

The Preservation Task of a Sound Archive

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What is the purpose of a “Sound Archive?” I shall immediately answer my own question with the words “To Preserve The *Sound*,” and spend the next twenty minutes developing this point! I believe preserving the sound is the main function of a *sound* Archive, rather than preservation of physical artefacts, which would be the function of a “Museum.” Please feel free to disagree with me, though; it’s a matter of definition rather than principle.

I also need to define that word “sound”. Do we mean a psychoacoustic sensation, or objective variations in pressure at the ear(s)? In other words, when a tree fell in a prehistoric forest before animals evolved ears, did it make a “sound” or not? I use the second definition – the objective variations in pressures at the ears. Today, it even seems possible that genetic engineering might enable us to develop better ears in future (and brains to perceive the results). Then, current sound-recording practices might change to ways of storing and reproducing nerve-pulses from the ears. But the objective nature of sound pressures is what a sound archivist can (and must) preserve at present.

I must also explain that human beings are not *born* with the ability to hear. They have to *learn* it in the first few months of their lives. For example, as a baby lay wriggling in its pram, Grandma might shake a rattle to get its attention. At first the child would not only be ignorant of the sound, but would lack the coordination of its other senses. Eventually it would turn its head and *see* the rattle, co-ordinating sight and sound to gain an understanding of what rattles are. There are six or seven thought-processes being co-ordinated here.

The first is the “sense of sight”, which in this case combines four thought-processes. First, the child has to learn which way is “up” – the sense of gravity. Next we have three processes combining to provide stereoscopic vision in the plane defined by the two eyes – the sense of left-eye-versus-right-eye, the sense of parallax, and the sense of the irises “pulling focus”. Another thought-process is the sense of hearing (which is stereophonic, combining the difference in times and in amplitudes at the two ears); and finally we have the sense of balance, and how this changes as the muscles of the neck operate. All this has to be *learnt*. Individual people learn in slightly different ways, and if an individual is defective in some physiological sense, psychological compensation may occur.

Until now, sound-recording engineers have based their researches upon studies of how people with normal “healthy” hearing perceive sound. But psychological compensation for defective hearing may mean these assumptions are not always correct. In these litigious times, it could even lead to an action for discrimination against the disabled! So, ideally, sound archives should preserve sound to a much *higher* standard than normal healthy listeners can perceive.

All these factors combine to make the sense of hearing remarkably complex. It is therefore even more amazing that, in the first 100 years of sound-recording history, it was possible to fool the brain into thinking a sound-recording was the real thing – and to a higher standard of fidelity than any of the other senses.

The *Intended* Sound

Here is another point. In many cases the work of people behind-the-scenes is just as important as that of the performer, for example in editing defective sections of a performance. So what we preserve must often be modified to read “the original *intended* sound.” I would enlarge this in two ways. When it comes to the subject-matter, it must surely mean “intended by the *producer* of the recording” (or the film or the broadcast), although this will become rather a subjective judgement. And when it comes to technical matters, it must mean “Intended by the Sound Engineer”. Thus, a sound archive should

understand how their holdings differ from the original performances – *and* the original sound-pressures.

Since older media often distorted the sound, it is first necessary to decide *whether* we should attempt to restore the sound in an undistorted form. It is often argued that the existing media should be transferred as they are, warts and all, on the grounds that better restoration technology may be available in the future. Another argument says that such warts are part of the ambiance in which such media were appreciated in the past, and should be preserved as a significant part of the artefact.

Having been a professional recording engineer myself, I challenge these views. I should not wish that the sound recordings I made before I joined the National Sound Archive should be reproduced “warts and all”. I should certainly demand that the ravages of time, and the undocumented but deliberate distortions (called the “recording characteristics”), should *always* be compensated, because listeners would get my original *intended* sound. So I consider it’s my responsibility to perform similar services for my predecessors. As for attempts to tidy up my work in ways which weren’t possible when I made the recordings, I hold the view that where the warts are accidental, I have no objection to their being corrected, so long as the corrections result in more faithful intended sound. Examples of *deliberate* distortions might be processes applied to a guitar within a pop-music balance.

Today, using something called “Information Theory”, we can often achieve the intended original sound in an objective manner; but I would draw a line here, because if we go any further we will be using subjectivism. The answer to this patch of grey is to do the job twice, one faithful “warts and all” version which will permit future restoration techniques to be applied exactly as if the copy were an original, and once with the ravages of time and the recording characteristics neutralised.

Finally, I should like to mention that some workers have argued that old recordings should be played on old equipment, so we would hear them the way contemporary engineers intended. I have a certain amount of sympathy with this view, although it does not agree with my own opinion. I would prefer my recordings to be played on state-of-the-art equipment, not what I had thirty years ago! But if we wish to pursue this avenue, we meet other difficulties. The principal one is that we have very few accounts of the hardware actually used by contemporary engineers, so we don’t actually know what is “right” for the way they worked.

Even if we did have this knowledge, we would have to maintain the preserved equipment to contemporary standards. There was a great deal of craftsmanship and taste involved in this, which cannot be maintained by recipe-book methods. Next we would need an enormous collection of such equipment, possibly one piece for every half-decade and every format, to satisfy any legitimate historical demand for sound the way the original workers heard it. And we would inevitably cause a lot of wear-and-tear to our collection of original recordings, because we do not have satisfactory ways of making modern replicas of original records.

But it so happens that we can have our cake and eat it. If we transfer the sound electrically using precise objective techniques, we can re-create the sound of that record being played on “any” reproducing machine at a subsequent date. For example, we could drive its amplifier from our replayed copy, its soundbox from a motional-feedback transducer, or its aerial from an RF modulator.

Sound Accompanying Pictures

Recording sound to accompany pictures is a completely different business from recording sound on its own. Today we see this every time portable video cameras are used by amateurs. Usually, the start-stop nature of shooting pictures carves the sound into meaningless chunks. And because the cameraperson wants to concentrate on pictures, we find automatic volume controls corrupting the recorded sound. But what about professionals?

I have spent much of my life as a film and video dubbing-mixer, and I cannot think of a single case where it would be justifiable to take any of my final-mixes and “restore the original sound,” even if it

were possible. I would only want people to go as far as indicated earlier – to undo the ravages of time and equalise the known recording characteristics. All the rest of the “distortions” are deliberate – to distract from compromises made during the picture-shooting process, to steer the emotional direction of the film by the addition of music and/or the pace of the mixing, to deliberately drive the dynamics and background sound to fit imperfect pictures, etc. In these circumstances pictures are dominant while sound is subservient – the sound only *helps* to convey a film’s message. (Films of musical performances seem to be the principal exception).

Most people find their visual sense is stronger than their aural sense, even though sound-recording has achieved a higher degree of “fidelity” than moving pictures. Thus films and videos become art-forms with rules of their own, built into them at the time they went through “post-production.” When we *do* want to restore the “original sound,” rather than the original *intended* sound, we should clearly divorce the sound from the pictures, and use “rushes” or other raw material unmixed and unedited – *not* the final mix. Again, a sound archive should study how their holdings differ from the original performances – and the original sound-pressures.

Sound Volumes

Next comes another point. The human hearing process can cope with a dynamic range in the order of 120 decibels. Yet even today, we cannot quite cover this range with present-day recording equipment. And even if we could, health-and-safety laws would stop us making use of the results! More psycho-acoustics come into this, which I won’t develop now; but ever since the 1880s, professional recording engineers have adjusted the dynamic range of the sounds they captured, exercising their judgement to make recordings which would sound satisfactory when heard with the conventions of the time. This makes it a remarkably complex matter to do justice to “the original sound” in the manner professionals intended, let alone amateurs.

At the National Sound Archive, we have been forced to develop tools to reverse the misapplication of automatic volume limiters. This work is still at a very early state, but at least I am confident we can *sometimes* recover the *original* sound. But I doubt this will *always* be possible to an archivally accurate standard.

And even if we abandon subjective tampering, nowadays we have at least two more kinds of *objective* tampering to make the original recording closer to “the original sound”. These are: Analogue noise-reduction systems, and “spatial effects” (such as stereo). Today these are problems of *reproduction*, rather than of recording; but we must understand (and document) these processes for future generations if we wish to be able to reproduce the original intended sound. Once more, a sound archive should know how their holdings differ from the original performances – and the original sound-pressures.

Documenting Preserved Copies

At the British Library National Sound Archive, we seem to be providing adequate storage-conditions for the majority of our holdings. And because we do not yet have all the tools for recovering sound from obsolete media, we are concentrating our efforts upon media which we call “vulnerable”. These are media which will self-destruct – even if we leave them on the shelf without playing them. This work is currently being financed by the British Library Preservation Service, and is being carried-out by freelance contractors under much the same management procedures as bookbinding or microfilming.

So far as sound-recordings are concerned, the most important thing is to transfer the sounds using objective engineering techniques, which usually means working to “International Standards”. I won’t develop this point any further, except to say that the relevant standard must be documented along with the subject-matter. Then in future, if research has shown the sound to have been inadvertently distorted in some manner, it will be possible to reverse the standard and have another go. The procedures for setting playing-speeds, for example, include both objective and subjective techniques; so documenting exactly what happened back in the year 2002 is vital.

In a recent broadcast about preserving recorded performances, the presenter described how he had taken a (modern) performance of a solo piano piece, and deliberately distorted it until it sounded like an acoustic recording made in the first quarter of the twentieth century. He then played the two versions to a number of musically-literate listeners. Not only were all the listeners fooled, but they put quite different artistic interpretations on their two responses, even though the actual performance was the same! This shows modern-day listeners may have quite different artistic responses to historic records, especially if progress in sound restoration continues!

However, the programme then went on to outline the second of three difficulties – the compromises forced upon performers by obsolete recording techniques. So another task of a sound archive is to preserve knowledge about the techniques of former sound-recording engineers, so we may judge how *they* balanced scientific and aesthetic thought-processes, and understand more of the differences between the original sound and the *intended* original sound.

The third of the three difficulties is that sound recording is now becoming subservient to other media, because it is comparatively cheap and easy, and less of a self-contained discipline. Thus audio is becoming centred on applications, rather than technologies. All this means the craft of sound-recording may disappear much quicker than the sounds themselves.

If sound recording becomes more and more “idiot-proof,” eventually we shall forget the relationships between past artists, engineers, and equipment. If we misunderstand this relationship, we are likely to misunderstand the way the recording equipment was used, and we will be unable to reproduce the sounds correctly, even with perfect technology. I shall illustrate the point with the same example I mentioned above. Enjoying popular music when I was young, I generally know which distortions were deliberate – the guitar in the pop mix – and I know which were accidental; but I must not assume these points will always be appreciated in the future. Indeed, I strongly suspect that the passage of time will make it more difficult for future operators to appreciate what is now subliminal for us. But few people appreciate these “cultural” factors. They have never been written down; but they’re there.

Today, I am desperately worried about all the possible misunderstandings. For me, this must be the main preservation task of a sound archive.