BINAURAL RECORDING

In this article, Claes Olsson goes through history and the basics for an age-old sound recording method, binaural recording. An approach that has gone from a fun factor in 19th century Paris, allowed today a key method Professional examination of what happens naturally when the sound sweeps around the head.

The story of binaural recording goes like this way back to 1881. The first binaural unit, the teatrophone, was an array of carbon telephone microphones installed along the front edge of the Paris Opera House, L'Opéra Garnier. The here was a method of recording sound where one used two microphones with the intention of creating one three-dimensional sound image to get the listener to be in the room with the artists or instruments. The signal was then transmitted via a kind of telephone system that required the listeners to wear a special one headset with a small speaker for each ear.

A typical binaural recording device is, for example, the Neumann KU 100, a dummy head with two mounted omni-microphones, recessed in ear-shaped shapes for outer and inner ear, where they can capture all audio frequencies. Sadly, there was no major interest for this technology until forty years later, when some of
Connecticut's radio stations started transmitting binaural recordings. At this time stereo radio had not yet been implemented, so the station had to broadcast the left channel on a frequency and right channel on another frequency. This happened, however, at the expense of the listeners, as if to take part in the effect had to own two radios and connect the right and left headphones to each radio. Was it a success this time either? No. Modern times, however, have seen an upswing and renewed interest in binaural recording, partly due to the widespread availability of headphones and cheaper methods of recording. In 2013, David used Cittadino together with Andrew Hills binaural recording technique and technologies on the Australian short film The Blind Passenger.
The same year they played both in The Metropolitan Orchestra with the same approach. Binaural recording has also been translated into useful developments in technology such as stethoscope, and enabled IMAX movies to create a three-dimensional acoustic experience.

You need to keep that in mind to record binauralt However, the term binaural has often had a slightly confused explanation. The mid-50s were binaural a marketing ploy in the record industry. One disadvantage of conventional stereo recordings within that area, is that they do not include it natural factor with, for example, head shadow of the head and ears. Then speaker crosstalk of conventional stereo interferes with binaural reproduction, headphones are a requirement for this to work. The reason for this is that the above. The factors generate their own interaural time differences (ITD). And what are interaural time differences? Well, the interaural time difference what applies to people, is the difference in arrival time between two ears. This is an important one part in the localization of sound, because it also gives an idea of the direction or angle on the sound source, i.e., interaural level differences (ILD). A real binaural recording can be created with a relatively simple recording method. With help of two microphones placed about 18 centimeters (7”) apart, facing away from each other.

En typiska binaural inspelningsenhet är exempelvis Neumann KU 100, ett attrapphuvud med två monterade omni-mikrofoner, infällda i öronformade formar för yttre och inre öra, där de kan fånga upp alla ljudfrekvenser.

På insidan av Neumann KU 100 finner vi ytterligare switchar för attenuering och det inbyggda högpassfiltret.

The distance between and placement of the microphones, roughly calculates the position of an average human auditory inputs. But there is nonetheless more to include in the calculations, and more approaches to be able to see what happens naturally when sound sweeps around the head.

Binaural recording devices There are recording devices designed for surveys like these. Typical binaural recording devices are, for example, the Neumann KU 81 and KU 100. These units are dummy heads and has two mounted omni-microphones, recessed in ear-shaped molds for outer and inner ear, where they can capture all audio frequencies. The purpose of that use a Neumann KU 81 or KU 100, is that create an effect using a technique called art head stereo and be able to see what is going on naturally when the sound sweeps around a head.

Within research for psychoacoustics, this is an approach known as mainstream transmission methods (HRTF) and is intended for playback with headphones and not a pair of stereo speakers. Upon completion of recording, it may be binaural the effect is reproduced with headphones. It does not work with mono playback, nor when you use speaker units. All headphones that give good right and left channel isolation is sufficient to hear the effects of the recording. Is it so that you have one? cheap set of headphones one can still enjoy the

recordings. Several advanced headset manufacturers have created some devices specifically for playback of binaural recording technology. In addition, several headphone manufacturers have created hardware that benefits from these special recordings. Surround versus three-dimensional sound While surround sound places the sound in the room, it is required by three-dimensional sound that one on one effectively simulates the location of the sound source in the room. To understand and effectively be able to simulate three-dimensional sound, it is required.

Binaural listening in cars.

How can this be linked to sound? Yes, even though the use of hands-free reduces the direct absence from the road then we, for example, turn our eyes away to answer, there is still a mental absence which means that our focus is shifted from the way to the call. This mental absence can be minimized by placement the sound of the call-in front of the driver, binauralt. Binaural sound can be translated to three-dimensional hearing, exactly as our own hearing works. By you can filter the sound from two speakers with this method place sounds in one three-dimensional room, as surround sound fixed with only two speakers. The reason for the mental absence from the road becomes smaller is that the distance between the call and the path becomes smaller for the brain to process.

Careful research on how the human ear perceives differences between sounds with different placements in space and its possible movements. Research shows that the ear that is furthest from a sound source cannot hear higher frequencies as well as the ear that is closer to the sound source. On the other hand, there is hardly any difference at all among the lower frequencies below 300 Hz. The shape of the ears and head acts as a damping filter for certain frequencies in the sound spectrum.

The design of the outer ears uses us to determine the direction in height. For frequencies lower than 3 kHz, the phase shift that occurs due to different arrival times to each ear is used. For higher frequencies, differences in the intensity of the sound are used. Phase shift cannot be used here as the differences that occur are too short to be measured by nerve cells. However, the head absorbs high frequencies and thus shadows one of the ears. This reduces the sound pressure at one ear.

This shows how important it is to have the right acoustic control in the room in which the listener is to get a correct reference listening. The advantages I see with three-dimensional sound is that I publish the production, it is sent with the finished sound and therefore no external decoder of the sound is required. It is also significantly cheaper to use than real surround productions.

Recording in non-acoustically controlled rooms Recording in non-acoustically controlled rooms becomes very noisy and does not do the recorded source justice, as much of the room's frequencies become very roomy and room nodes, i.e., extinctions and amplification of certain frequencies. In addition, the choice of microphone and a significant part of the representation of the recorded material means. Other recording equipment is also especially important for the result, as we today convert the analog sound to digital formats.