

Interview with Hans van Maanen

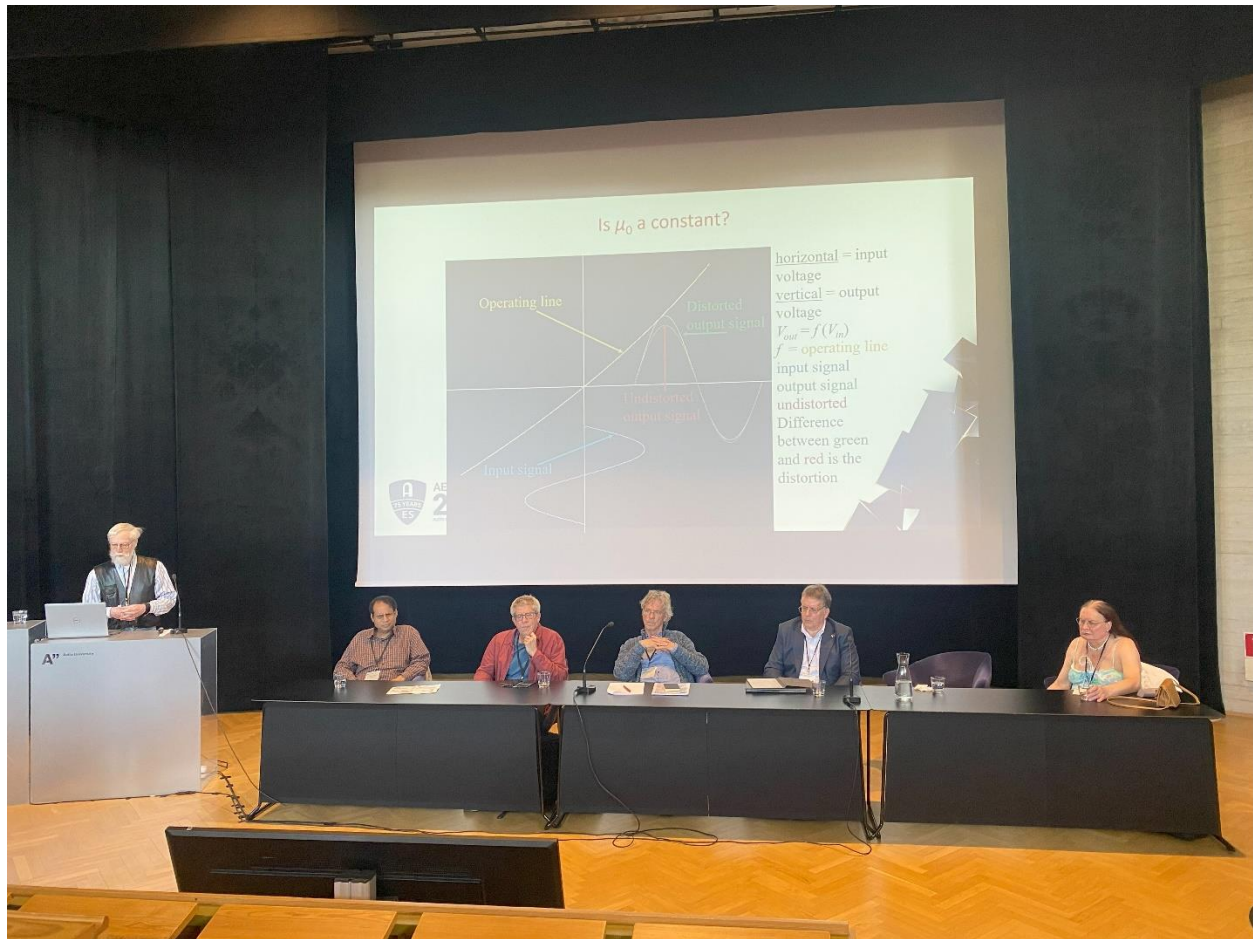


Measurement signals which simulate music

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Temporal Coherence and cooperation partner Hepta Design Audio may not be large companies, but in essence, it all turns around pure sound quality. It is a choice. Either you are ruthlessly commercial, and you ‘buy’ the market with a huge advertisement offensive and thus a lot of marketing nonsense or you are bewildered by quality and the quest to the root of sound reproduction. Pressing hard on the market is no license to deliver low quality. The competition is rocky and there are too many brands and products. Those who deliver too little quality won’t stand a chance. Your author talks to Hans van Maanen.

The advertising force has left its marks. Whole generations of audiophiles have been framed and brainwashed. There might not be another field of expertise where so much nonsense is floating around as within consumer audio. It is a pity that these allegations are never verified by an official committee. Hans is a scientist, a spirited lover of music, developer of audio equipment and a member of the AES (Audio Engineering Society). He is not afraid to give interesting lectures on his technical insights and to confront this critical group of professionals. As far as known, no manufacturer of cables had so many guts. Actually, the AES library includes only a few papers on cables. Except an important paper from 1991 on the interface between the amplifier and the loudspeaker via the cable. A discussion with Hans is entertaining and instructive. He always wants to know why things are as they are. So, this dives deep, including a bit of mathematics and insights from physics. Hans could fill half a Music Emotion in no time. So, from this interview, the highlights are presented in a condensed way. Mostly, the text to the letter, sometimes a summary and there is an exchange of points of view too.



How did you end up in HiFi?

“This is because of my love for music ever since I was a child. In my high school years, I saved some money by distributing the folders of the local grocery shop and I used it to buy a tape recorder. Without any knowledge of the technique, I made recordings of the English pirate stations. This was done by placing a microphone on a piece of foam rubber. A friend of mine made a direct connection between the tape recorder and the radio, albeit with some problems. Later, I started working for Shell and I followed the base course on electronics. In those days, audio equipment was relatively expensive compared to what it is now, and my income wasn't that high, so do-it-yourself was obvious. Acquaintances and colleagues found that those amplifiers sounded better than those in the shops for the same money. So, it became a mix of music and audio quality and I wanted to find the reasons why. Understanding of the backgrounds is required and I became a member of the AES. After leaving Shell, I had more time for audio, and I also learned to translate an audio problem into a computer program. Already during my career with Shell, I studied physics, and I acquired knowledge on computer programming. That provided a lot of theoretical knowledge, a.o. on the field of signal processing. My reference for sound is the Concertgebouw (the famous concert hall in Amsterdam). The equipment we produce will have to produce a sound which resembles this as much as possible, even though it won't be possible to reproduce that completely in the living room. To get really commercial with audio became feasible after leaving Shell. There was more time available and

financially, it was no problem when there was sold less at some point in time. We do this together with some other audio friends and also in cooperation with Hepta. We want to bring the joy of good sound to others, but we also want to find out why things are as they are. I don't like that there are things we don't know yet."

Possibly high-end audio has not a large societal importance?

"Maybe it does, but if I hear some loudspeakers, I wonder whether the designer has ears on his head."

The designers from the early years wanted the best audio quality, whereas nowadays, it is mostly about commercial results.

"Yes, but a good sounding product would still sell more easily."

The future of audio?

The further integration with video is interesting. But by using a good stereo system and not just a soundbar. Immersive audio is less obvious. If you want to do that well, it will cost a fortune and the Dutch living rooms are too small to fit it in. So, rather a high-quality stereo system than several channels with small loudspeakers all over the place."

Currently, there is a lot of hifi throw away equipment around. It works for 4 years and is beyond repair then. Are we going back to longer-lasting equipment, which is more sustainable?

"I agree, I am strongly opposing wasting too. Our products last for at least 20 years. We keep an eye on the temperature. If you want to destroy electronics, make sure it gets hot. Because our products are longer-lasting for sustainability, we have taken care that these are easily upgradable."



There is a limit to the development of amplifiers, cables and other electronics. What is your view on that?

“I partly agree with you, but as long as we don’t know how things work in reality, there is still room for improvement. E.g, with our power stages, we discovered that distortions at a very low level can make the big difference. When you are playing music, it is most of the time at a low power level. The distortion of amplifiers is at low levels relatively high, but of loudspeakers it is actually low. Also, parasitic feedbacks play a role. At the input of the amplifier, the currents are at microamps level. At its output, far stronger currents occur with the related magnetic fields. This can affect the sensitive parts of the amplifier. Menno van der Veen discovered distortion in capacitors, which is caused by internal vibrations. This can be perceived too.”

Many manufacturers of audio equipment are not interested in such a depth of investigation. Innovation thus has to come from other sources?

“Yes, it takes people who can think independently and critically. It should also be approached more from a scientific perspective. The given, that we still have no measurement which predicts how something is perceived is, after 145 years of audio, too mad for words. As a manufacturer, I want to build a system as good as possible. I encounter many combinations (e.g. at fairs) which I would not dare to demonstrate.”



Yes, that is indeed very recognizable. The last couple of years, I am looking for systems which sound naturally.

“You must look in a more holistic way. One of the highly underestimated aspects is the interaction between the amplifier, via the cables, with the loudspeakers. In the ‘90ies I started to experiment with impedance compensation. This leads to very convincing results. The ordinary impedance of a loudspeaker varies all the time. This results in phase shifts between voltage and current. With a class AB amplifier, it is possible that the voltage is, at a certain moment in time, positive and the current is negative. To create a positive output voltage, the plus-transistor needs to be opened. For the negative current, the minus-transistor needs to be opened. This cannot be the case at the same moment in time. So, problems occur, certainly when you have a complex signal. As a solution, you make the impedance of the loudspeaker as ‘Ohmic’ as possible, which makes the problem disappear. During the design of the cross-over filter, it is assumed that the impedance of the different units is Ohmic. But, during the interaction of the units with the components of the filter, it shows that the system does not behave as a resistor. So, you have to apply impedance compensation on the units. As a result, also the filters behave better and respond as calculated during the design. Resonances store energy, which will

be returned to the amplifier, which does not like this. So, the complex impedances create problems, and its behaviour is quite different than when the amplifier is tested with an ideal 8 Ohm impedance. So, you have to look holistically how the amplifier and the loudspeaker behave together with music signals.”

Matching an amplifier and a loudspeaker is, at this moment, for dealers and at fairs, a process of trial & error. You often hear that it doesn't work. In our listening room, there is by now some experience with this match, but would it be possible to get a handle on this by modelling?

“I agree, but I try to avoid this in the design itself. However, a Chinese wall has been erected between amplifier designers and loudspeaker manufacturers. So, make sure that the design of the loudspeaker fits the amplifier.”

The audiophile mostly buys a combination which does not match.

“Certainly, when a loudspeaker has a better impedance curve, such a model sounds better and you can sell more of them. I have written a computer program which calculates the impedance curve and subsequently designs a Zobel network to solve the problem. You have to do that for each unit, which makes it a bit more cumbersome, but if you have a loudspeaker with an impedance curve between 3 and 50 Ω , you should wonder who steps forward with such a design.”

Many designers look at the figures, based on measurement signals. They do not use music.

“Correct, they don't have ears on their head. No problem but let people who do have ears listen to your product. Hire people with a background in music. Don't drive me mad with those so-called 'scientific' listening tests. Very tiring and very unreliable. I listen to music I know very well and during extensive periods of time. Then you discover things. You won't find those with short-time AB comparisons. Also, human memory has its limitations.”

Can someone with live experience give a judgement on a system much simpler?

“Yes, but I can only give a good judgement when I listen to it for an extended period of time using music I know well.”

Could I possibly be a little faster in this?

“When it comes to marginal improvements, it is going to be a lot harder. When you hear a system with crash cymbals and only the crash remains, it is obvious in no time. But improvements in small steps using AB-testing is difficult.

How are things with Temporal Coherence and Hepta?

“We couldn't live on it, but we are happy that we are able to provide people in their home with good sound. The cooperation with Hepta stimulates the developments on both sides and thus the sales, because Hepta will have to live on it.”

Growing bigger has often more to do with the marketing budgets than with quality.

“Certainly, if we provide a million for marketing, we will be at the top of the selling list in no time. We do advertise and we demonstrate at fairs to show we are here. We are not

an ephemera. But the company is to me also a tool to increase knowledge and understanding of audio. Which is why there are also several publications to be found on our website.”

Looking around at the Technical University, there is an enormous amount of knowledge of electronics and all types of circuitries. Obviously, only little seeps through towards HiFi. Each and every manufacturer comes every year with improved versions, even though these circuitries have been known for years.

“That is correct, but the goals of such electronics are often different. One of the problems is that we impose very high demands with music. It is quite a different field than e.g. instrumentation electronics. Which is why we have to figure out which aspects are of importance for perception. It is amazing what human hearing is able to resolve. It is probably better than our eyesight. Look at its dynamic range in sound pressure levels and frequencies.”

This has an evolutionary importance.

“Which is why also temporal response is important. When a small branch behind you breaks, it might be that it is caused by an animal moving with priority for its evening meal and less with your well-being. Our hearing is non-linear. Nature has used this because more information becomes available than with a linear system.”

From here, a number of off-topics: Higher frequencies than 20 kilohertz?

“We will have to move in that direction to get a more natural sound. This will become feasible by digital correction of microphones.”

Temporal response?

“Everything I have done to improve the temporal response resulted in a more natural sound. Which is why resonances should be forbidden. These ruin the temporal response and that is the reason that I despise base-reflex systems. With our active systems, we apply an analog feedforward correction for the woofer. With a small enclosure for the woofer, we achieve 16 Hz (-3 dB).”



Chewed up subject with unbounded annoyance online: electron (vacuum) tubes vs. transistors.

“When an amplifier is well built with transistors, electron (vacuum) tubes or beer cans, it should not make any difference. When there are differences, then there are different artefacts. I don’t want artefacts. If you design them both well, there should be no difference.”

Agree, this is also the experience in the listening room. It is all about the implementation?

“The same holds for the differences between digital and analog. So, why does analog sound so good? You could better ask why digital sounds so bad. There are still a lot of unresolved issues in the digital domain.”

Feedback?

“What disappoints me, is that it has become a discussion between deaf people. Feedback up to stratospheric heights or no feedback at all. You should try to find out what happens inside a system with feedback. Then you can get it in a way that includes all the advantages. You can design a disastrous piece of electronics and then throw a bunch of feedback at it, which makes the numbers OK, but it is impossible to listen to it. That’s not the way to do it. It is a pity that the discussion has become so polarized. Many people who love vinyl oppose feedback. But there is no cutting machine which works without motional feedback.”



The annoyance keeps on continuing and it never comes one or other form of common sense. Never a varicolored and an underpinned final conclusion is given. Audiophiles don't progress a millimeter.

“Actually, the current feedback theory is incorrect. A constant open-loop gain μ_0 is used and then calculated how much the distortion is reduced. But what is the root cause of distortion? Because μ_0 is not a constant.”

Headroom?

“If you design an amplifier well, it will behave the same up to one tenth of a percent of the clipping limit. Many problems in the feedback loop increase with an increase of the amplitude. Approaching the clipping limit, the amplifier will behave worse and worse. So, if an amplifier needs headroom, it has a flawed design. A well-designed amplifier will behave well up to the maximum power. Our amplifiers have, in that respect, sufficient air.”

Another wish?

‘Measurement signals which resemble the properties of music a lot better.’”

Epilogue

From this interview, several different insights can be retrieved. Essential is that virtually any type of technology has its pros and cons. Manufacturers and audiophiles only highlight the advantages of the solution they have chosen or of the equipment they have bought. A balanced view is missing. The best audio equipment is designed by manufacturers who are able to optimize the advantages and minimize the disadvantages. The price itself is not related to the audio quality. For the rest, the world would be a better place when something is done about the appalling nonsense which floats around in HiFi-land. Also, it would be a good idea to work on more durable equipment, which can also easily be repaired. To listen to music, you don't need fancy technology, just because it happens to be there.

Ruud Jonker