

**See Extension X1**  
 More about fricatives  
 (page 32)

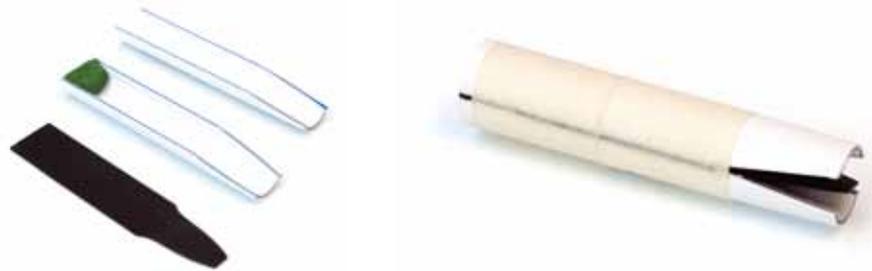
Some fricatives used by Scots and Welsh speakers can be explored as an extension activity. Example fricatives used in German and in Arabic are also mentioned and, if there are native speakers of a language other than English in your class, they could be invited to give additional examples of fricatives.

Students can make physical models of the larynx and vocal tract which, used together, produce the vowel sounds "ah", "ih" and "oo". Although it makes for a slightly noisy classroom, students in the trial schools really enjoyed doing this. The results are surprisingly effective. The transformation from buzzing to vowel sounds is almost magical.

**See Activity A5**  
 A buzzing reed (page 28)

First they need to assemble a 'buzzing reed', which models vocal folds in the larynx. If they do this, you will need a disinfectant solution on hand so that more than one student can use the same buzzing reed. You may also want to experiment with thinner and thicker reeds. Thin reeds are easy to blow but produce quiet sounds. Thicker reeds can be quite hard to blow and resemble loud duck calls.

Students assemble a buzzing reed, which models vocal folds in the larynx.



**See Activity A6**  
 Vowel resonators (page 29)

Models typically exhibit similarities and differences with the phenomenon they explain. A simple reed and vocal folds are similar in that both vibrate when there is an air-flow across them. They differ in that a reed vibrates at a single pitch whereas the vocal folds can be stretched or relaxed to alter their pitch.

Different 'vowel resonators' can be assembled from simple tubular components to model the vocal tract shaped for different vowel sounds. Using the buzzing reed with the resonator tubes, students can make the vowel sounds "ah", "ih" and "oo".

The activity sheet gives cross-sectional images of the vocal tract shaped for each vowel sound, so that students can relate these to the shapes of each of the models. They can also be encouraged to associate each cross-sectional image with their own vocalisation of the vowel.

Assembling the parts from the vowel resonator kit to produce the vowel sound "oo": the vowel resonator kit (1), selecting the pieces for a particular vowel (2), the assembled vowel resonator with buzzing reed (3) and making a vowel sound (4).



**See Activity X3**  
Using the *Vocal tract simulator* (page 35)

As an extension activity, students can use the *Vocal tract simulator* software (on the CD-ROM). This program animates a highly simplified diagram of the human vocal tract (for an adult male, an adult female or a child), for any of six possible vowel sounds. Using the software, students can see how different shapes of the vocal tract produce particular sounds.

### FOSSILS AND THE EVOLUTION OF SPEECH

Over millions of years, humans evolved several unique abilities that make us very different from other animals. One of the defining characteristics of the human species is the ability to communicate using language – that is, the ability to talk. This ability arises from a combination of physical changes and developments in the brain.

Throughout history people have speculated about when and how language emerged among our ancestors. The CD-ROM contains an annotated timeline showing this in detail. Darwin, for example, observed that language is learned behaviour and yet baby babbling suggests an innate human tendency to speak.

The ability to communicate effectively was a critical development which improved humans' chances of survival. Yet working out when and how language evolved is still a major unsolved problem. In fact for a long time scientists more or less gave up trying, because the fossil evidence was so sparse as to make any speculations untestable.

# VOICEBOX: A BUZZING REED

In this activity you will assemble a simple reed that vibrates when you blow across it. It behaves just like vocal folds in the larynx, making a buzzing sound.

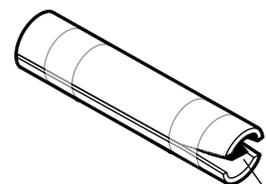
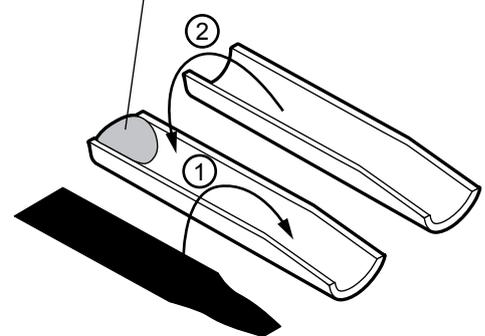


It is perfectly safe for someone else to try blowing the same buzzing reed, provided you first rinse it thoroughly in a disinfectant solution.

## Task A Assembling the reed

1. Collect two pieces of pre-cut channel, some masking tape and a piece of flat plastic (a 'reed') to fit between the two channels.
2. Place a small lump of Plasticine in the square end of one of the channels, ensuring that it will block off air-flow through this channel.
3. Sandwich the plastic reed between the two channels, as shown in the diagram, ensuring that the last 2 cm is free to move within the curved end.
4. Use masking tape to hold the three pieces together as shown.

plasticine added to block end of one channel



blow into this end

## Task B Testing the reed

5. Blow into the curved end, where the reed is visible. You should be able to get a buzzing sound. (How hard you need to blow will depend on the thickness of the reed. With a thin reed, blow softly. With a thick reed, blow hard.)

# VOICEBOX: VOWEL RESONATORS

In this activity you will assemble sets of tubes to make particular vowel sounds. Each vowel resonator changes the sound that a buzzing reed makes on its own. This models the human vocal tract changing the sound made by vocal folds in the larynx.

## Task A An "ah" resonator

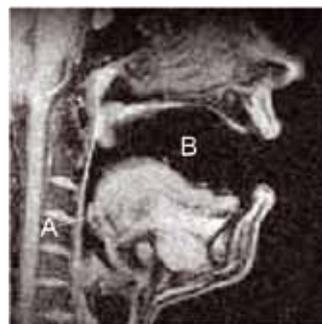
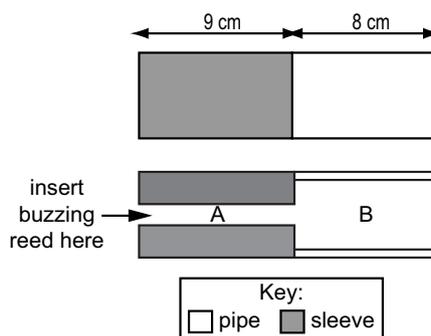
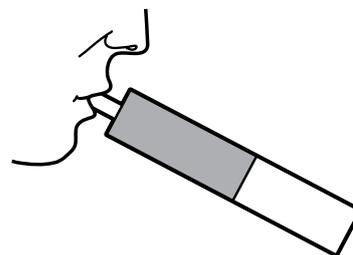
This resonator produces a sound like the long "ah" vowel that you find in words like "palm".

1. Select a 9 cm length of foam sleeve and an 8 cm length of plastic pipe. Fix them together as shown in the diagram, using masking tape. Notice how the internal shape of the vowel resonator resembles the shape of the vocal tract in the MRI image of a person saying "ah".
2. Place a buzzing reed in the larynx end of the resonator and blow the reed. This should make an "ah" sound.
3. Make an "ah" sound yourself. While doing this, try and compare the shape of your vocal tract with the "ah" diagram and MRI image.

The foam sleeve (A) models the narrow shape of the vocal tract from the larynx to the back of the mouth.  
The plastic pipe (B) models the open mouth.



It is perfectly safe for someone else to try blowing the same buzzing reed, provided you first rinse it thoroughly in a disinfectant solution.



## VOICEBOX: VOWEL RESONATORS

### Task B An "ih" resonator

This resonator produces a sound like the short "ih" sound that you find in words like "bit".

4. Select 3 cm and 7 cm lengths of foam sleeve, and a 6 cm length of pipe. Fix them together as shown in the diagram, using masking tape.
5. Place a buzzing reed in the larynx end of the resonator and blow the reed. This should make an "ih" sound.
6. Make an "ih" sound yourself. While doing this, try and compare the shape of your vocal tract with the diagram of the resonator and the MRI image.

The vowel resonator models the shape of the mouth as shown in the diagram:

- A - the narrow shape of the vocal tract above the larynx.
- B - the wide cavity behind the tongue.
- C - the cavity above the front of the tongue.

### Task C An "oo" resonator

7. Select a 2 cm length and two 3 cm of lengths of sleeve, and two 5 cm lengths of pipe. Fix them together as shown in the diagram, using masking tape.
8. Place a buzzing reed in the larynx end of the resonator and blow the reed. This should make an "oo" sound.
9. Make an "oo" sound yourself. While doing this, try and compare the shape of your vocal tract with the diagram of the resonator and the MRI image.

The vowel resonator models the shape of the mouth as shown in the diagram:

- A - the narrow part of the vocal tract above the larynx.
- B - the cavity behind the tongue.
- C - the narrowing above the tongue hump at the back of the mouth.
- D - the larger cavity above the front of the tongue.
- E - the narrowing at the lips.

