

Henkjan Honing interview

Switching on the radio to listen to silky-voiced DJs introducing auto-tuned top-40 music by perfectly preened pop stars with perfume lines or watching tonally challenged innocents with stars in their eyes being led to the slaughter in the cacophonous contemporary TV coliseum that is *X Factor*, one could be mistaken for thinking that a large percentage of human beings are far from musical. However, according to Henkjan Honing, professor of Cognitive and Computational Musicology at the University of Amsterdam (UvA), we are all musical creatures and this sets humans apart from the other creatures roaming this planet.*

Music Cognition is a relatively new field of study, having risen in prominence in the last 20 years. It uses an interdisciplinary approach, combining fields ranging from computer science and psychology to chemistry and medicine, in its quest to understand the cognitive processes that underpin musical behaviour, such as perception, comprehension, memory, attention and performance.

Honing gave a highly entertaining presentation in the *Glass House of Science and Scholarship* on 3 September 2012, an event which saw UvA professors deliver lectures to the general public in the centre of Amsterdam.

Spectators were treated to videos of apes playing percussion, parakeets dancing in time to the Backstreet Boys and babies wired up with electrodes so that they resembled tiny Russian cosmonauts (although Honing was quick to assure us they were not harmed or in any discomfort).

In this interview, Prof. Honing gives more insight into his innovative research, which has attracted worldwide media attention and explains the science behind man's innate musicality and how it can be harnessed for the common good.

** It should be noted that Prof. Honing also pointed out in a previous lecture that 4% of humans suffer from amusia, a musical disorder that manifests mainly as a defect in processing pitch. This may explain top-40 radio and X Factor.*

For those of us unfamiliar with Music Cognition, could you explain the central theme behind your work and research?

Music cognition is a field where you are interested in music, but not only in the way a musicologist would be. A musicologist typically studies composers or repertoires. I'm less interested in the composer than in the listener or the performer. And if you're interested in the listener or the performer, you need methods from Psychology to undertake listening experiments and you need methods from Computer Science to make models of the knowledge that is involved. That's where the 'cognition' comes from. I'm using methods from the cognitive sciences, a conglomerate of fields including Psychology, Computer Science and Linguistics, to study music.

Could you say something about the history of Music Cognition as an academic discipline?

Music Cognition is a relatively new field of study. In that sense it's lagging behind language, where the cognitive revolution was already happening in the 60s. I would say the field is now 20 years old. The first conference on the subject was held in 1992.

I attended your lecture in the Glass House of Science and Scholarship. Although it may be entertaining to see that apes can't adapt to tempo changes while parakeets can, and that babies have a developed sense of syncopation, what's the practical use of this knowledge?

The main thing is that it's science, so we just want or have to know. I think we have a duty to figure out why there's such a thing as music. That's the main aim. Music Cognition does have applications. It influences music therapy. It turns out that people who have problems with language can activate areas of the brain that are involved with music. It can therefore help people with aphasia (impaired language ability, ranging from having difficulty remembering words to being completely unable to speak). Music Cognition also has applications in the treatment of Parkinson's disease. Thus, there are lots of medical applications.

It also has applications for the entertainment industry. If you want to play music together on the Internet with somebody or something, like an animation, you have to create a system that understands music cognition, for instance where the beat is. So you need models of *beat induction* (the cognitive mechanism that supports the detection of a regular pulse from a varying rhythm). That's still problematic, because we don't know precisely how beat induction works. As yet, we do not have a proper model of regularity detection in music.

The presenter of your lecture in the Glass House of Science and Scholarship stated that you wanted people to know that you work for both the Faculty of Humanities and the Faculty of Science at the UvA. In what ways is this interdisciplinarity important?

It's essential. In Cognitive Science, interdisciplinarity is very common. It bridges from the Humanities, to Psychology, Computer Science and even Biology. You need them all in order to study Music Cognition. The members in my research group have all these different backgrounds.

To what extent has this interdisciplinarity been developed in the Netherlands? The humanities and the sciences have traditionally been separate.

That's still the case. They're still very separate and I'm very much against that. I'm against the faculties. Let's get rid of them. However, it's not that easy. You always see that in the fields where innovations occur, we normally see people from different backgrounds working together. I'm very optimistic about that approach.

In your lecture, you mentioned how babies can recognise syncopation and that our ears play tricks with us as we grow older and are influenced by the culture we live in. Does our aptitude for music change as we grow older, as it does in learning languages?

I think it's similar, although the evidence is not very solid yet. We've done far more research on language and language development than we have done on music and music development. It makes me jealous. But the experiments that exist show the same thing, only at a slightly earlier age. The critical age in music is around 10 months old, very early. You see children take on the patterns of their culture and become insensitive to other cultures and other music. Only a few papers support this, but it seems to be a trend. So, there's a critical age, which is very young.

In Japan and other Asian countries, it's much more normal to teach music from an early age. In Japan, for example, they use the Suzuki method. Why don't the Netherlands and other European countries engage in the same techniques?

Young children and babies have an enormous talent and aptitude for music. There's lots of research comparing special skills and in Japan you see that some musical skills are at an extremely high level compared to those in Europe. In Europe, we make music very special. Only a few people in the classroom are busy with music, probably rich kids who play the piano or violin. It's something very elitist. In Japan or China, it's normal. Almost all children are exposed playing an instrument. In Brazil, everyone sings and plays the guitar or pandeiro. It's part of the culture. In Holland, we've made music special.

Special in what way?

Special in a negative way. That's why I'm involved in promoting this knowledge that we're all musical. I spend a lot of time giving public talks and writing books for a general audience, in order to raise the general awareness that we all have these musical skills, especially in terms of listening to music.

You've talked in interviews about how Darwin believed music might have preceded language among Neanderthals, and there is a recent book about this called *The Singing Neanderthals*. Can you explain more about this area of study?

The origins of music are a recent interest of mine. It's always an area of speculation. That's why it not considered very scientific. But in recent years, because of the comparative method and through looking at different animals, we can say something more substantial about the evolution of music. I find it an intriguing topic. Very little is known about it. Even Darwin wrote, I think, only eight pages about music. And he had two theories. Firstly, that it was in our culture because of sexual selection and secondly that it is a proto-language, a preceding communication mechanism. Music as a kind of living fossil.

Steven Mithen (professor of Archaeology at the University of Reading) wrote this wonderful book called *The Singing Neanderthals*, in which he combines the literature from my field, Music Cognition, with that from Developmental Psychology and Linguistics. He comes up this with hypothesis that music is a derivative of a proto-language.

You have described how music may have been a part of natural selection in order to develop and stimulate people. How are music and natural selection related?

That's a big topic of discussion. Is music a by-product of some other things, which is what Steven Pinker believes, or do we really have music because it helped our species survive? That's the big natural selection discussion. There's lots of evidence against it. If we remove music from our lives, we don't die of hunger. Nor do we live a day longer if we listen to music. So, it's very unlikely. But some theories say there might be evidence that some aspects of our musicality are part of natural selection. One of those aspects might be this synchrony or beat induction mechanism, because it has an advantage for us as a group, in terms of social cohesion and it makes us happier. We are looking for ways to show that music itself is not adaptive, but rather some components of our musicality.

The popular science author Stephen Pinker has stated that music is 'auditory cheesecake'. What was he suggesting with that?

He made that remark for the first time at MIT (Massachusetts Institute of Technology) in 1997 at a Music Cognition conference and the whole audience was angry. He said music is really a by-product. It's not essential for our survival. It's just something we like and get addicted to. I think, in the end, he turned out to be quite right, because that's actually what music can do very well. It's cheesecake in the sense that it tickles lots of our mental faculties in a very effective way, more effectively than language or other domains. But the idea that it's a by-product is still the subject of discussion.

Do some scientists still see Music Cognition as being of secondary importance or have you noticed a change in how seriously it's taken?

It was in the margins and a novel subject 20 years ago. It was not at the centre of attention. But that's been changing thanks to some ambassadors in North America. The advantage of people working in Music Cognition is that they all love music and that makes them extremely motivated. It's a passion that people can understand.

You've written about Canadian research on music and dopamine release. Can you tell us about this and its significance in Music Cognition?

This is a recent study from the laboratory of Robert Zatorre, who is one of the pioneers in the neuroscience of music. What's interesting about his study is that he was able to show that when people listen to their favourite music, in anticipation of the moment when they get shivers or tears in their eyes, their brain releases dopamine. That was the big finding. Dopamine is mostly released in the brain in relation to a reward system. So, if we get food or have sex, dopamine is released. He was able to show that the brain makes dopamine in expectation of an abstract stimulus, namely music. And that's special. Dopamine is not released in reaction to music. It is released in anticipation of a moment in the music that you find very exciting. For me, that was an eye-opener.

There's lot of emphasis in Psychiatry at the moment on mindfulness and meditation and the benefits for the human mind. Could music be harnessed in a similar way?

Probably. People are working on that. If you look at brain activity when someone is listening to music, almost all of the brain is involved: lots of networks, lots of hormones.

To what extent is there interdisciplinary cooperation between Music Cognition and Medicine?

There are at least two such groups cooperating in this interdisciplinary manner, the most important one being at Harvard and led by Gottfried Schlaug. He is interested in the transfer effect. That is, people with problems in language that can make use of brain areas which are actually special to music and seeing if you can help them to improve their speech. He's one of the people who think music and language use different brain networks and if one of those networks is broken, it might be possible to use the other network to repair that. So, it's a medical aim.

It seems the therapeutic values of music are very broad, ranging from helping depression to autism. Can you explain more about this?

A concrete example is the research by Michael Thaut, a musician and neuroscientist. He has done a lot of work on Parkinson's disease. People with Parkinson's are immobile. He showed, in beautiful research, that if you use

rhythmical music, or music with a clear beat, Parkinson sufferers can suddenly move and are no longer immobile. So there's an intimate relationship between listening to music and the motor areas in the brain, triggering this connection in the brain that apparently malfunctions in people with Parkinson's disease.

If there are so many therapeutic benefits, to what extent are governments investing in these?

Little or not at all. We think of music as a luxury. It's deeply engrained in our culture. I think this is wrong. I don't think music is a luxury. In addition to all the benefits, it's also intuitively important. I think that it's important for our field to show that it is important. And they have to think if it is worthwhile to finance that.

In an article you wrote with Dick Swaab, you talked about the benefits for children, you mentioned it could benefit IQ or concentration. Could you explain this?

One study of a Canadian colleague of mine convincingly showed music lessons improve your IQ. He did a very nice controlled experiment, that was also very expensive. It involved six-year-old children taking music lessons and six-year-old children taking drama lessons and another group of children not taking specific lessons. After a year, you saw there was a significant increase in the IQ of children who had taken music lessons. Most importantly, it showed that it was the cause of this improvement. But that's the only study that's there. The rest is all correlational or even weaker.

There is also some evidence that executive functions (such as working memory and attention) are improved by music. Social skills are not improved. Emotional intelligence is not improved. But we need more controlled studies.

These type of experimental results are often used as an indirect validation of why music is important. Music is important because you get smart. So what we really value is getting smarter and not so much making music and all the pleasure it gives. That's what I dislike about this way of reasoning. I'm always asked to say why music is important and then people ask you to come up with things that are not intrinsically musical: that your memory is improved, for example. And that's a pitfall. What I want to know is what makes music intrinsically interesting. Why do we have music in our culture. We're underestimating this intrinsic meaning.

You talk a lot about the role of listening being as important as the music itself. Why does that fascinate you?

It's a way to position the research. In Musicology, you traditionally consider music and art as an object that you study in the social and cultural context in which it was created, functioned and currently functions. For a long time, I thought it was fascinating to think 'What is that composer doing?' or 'What are his or her tricks?' to make this beautiful piece of music that touches me so much.

This fascinated me, as a composer of electronic and computer music who wasn't yet practicing science. Then it turned out, over and over again, that all the things that I heard in that music were not put there by this composer. I was actually putting it there. In my field and in Musicology as well, there is more and more attention for the listener, because that's the other part of the story. Music without a listener is not the music I'm talking about in my work. My research shows these cognitive processes of attention, memory, perception, expectation are all processes that are active in the listener and can be traced back to what you've been listening to before. Your whole history as an individual influences what you perceive in the music. And that's what I'm interested in.

What differentiates the UvA from other universities? What should an international student come here instead of England or America?

I think the location: Amsterdam. The spirit of Amsterdam is also in the spirit of the UvA, I think, more than in VU (University Amsterdam). There's an international flavour. We talk English on this floor.

Also all disciplines are represented at the UvA. There's expertise in a vast range of disciplines. This creates a very dynamic environment. And it's a very ambitious university. The UvA really wants to be first. If something changes, it embraces this change. That kind of ambition and entrepreneurship is what I like about the UvA.

Can international students take your courses and, if so, at what levels (Bachelor's, Master's, PhD)?

All the courses I teach are in English and they're all open to international Bachelor's and Master's students. I do a Brain and Cognitive Science programme at Master's level. About 50 or 60% of our students are from foreign countries, such as America or Spain.

Links

<http://cf.hum.uva.nl/mmm/> - Music Cognition Group homepage

<http://home.medewerker.uva.nl/h.j.honing/> - Henkjan Honing's homepage

<http://musiccognition.blogspot.nl/> - Henkjan Honing's Music Cognition blog

<http://www.youtube.com/musiccognition> - Henkjan Honing's youtube channel