



Archaeoacoustics

- pipe dream or possibility?

By archaeoacoustics I mean the recovery of sounds from the time before the invention of recording. This implies that such sounds would have been recorded inadvertently, while intending to do something else. Not much has been written about this subject and only very few experiments have been made, but I find the subject fascinating enough to dare the deep waters of the unproven and often scorned.

So far no ancient sound has been heard, and the experiments conducted have been attempts to reproduce the conditions at which such recordings would have been produced, successful attempts, according to the papers published.

The Woodbridge experiments

What is probably the first publication on the subject appeared in 1969, when Richard G. Woodbridge, III related four experiments in a letter in the Proceedings of the IEEE¹. In the first experiment, he could pick up the noise produced by the potter's wheel from a pot, using a hand-held crystal cartridge (Astatic Corp. Model 2) with a wooden stylus, connected directly to a set of headphones. The second experiment yielded 60 Hz hum from the motor driving the potter's wheel. More interesting were the following experiments, with a canvas being painted while exposed to sounds. In the third experiment the canvas was painted with a variety of different paints while exposed to martial music from loudspeakers. Some of the brush strokes had a striated appearance, and "short snatches of the music" could be indentified. For the fourth experiment, the painter spoke the word "blue" during a stroke of the brush, and after a long search the word could be heard again when stroking the canvas with the stylus.

The Kleiner - Åström experiments

Years later, similar experiments were made in Gothenburg, Sweden, by archaeology professor Paul Åström and acoustics professor Mendel Kleiner².

Their experiments were dedicated to the analysis of the forces acting on a stylus or its equivalent (feather, vane etc.) while working on a soft surface, and to the actual recording of sound on a clay cylinder that was subsequently fired.

The results are rather encouraging for those who wish to hear the sounds of antiquity. The stylus analysis showed that the maximum force on a possible stylus (in this case a feather used to decorate a pot) would occur at high frequencies, those carrying the consonants of speech and thus the maximum information.

The actual recording also gave a fairly good result. A clay cylinder was formed on a dictaphone mandrel and a 400 Hz signal was recorded with an electrical cutting head giving a lateral modulation. After firing the cylinder, it could be fitted on the mandrel again

after some filing, and the signal could be both heard and measured. The noise level at 400 Hz was about the same as the signal level, but at 1-2 kHz it measured considerably lower, which would make it easier to make out any recorded voices.

But, really?

So, experiments have shown that sound can be recorded in paint on a canvas and on a clay surface - that is, if you actually intend to record a sound. But if we want to recover sounds from hundreds of years back, we would then have to look for objects on the surfaces of which sounds have been recorded unintentionally. Then we would have to have some idea about where to begin. What we need is:

1. A surface soft enough to receive an imprint of the low energy of the sound, yet it has to solidify before this imprint is smeared beyond recognition.
2. This surface would have to be formed during movement, as we need a time axis along which to search for the recorded sound.
3. Transversely to this time axis, there must be a movement produced by the sound vibrations. This could be a movement of the tool used to work the surface - as in the case of the potter's wheel - or of the surface itself - as in the case of the painter's canvas.
4. The surface would also have had to withstand the ravages of time in a more or less pristine condition if we are to make out anything at all through the noise. Nor must it have been covered with any substance that smooths the surface markings.

All this leaves us with precious few objects to try our luck on, for the recorded surface would also have to be old for our search to make any sense. From the last 100 years or more, we have intentional recordings of a quality and duration that we cannot hope to equal in archaeoacoustics.

One object often mentioned in the newspapers as a possible source of sound is Leonardo da Vinci's 500 year old painting Mona Lisa (La Gioconda). It does not seem to give any possibilities of hearing either Leonardo's or Mona Lisa's voice, however, as it is painted on wood, a material probably too stiff to vibrate enough for our purposes.

Christer Hamp, 1999

1. Acoustic Recordings from Antiquity, by Richard G. Woodbridge, III (Proceedings of the IEEE, vol. 57, No. 8, August 1969, pp. 1465-1466).
2. The Brittle Sound of Ceramics - Can Vases Speak? by Mendel Kleiner and Paul Åström (Archaeology and Natural Science, vol. 1, 1993, pp. 66-72, Göteborg: Scandinavian Archaeometry Center, Jonsered, ISSN: 1104-3121).

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