

Test Listening Genelec's Aural ID

by Matt Foglia CAS

A number of years ago, the good folks from Smyth-Research (Smyth-Research .com) came to Middle Tennessee State University, where I am a professor. They brought their A8 Realiser in for us to demo. The purpose of this hardware box was to allow the perception of listening over loudspeakers (up to eight channels) while actually listening via headphones. Peter Damski CAS wrote an article in the Fall 2011 *CAS Quarterly* about the unit and included a quote from me describing the representation as “mind numbingly accurate.”

What did Smyth-Research do so accurately? First off, they took a personalized HRTF (Head-Related Transfer Function) of the individual in the room they were listening in. They did this by placing small microphones in the listener's ear while seated in the listening position. Each speaker emitted test signals that were picked up by the microphones in the listener's ears and took into account the HRTF of the listener. (Our setup at the time was 5.1, though the new A16 Realiser can handle 16 tracks for immersive representation.) The unit took into account the room acoustics, speaker placement, and listener's HRTF relative to that space with precision strong enough to make you question whether the headphones were on or off your head.

While the Realiser is extremely impressive as a hardware solution, portability is often the reason we're mixing on headphones in the first place. As such, software solutions are very desirable and even more possible given the processing power of personal computers these days. Some companies have tried to emulate loudspeaker listening through headphones with the use of plugins. Two that come to mind are CanOpener by Goodhertz (goodhertz.co) and Nx Virtual Mix Room by Waves (waves.com).

CanOpener (get it?), which is limited to stereo, uses a

crossfeed algorithm that allows some of the left-channel signal to feed the right side of the headphone and vice versa. It also allows for adjustment of “speaker” angles, eq, and room sound. The user can alter these based on taste to try and match a listening environment they're familiar with.

Nx is more sophisticated, allowing for up to a 7.1 emulation. Waves also allows you to input your head circumference and inter-aural arc (distance from ear to ear around the back of your head) to gain a closer representation of how the user's head may affect perception. Adjustments to eq, angles, and room can also be made. Like the Realiser, Nx even offers head-tracking to add a level of realism to the listening experience as you move your head.

So, what is Genelec trying to do with Aural ID? What they're not trying to do is give you what these plugins and hardware do.

What they are doing is creating the fingerprint equivalent of how your head and auditory system affect the way you hear.

Given that the company has spent 40-plus years developing and improving the accuracy of their loudspeaker monitors, accurate headphone monitoring was a natural step.



Smyth-Research A8 Realiser

Here are a couple of questions I was looking to answer when researching Aural ID. What do you need to do on your end? What do they do with what you give them? What do you get? And what do you do with it? Here's a look into my experience.

CAPTURING | In order to create an accurate HRTF, one would, traditionally, have to put special microphones in their ear canals (not dissimilar to how the Realiser captures this) and record test signals in an anechoic chamber to remove the effects a room has on direct sound. The subject would have to be extremely still during the process so the orientation is consistent. Given the unlikelihood of people actually doing this, Genelec created a very clever approach for capturing this information using readily available technology.

The technology needed is a video camera and a person to operate the camera. For me, it was my iPhone and my teenage son Michael. If you want to illicit a strange reaction, tell your kid, "Hey (insert said kid's name), I need you to video my head and pay particular attention to my ears." While not the cinematography debut he was looking for, Michael recorded my head by walking slowly around me as I sat on a stool in our garage (see photos on the next page). Genelec provides a good video example of how to do this with enough detail for the video to be effective. It's very easy to record this too quickly. Slow and steady are your friends, though you may have to introduce the concept to your kid. You then put a ruler up to your ear and take a picture to show its length and to provide a

measurement reference for the folks at Genelec (again, insert odd reaction from kid). The video and the ruler photos of your ear are then uploaded to Genelec's site.

PROCESSING | Back in Finland, Genelec's team uses software to create a 3D model of the head recorded in the video and seen in the photos. Once this is created, they use an acoustical simulation to calculate the acoustical field. The process measures the equivalent of 836 different orientations. Think about that for a second: 836. This allows for hundreds of aural origination points (e.g., monitors) to be represented in the HRTF.

DELIVERY | Once Genelec has completed their processing, you are sent .SOFA files at three different sampling frequencies: 44.1 kHz, 48 kHz, and 96 kHz. The file to be used is based on your session's sampling rate. If you're unfamiliar with the .SOFA format, it stands for "Spatially Oriented Format for Acoustics" and is a format standardized by the AES to store acoustical data such as HRTF and binaural or directional room impulse responses. You can read more about the file at www.SOFAconventions.org. With Aural ID, this file contains your HRTF.

INCORPORATION | Once I received the file, I was curious to hear what it would do. To use the file, you need a plugin or a program that can read a .SOFA file. Pro Tools does



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