The sounds of science

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explores the cross-curricular nature of language in scientific recording and how children can waken an audible science world with words

Enjoying creating and describing sounds

Some years ago, I listened to a programme on BBC Radio 4 that discussed the terms used to describe pain in modern medicine; it appeared the grade of pain was based on four terms: *hot*, *dull*, *sharp* or *throbbing*. The concern of the presenter was that, by limiting the vocabulary used, a patient or sufferer was less able to convey the nature of their symptoms.

The discussion moved on to comparing the use of language in Victorian times when scientific and medical observations used much more descriptive, almost poetic, language to describe observations in order to convey them with precision. The conclusion of the programme was that the greater the level of observation using all senses, the more descriptive the terms used and therefore the more precise the picture conveyed. To reduce a description of something as diverse (and serious!) as pain to four words was considered very limiting to both doctor and patient.

Making and describing sounds

I was reminded of this programme when introducing the concept of sound to a year 5 (ages 9–10) class recently. The activity I prefer to use involves making and describing sounds and their methods of production using a variety of ordinary objects and materials (e.g. paper towel, paperclip, rubber band, metal spoon, drinking straw, lolly stick, string, toothbrush, ping-pong ball). The progression of the activity is to move towards sound production in musical instruments, leading to investigations on the control of pitch and volume through cross-curricular links with design and music.

The children, working in pairs, used each object individually to make sounds and recorded their observations in a three-column table as in Table 1.

Table 1 Recording sounds

Object	How the sound was made	Description of the sound
lolly stick	banging on table	
drinking straw	blowing over end	
paper towel	crumpling in hand	

Key words: Language ■ Scientific recording

The stumbling block always came at the third column: the children simply did not seem to know how to describe sounds accurately. This was as much a case of lacking the vocabulary as not understanding the different aspects of sound that could be described. In response to this, I decided to use a science session to build a basic vocabulary of sonic terms.

Fairly quickly, the children decided on main categories:

- **loud and quiet (volume)**
- **high and low (pitch)**
- **long or short (duration) – this led to the terms attack and decay (the 'speed' of the start and finish of a sound).**

Then the idea of the quality of the sound was suggested. Terms such as 'texture' (**rough or smooth**, **soft or hard**) were introduced.

The children seemed to be under the impression that there had to be a specific one-word term for every aspect of the sound they wished to describe; if they did not know the word, they were unable to go any further.

'*Well, how would you describe something in a story?*' they were asked.

Immediately came the replies: '*Adjectives! Adverbs! Similes! Metaphors! Personification! Alliteration!*'

'*Well, could you use these to describe the sounds?*'

After a puzzled silence: '*Can you do that in science, then?*'

Suddenly a world of observational description (or descriptive observation if you prefer) opened up; children began thinking in terms of what the sound reminded them of, with what it could be compared, what it sounded like: '*It's as if …*', '*It reminds me of …*', '*It's just like …*', '*Imagine if a …*'.

Next came the realisation that some words actually made the sound they were trying to describe; someone remembered the term *onomatopoeia*. Children began to draw on their own 'stored' vocabulary, using words that named the sounds they were hearing. And from this came a fascinating realisation about accuracy of word choice. Words that previously had only been used in writing poetry or descriptions in literacy were now being used as technical, scientific terms to record observations.

(Comments on observing '*with the ears*', along with children deciding what sounds '*looked like*' in terms of shape, colour, movement and speed, took this piece of work into art, PE and computer science, but that is a story for another time!)

Expanding the children's vocabulary

The class were asked to think of as many words for sounds as they could, creating a massive word bank on the whiteboard (Box 1). (It was decided to exclude 'vocal or speech' terms as these could not be made with the objects they were using.) They then sorted them into groups by their own criteria.

The grouping of these words began to show a quite discerning understanding about the way they could be used to describe sounds. The children associated them with the basic categories established at the start (volume, pitch, duration, texture).

Vowel sounds suggested a scale of pitch:

high – i e a u o – low

(Imagine an aeroplane in a dive and this is pretty much the same sound!)

The words *clip, clap, clop* suggest a drop in pitch (the class insisted on inventing the terms *clep* and *clup* to complete the scale). They decided the same principle applied in *clip-clop* (horse's hooves), *ping-pong* and *tick-tock*. The short 'o' sound was also considered to suggest a hollow, woody object in words such as *clonk*.

There was also an association between vowel and 'size' of the sound: *click* was considered to be 'smaller' than *clack*. This notion of the size of a sound was explained as a combination of pitch, volume and duration, so quiet, high-pitched, short sounds (*click*) were the 'smallest', whereas deep, loud, long sounds (*boom*) were 'huge'.

The children also began to associate sounds with materials:

- **Words with a vowel followed by *-nk* or *-ng* suggested a longer decay than words that ended in *-ck*. The longer, ringing tone of *clang* suggested metallic objects because they seemed to produce long, sustaining notes like bells or chime bars.**
- **Words that began with the *scr-* letter string were considered harsh and abrasive, closely associated with their method of production: scratching or scraping.**

The children also noted the connection between the length of the vowel and the duration of the sound:

- **scr-a-tch: short 'a' producing a short, sharp sound (association with *itch*) with a quick ending '*like lifting your fingernails up when you finish scratching your arm*'.**
- **scr-a-pe: long 'ay', producing extended sound by continuous contact and movement between two surfaces.**

Words were grouped on the basis of a

Box 1 The word bank generated by the children to describe sounds

crack	scratch	clang
bang	crinkle	rattle
clap	crunch	scrape
ping	ring	boom
rumble	chime	twang
whistle	slap	rustle
fizz	clonk	rip
splat	knock	tear
splash	click	clink
splatter	thrum	squeal
crack	tick-tock	squeak
hum	clip-clop	squelch
flick	hiss	rattle

'liquid' quality: *splat*, *squelch*, *splatter*.

They also made a vocabulary link between the description of the sound and the method by which it was made. Certain words led to much involved discussion: *Crinkle* produced words such as *crack*, *crease*, *crush*, *crunch* and *wrinkle*. This was explained as '*being like the sound of a crisp bag being squeezed into a ball*'.

This visual image was supported by associating the sound of the plastic bag being crushed and its appearance, covered in multiple tiny folds and facets (it is very tempting to slip into a Lewis Carroll-type of word-play, making portmanteau words; yet another possible cross-curricular link).

Outcomes

By the end of the session the children had started to think in completely different terms when they described the sounds they were creating; it was one of those glorious moments like a dam bursting. As a plenary, the class listened to the chapter from Norton Juster's *The phantom tollbooth*, in which Milo meets Dr Dischord and his assistant, the Awful Dynne (Milo's meetings with Chroma the Great, who conducts the dawn chorus, and the Soundkeeper, who makes and catalogues sounds, are also fascinating studies of 'sound on vision' that I have used in sessions on musical notation).

The ideas that came from what started as an applied vocabulary exercise demonstrated just how many cross-curricular links can be made, emphasising the power of well-chosen topic titles. It also shows the need for clear focus when making subject links as it would be easy to be swamped by a flood of initially exciting ideas that drain away to diffuse, diluted, insubstantial outcomes.

For me, the most important outcome of the exercise – the factor that has had the greatest impact on recording observations in science – is the understanding that descriptive vocabulary is as essential and precise a scientific tool as any measuring scale, newton meter, stopwatch or graph.

In order to accurately communicate their thoughts and observations, our children must have the words with which to do this.

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