double glazing). In soft materials vibrations are transmitted very poorly. These are also therefore good materials to use for sound proofing.

An example of the set up for this investigation is shown below. Please note that this works best with low levels of background noise so children may need to go to another location to run collect their data.





## How does sound travel from animal to animal?





## What do you observe?

Experiment	What did you hear?	What did the sound vibrations travel through?
<b>Shaker</b>		
<b>Water bowl and two stones</b>		
<b>Tuning fork</b>		
<b>String telephone</b>		





## Design a soundproof studio for the Homemade Orchestra.

