LEARNING TO LISTEN

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1 INTRODUCTION

Listening – or attentive hearing – is a crucial skill for our education. As an adaptive and inferential behaviour, it has many forms. For example, it offers active or passive sensory pleasure. It may also be 'discriminative' (eg 'is this an advancing vehicle or a tiger?'); 'comprehensive' (for learning), 'therapeutic' (eg. for counselling or healing) or 'critical' (for evaluating our views).

Listeners may or may not succeed, depending on how they feel psychologically, or in terms of their comfort. Mental protection against hearing may be dominant, to exclude noise. We may even progress to 'alternative' listening (eg the iPod) to calm or excite us, or to escape environmental noise.

Psychological research has suggested that, in all forms of listening, there is a covert form of performance, the very process being rooted in preparation to participate. Our experiences of listening seem to be there to prepare us for judging how we will act. This provides very strong reason to teach the very highest standards of listening.

Cultural sustainability depends heavily on what is now perhaps fashionably derided as folklore and hearsay. It is an interesting observation that good listeners tend to make good storytellers.

This paper explores experience of how we learn to listen and aims to filter out a few lessons for acoustic designers working in education, in the context of developing teaching methods.

2 BACKGROUND

It is entirely natural that, in the past, we have relied on teacher's efforts to engage pupil attention, and on music, for clues about learning to listen. It is easy to neglect broader uses of listening. In particular, listening and use of aural memory are so vital for human relationships and for enjoyment of both sounds around us and inner experiences. Wannenwetsch[1] even suggested that making sound is the highest form of listening, referring to psalmody as communal listening.

The neglect of the potential of more expansive listening has begun to be appreciated only relatively recently. Blesser and Salter[2] have now focussed attention on wider horizons for listening and aural architecture. The teaching profession has for some time been extending its activity in reaction to the earlier rigidity of the 'three Rs', using more interactive methods.

In the 2006 Reith lectures, it was the eminent musician, Daniel Barenboim, who entitled his second lecture 'The Neglected Sense' and later suggested that 'we have done everything to anaesthetise the ear'. This applies not only to music, where sensitivity to sound has often been trained and developed, but also to the wider practices of listening. Having been immersed in acoustic consulting practice since the late 1960s, the author holds the view that experience of, and communications relating to, sound quality in our environments have been severely inhibited by poor general education in listening.

In education, successful speech and hearing are normally pre-requisites for effective listening to learn. Study of the physiology and psychology of not just hearing, but listening, suggests that there is real potential for extension of teaching to develop even more effective listening, and to take advantage of the more supportive acoustic environments that we are beginning to provide for schools. Equally, better understanding of educational needs, particularly development of better and wider listening skills, may be expected to feed back guidance into improved and more holistic acoustic design for schools.

The BB93 provisions for acoustic design in schools[3] have made important strides in improving standards. An emphasis on regulation may lead practitioners to concentrate on meeting minimum standards. This may lead them to ignore creative, positive uses of sound. These are usually referenced in the document only by a suggestion that specialist advice should be sought. The ***regulation*** within BB93 is, let's face it, highly defensive – against reverberation and against noise. It seems appropriate also to look for more positive support for aural education. The document does provide some good opportunities for that as well.

3 THE INSTINCT TO LISTEN

Exploring the history of education in listening, one principal factor stood out as a danger to the development of effective listening. That was an assumption that listening is predominantly instinctive ie. our upbringing will give us enough and we will pick it up as we go. Providing we could focus attention on what is being taught, this could all too often be accepted as enough. That seems to be a recipe for slower progress than a good education should offer. Such an approach to the potential offered by developed hearing is a major handicap and needs to be challenged. Good listening does not happen by accident. We need comprehensive training.

4 EARLY LISTENING

We hear our mothers before we see them. About four months before birth, it is usual for us to begin listening. There is even some evidence that we build up pre-natal aural memory by filtering the signals[4]. Rhythm is a major part of this and in early childhood, rhythm of speech is remembered better than the actual words. Attention to parents is dominant. Up to the age of 3, children do not learn spoken language from eg TV, but only from the adults around them.

Perhaps as a result of the experience of following the initial response to the rhythms of a mother's body, young children learn aural discrimination *before* phonics. They will respond to 'pitch', rhythm and intonation. For example, the connection between faster, louder speech and warning is learned very early. Aural curiosity (focus) and aural familiarity (memory) are key motors of early learning. Good aural localisation is sought. Movement of the head to help identify direction develops very early on. Of course, the influence of vision on aural perception is substantial.

Our use of listening for detection is followed by discrimination, identification, comprehension and aural memory. It is this same searching that allows us to distinguish the aural identification of people, animals, musical instruments, often by the onset of transients.

It is difficult to be sure at what age there is evidence of sound affecting mood and aural preferences. Parental sounds and other sounds for babies to sleep by are, of course, starting points.

It seems that with relatively fast rhythms, it is easier for children to coordinate their movements. A further early feature of rhythm is our disposition to a 'natural' rate of tapping. This is a supplementary motor area of our behaviour that invades our aural perception. Our instinct to dance to a rhythm is part of much of our listening.

Our human development has produced a wide range of unwanted sound and we have been irresponsibly tolerant to it, so much so that, particularly when very young, we use an undue proportion of our aural effort excluding distracting noise. Our listening skills are handicapped not only by noise, but also other factors such as smell, allergy, and excess CO_2. In time, we tend to improve our ability to exclude noise from our attention, and so from our listening, but there are limits.

Imitation follows listening and seems to be a pre-requisite for innovation and invention with sound.

5 PRE-SCHOOL DEVELOPMENT

Seeking a structure in sound and use of rhythm characterise early development. For example, in 'counting to 10', auditory memory appears to make substantial use of the sense of rhythm, with a strong physical component.

Before learning phonemes, children must be able to discriminate a wide range of sounds, becoming aware of *tiny* differences between them. This can take time and it is often not until primary school attendance that commonly confused phonemes are distinguished well (eg /f/ and /v/).

From a very early age, development depends very much on being listened to. In recent times, parents and very young children have communicated less on average. There are practical reasons for this. There has been greater emphasis placed on visual stimuli; more pushchairs face away from parents; there are fewer family meal times. For some children, their experience is a daily instruction and babysitting by TV. In contrast, by the age of three, children who have been listened to, and have received effective communication, may have a larger vocabulary than many adults who have not.

All of this is important because it means that children arriving at primary schools bring with them widely differing listening capabilities. Some may also have hearing impairment, coughs and colds, or temporary 'glue ear'. They may also have attention deficit hyperactive disorder, perhaps, in part, derived from poor earlier communication. It is now more common to find lowered attention span arising from a 'scan and shift' style of attention, rather than focus. Then there are inherently lazy listeners.

6 LISTENING IN SCHOOL

In two particular areas already referred to, historically, teachers have worked to train children to listen – 1) to listen to them, 2) to listen to the music. There are encouragements to pick up aural cues (such as 'listen for the bell', or 'listen – that's a cuckoo'), but although the importance of much wider and deeper active listening skills are becoming recognized in teaching, in general, adult appreciation of this has a long way to go.

The highly variable listening history and capabilities of new arrivals in primary schools is a serious challenge to entry level teaching policy.

Most recently, our social preference has been to avoid separating the hearing impaired into different classes (to avoid the consequent social separation). This means that teaching has to find ways of moving listening forward, advancing all of the children. This has a major influence on selection of methods of teaching. Both convergence and advancement of capability are needed – a substantial challenge.

As our schools become increasingly multi-cultural, there are subtle, additional and important factors to be considered. Cultural variations in listening history and language patterns can affect listener development (eg Japanese pupils have difficulty in separating /l/ and/r/ phonemes). Sitting correctly is surprisingly valuable to good listening. With good posture, we can expect more effective use of the vestibular system.

There are other factors which may be more significant than they seem. Up to the age of 10, hearing is pitched higher than for adults. Unsurprisingly, Goldhaber[5] found that the rate of integration of phonemes varies with academic grade. It also varies substantially with hearing ability. It is important to note the potential for significant mis-calibration of work to derive speech intelligibility targets applied to the very young, but derived from studies using adult listeners.

The close relationship between listening (hearing attentively) and more general attention may in part explain why experience has shown the listening seems to be better in mornings. For pupils with declining concentration through the day, there is a tendency to migrate towards what might be thought of as the aural equivalent of the gaze. We respond well to variety in listening. We have yet to discover the full range of aural parallels to visual experience – and so, perhaps the full range of aural aids to match the visual aids.

We like variety in listening. We should not underestimate the value of music in training our listening, except that it may devour our aural attention. In general, we tend not to be active listeners to the spaces around us and to nature, and our listening to each other is often shallow and unduly hasty. In schooling, there is major opportunity to widen our capacity to listen more widely. Listening, already being addressed more positively by many teachers should perhaps be a separated topic for teaching.

As we develop, we establish a capability of prosody - ‘chunking’ sound, appreciating pitch as well as rhythm and working to focus our attention. The tension between the right side of the brain (controlling movement and rhythm) is balanced by our education in pattern and sequence (left side of the brain). The Tomatis method of teaching how to listen (to learn) puts emphasis on right ear listening. It is interesting to speculate how acoustic design might encourage this.

We should not underestimate how successfully we can develop the capability to trade aural cues over time and intensity to build our aural perceptions.

In learning situations, we may be attempting to absorb 100-140 words a minute, but have capacity to deal with 600 words a minute. This gives us huge capacity to be aurally distracted, even before we are exposed to unfamiliar noise, or, more realistically, once we have filtered out familiar noise.

7 CURRENT PRACTICE

It seems, from several studies, that, broadly, our lives involve more than 50% of time listening, nearly a quarter speaking, and less reading and writing, yet education has until recently been focussed on completely the opposite priorities. The UK National Curriculum has perhaps placed too much emphasis on literacy, too little on listening skills. Relatively recent recognition of 'oracy' (listening, speaking and spoken interaction) is a step forward.

Principles for teaching better listening have been identified and are now in practice. Parents and teachers are called on to set an example by listening more, allowing pauses, good eye contact, asking questions, not interrupting, remembering and responding. Listening games are played. Use is made of listening before reading, read/understand/repeat techniques and interactive learning to listen. The more traditional action songs, rhythm and rhyme and efforts to produce clear speech are still part of the approach.

The British Association of Teachers of the Hearing Impaired can provide 'listening boxes' containing lessons to improve listening. There are important minority activities such as Music Therapy, and broader guidelines such as the Key Stage 2 framework for languages that provide support to listening.

8 BETTER PRACTICE

From a better understanding of how we learn to listen, there is opportunity to filter out ways to explore better acoustic design, which is not only supporting educational objectives but encouraging their improvement. Certainly acoustic designers working in education have opportunity not only to make better use of, and improve, the BB93 standard, but also to take a wider view of the scope of their contribution. By working closely with educators (and those providing facilities for education) we can improve the aural environment, aural aids, including advice on their production.

There is a preliminary question over how much learning to listen should be restricted to the classroom. Listening to places and to nature may mean restoring more mobility to teaching or bringing many more, and more sophisticated, aural experiences into classrooms virtually.

We have already noted that the teaching profession has moved to improve listening and pupil reaction to it. There has been more recognition that pupils arrive with an enormous range of listening capability and some with hearing handicaps (not always yet fully diagnosed) and more time is now spent listening to children (and the children to each other). This last point is particularly important for acoustic designers to note.

There is yet more that can be explored with educators, such as:

- Considering specific initial training in how to listen. There seems to be scope for development of specific and engaging methods to make listening a separately defined component in the curriculum, or to strengthen the activity within the concept of oracy.

- Making more use of rhythmic strengths. One fundamentally different option might be to, first, by-pass the understanding of words and oral skills and teach the skills of listening first.

- Being vigilant about aural variety, and using attractive aural material.

- Focussing on pupil mobility for aural variety, in reality or virtually.
- Strengthening the role of aural aids. In particular, there should be scope for wider use of audio technology and aural aids, to balance the excessive emphasis on visual aids.
- Spending time on aural distinction, detection and recognition of tiny differences
- Setting more aural homework
- Evaluating hearing and listening patterns in class, taking care with event orientation, source and receiver locations and awareness of room acoustic response

For acoustic researchers and designers, classroom design needs to consider aural education as a fundamental part of their brief. For good listening, as noted earlier, we need more research into the influence of posture, lighting, colour and ventilation.

More research is needed into the impact of perception of direction of arrival of sound. For example, beyond reference to spectral familiarity with voices in class, how quickly can pupil A ascertain that it is pupil B that has just begun to speak?

Perhaps stronger, early reflections can strengthen speech clarity and permit less reduction in reverberation. There also needs to be a clear determination of whether target reverberation targets are influenced most by the need to control activity noise levels or by the needs of a mixture of pupils with normal and impaired hearing[6].

Teacher voice strain is another concern[7]. Adherence to BB93 can help to reduce teacher voice strain, indirectly, by supporting speech clarity and through restraint over the Lombard effect. At the same time, talking into a less reverberant space will not always achieve that, depending on how much support the speaker experiences from the room response.

There is room for further research into the following areas:

- Further collection of data based on young pupil (not adult) speech perception to check our criteria for speech intelligibility in primary/secondary education.
- We need to address the real value of voice amplification systems (BB93 Section 8), taking into account their potential to raise classroom activity noise levels, and the need for vowel sound volume and consonant sound information to be well balanced.
- Although there is real progress in helping the hearing impaired, we should not forget that there are just as many, if not more, who are listening impaired, through poor attention. Design for achieving enhanced aural attention is a challenge to acoustic designers working closely with educators.
- More dialogue with educators over integration of audio aids into classroom design.
- More study of scope to accelerate our capability to trade aural cues over time and intensity, in search of improved listening efficiency.

- Classroom acoustic design better related to well directed and wider audio experiences eg a review of BB93 recommendations relating to side wall treatments, which are currently not well suited for lateral audio projection.

- More attention should be paid to distracting content eg tone or rhythm in background sound. Noise control, a necessary defence, needs to be compared with targets for wanted sound. Background sound from services needs attention not just for it's dosage (Leq), but for it's intrusive character and for the opportunity to be pleasant. Where more than one teaching activity develops in one space (eg children working in small groups), there is real advantage to be had from a combination of sound masking with beneficial character.

- For the future, perhaps the implications of VR experiences, aural implants and a widened view of aural experiences, justify more attention.

- Acousticians also need to support fellow professionals to deliver eg good air changes, comfortable furniture and appropriate visual surroundings, as important contributions to better listening.

In pursuing these topics, there is room for more direct collaboration between acoustic designers and educators ***in school premises*** to jointly widen the scope of acoustic design and its use.

9 CONCLUSIONS

Sustainable society now depends more than ever on successful listening to each other and our surroundings. Skill and experience in listening to, rather than talking at, each other, needs to be taught well. There is also an real opportunity to gather information from and enjoy many sounds, of places, and of nature, as well as of music. The developed 'attentive ear' opens up lifelong opportunity for us. As acoustic designers, we need to support a better start for schools, by developing a better understanding of listening environments and not assuming only that 'the less reverberation, and less noise, the better'.

The opportunities for collaborative research and action referred to in this paper are suggested to widen scope of support to the most valuable process of learning to listen, through more valuable acoustic design, working closely with teachers and pupils.

10 REFERENCES

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