Curatorial > INTERRUPTIONS

This section proposes a line of programmes devoted to exploring the complex map of sound art from different points of view organised in curatorial series.

With INTERRUPTIONS we make the most of the vast musical knowledge of the artists and curators involved in the Ràdio Web MACBA project, to create a series of 'breaks' or 'interruptions' in our Curatorial programming. In à-la-carte-music format, our regular curators have carte blanche to create a purely musical experience with only one guiding parameter: the thread that runs through each session must be original and surprising. In this new instalment, Genís Segarra charts an imaginative journey through the numerous attempts to create voice emulation machines that are able to synthesise our voice.

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Curated by Genís Segarra

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INTERRUPTIONS #13

The inhuman voice

Since the late eighteenth century, speech therapists, linguists, entrepreneurs, artists and musicians have nurtured the dream of emulating human speech. In this mix, Genís Segarra offers a personal overview of a subject that fascinates him, with the story of voice synthesis as a narrative thread.

01. Summary

A Brief Overview of Human Speech Emulation Machines

There is a long history of mankind's attempts to build a machine capable of reproducing human speech. Some of the inventors who embarked on this quest where driven by curiosity – speech therapists and linguists interested for scientific purposes, for example –, while others were entrepreneurs with an eye to business opportunities. The first talking machines date from the late eighteenth century, and many theoretical advances were made during the nineteenth century. But the turning point came with the emergence of electronics in the twentieth century. You can hear an example at 20'35" of this selection: a demonstration of the Voder (Voice Operator Demonstrator) at the 1939 New York World's Fair.

The arrival of computers and microchips led to speech synthesis machines being marketed by companies like Bell Systems, Votrax, General Instrument, IBM and SAM, who developed them with the aim of replacing human beings in communications. At 27'38" you can hear the first computer that ordered a pizza by phone. 'Domino? I want to order a pizza, a large pizza, pepperoni and mushrooms', the machine says. Although it is fair to point out that the experiment failed, given that the Domino employee hung up on the computer. At 31'17" you can hear the first videogame that included a synthesised voice: an arcade shoot 'em up called Stratovox.

The mix includes several examples of talking software and microchips, but I've also thrown in songs that have used similar technology creatively: from German group Kraftwerk to the Japanese phenomenon of virtual singers. You will also hear songs that use a vocoder, an instrument that does not generate a human voice but can analyse the harmonics of a voice and then modulate it in another sound. This means that it can make any source of sound 'talk' or 'sing'. The vocoder was invented with the same aim in mind: to synthesise the human voice. Although it has now been superseded by chips that can generate vowels and consonants, artists and musicians have developed and used the vocoder in order to stand in for human beings. One of the first machines that achieved this effect was the Sonovox, which Disney used in 1941 as the voice of Casey Jr., the train engine in *Dumbo*. In this mix you can hear Casey's cheery 'All aboard!' at 17'01" and listen to him chant 'I think I can' as he struggles to climb uphill at 27'01". The Sonovox was first used on a record in 1947, in the children's book *Sparky's Magic Piano*, in which a little boy discovers that his piano can talk and play itself. The voice of the piano was created with a Sonovox that transformed piano notes into a human voice. At 13'59" you can hear the fragment in which Sparky discovers that his piano can talk.

At the other extreme in terms of time and technology, the situation is much the same: at 13'18" you can hear a grand piano being 'played' by a computer-controlled mechanical system which manages to make the piano recite the Declaration of the International Environmental Criminal Court, a work created by the composer Peter Ablinger with the help of a software programme that assigns vowels and consonants to different combinations of piano keys. Throughout the mix, you will hear vocoders and computers talking and singing. I've included several examples in which I've used vocoders or speech synthesisers in my own works with the groups Astrud and Hidrogenesse. There are also samples taken

[The German band Kraftwerk]

from a voice synthesiser competition held at the 2007 *INTERSPEECH* Conferences, in which participants had to make their programmes sing 'The Synthesizer Song'. Several universities and companies participated in the competition and demonstrated their systems.

Forms of use:

This selection includes snippets of songs that use various voice emulation and speech synthesis systems for a range of different purposes.

1) Let the machine sing!

This section includes voice synthesis and vocoders that have been used to represent a machine that speaks or sings part of a song, to theatrical effect. This is the case of Dumbo and Sparky's piano, for example. The most widespread and least imaginative use has traditionally been to emulate a robot's voice, as Kraftwerk did when they proclaimed 'We are the robots' through a vocoder (39'26"). But there are other less orthodox examples, such as the reciprocal declaration of love between Momus and his Palm Pilot in 'Handheld', in which the Palm Pilot sings a whole verse in a synthesised voice (16'14"), or the Astrud song 'El juego de la vida' in which I used a vococoder to make inanimate objects sing when the protagonist of the song sprinkles them with a 'vital fluid'. I've also included the pinnacle of this genre: Kraftwerk's 'Die Stimme der Energie' (07'40''), in which the vocoder embodies the voice of energy, in the abstract sense. In the song 'Christopher' by Hidrogenesse, which you can hear near the end of this mix, the vocoder is used to bring a man back from the dead: Alan Turing loses his best friend and manages to make a replica by means of mathematical formulas.

2) Let the music speak!

The vocoder can also be used to add lyrics to melodies and harmonies without using a human voice, either as an aesthetic choice or for poetic reasons such as allowing 'the song to sing itself'. Starting at 41'30", the mix includes a section on the use of the vocoder in pop music. Sometimes, artists turn to it for the obvious kitsch strategy of creating 'spatial' or 'robotic' sounds, as the Beastie Boys did with 'Intergalactic'. And sometimes, for no reason other than the simple pleasure of hearing music that talks and instruments that sing, as in 'Mr Blue Sky' by E.L.O. (in which Terry Miles, the keyboardist from Go-Kart Mozart, shows how this song is performed on the vocoder), or Stevie Wonder in a song for Sesame Street. This section also includes a fragment from 'El miedo que tengo' by Astrud, in which I tried to create the different syllables of the words in the title with an analogical synthesiser so as to add a rhythm arrangement that was also an intelligible message.

3) Let singing disappear!

This makes up the largest part of this mix: voice synthesis applied to music, with the addition of other variables such as notes, intention and phrasing. At several points, you will hear cover versions of famous songs performed by virtual singers. Some of them are product demos (microchips or synthesis software), but others have artistic aspirations, such as the covers of 'California Dreaming', 'Smells Like Teen Spirit' and 'Anarchy in the UK' by Russian artist Alexei Shulgin and his cyberpunk group 386DX (the name of a 1985 Intel processor that Shulgin uses to generate the voice and music of his songs). I have also included the cover of Tina Turner's 'The Best' by British group I Monster, and the version of 'Technical (You're so)' by The Magnetic Fields that I did with Hidrogenesse.

4) Let a fictional character sing!

Starting at 32'33", you will hear several samples of the Vocaloid phenomenon: a software that was developed in Barcelona but sells mainly in Japan. It has managed to make celebrities out of its virtual singers, which have their own look and image based on anime or videogame characters. You can hear some of them in the mix, singing hits by pop divas such as Lady Gaga and Rihanna. Anybody can buy the software and make their favourite character perform certain songs.


[Alexei Shulgin and his Intel 386 processor]

The mix ends with the finale from Sparky's Magic Piano, when the piano decides to stop playing and Sparky, terrified, wakes up and realises that it has all been a dream. An ending with a conservative moral: in the real world, instruments that play and sing by themselves are a dream come true.

Genís Segarra, 2013

02. Playlist

0:00:13 Flame Talking Synth demo
0:00:24 'Text-to-Speech Synthesizer. How are you?' (Votrax SC-01A chip)
0:00:30 'Haleluja XXL' (VirSyn Cantor2)
0:00:32 'Hello comparison' (Dept. of Computer Science, University of Calgary, Canada)
0:00:47 Flame Talking Synth demo
0:00:58 Air, 'How does it make you feel?'
0:02:46 'Do re mi' (Centre for Speech Technology Research, University of Edinburgh, Reino Unido)
0:02:52 'Let me sing' (Advanced Institute of Science and Technology, Japan)
0:03:27 'Daisy bell' (IBM 7094)
0:04:20 Kraftwerk, 'Musique Non-stop' / 'Boing Boom Tschak' / 'Electric Café'
0:06:40 VocalWriter demo 'A capella'
0:07:00 'Hello everyone' (SAM Software Automatic Voice, Commodore64 SID chip)
0:07:04 'Let me Sing' (Advanced Sound Technologies, Yamaha Corporation, Japan)
0:07:40 Kraftwerk, 'Die Stimme der Energie'
0:08:26 Astrud, 'El juego de la vida'
0:09:05 'To Be or Not To Be' (IBM 7094)
0:09:10 '100 años de soledad' (Centre for Speech Technology Research, University of Edinburgh, United Kingdom)
0:09:13 I Monster, 'The Best'
0:11:14 'Pat-a-pan' (Computer Science Dept., University of Calgary, Canada)
0:11:57 Hidrogenesse 'Siglo 2000'
0:13:28 Peter Ablinger, 'Deus cantando. Declaration of the International Environmental Criminal Court'
0:13:59 Sparky's Magic Piano (Capitol Records, 1947)
0:16:14 Momus, 'Handheld'
0:16:59 'All aboard! Let's go!' (Casey Jr., Dumbo's steam locomotive, 1941)
0:17:04 Skrillex, 'I wish you all the luck in the world'
0:19:08 386dx 'California Dreaming'
0:20:35 'The VODER demonstration' (1939)
0:21:18 'Let me Sing (The Synthesizer Song)' (Dept. of Speech, Music and Hearing, Kungliga Tekniska Högskolan, Sweden)
0:21:57 'Sintetizador de voz en español' (Bell Labs TTS System)
0:21:57 VocalWriter demo 'A capella'
0:22:02 'Star Spangled Banner' (SAM Software Automatic Voice, Commodore64 SID chip)
0:22:20 Hidrogenesse, 'Eres tan técnico/a'
0:24:40 'I can talk like a little old lady' (SAM Software Automatic Voice, Commodore64 SID chip)
0:24:48 Ib, 'Superbad (Soul Substitute)'
0:27:01 'I think I can!' (Casey Jr., Dumbo's steam locomotive, 1941)
0:27:11 'Singing in the rain' (unknown source)
0:27:18 'Sinewave synthesis' (Haskins Laboratories)
0:27:25 '/x/ sequence' (VocalTractLab)
0:27:29 VocalWriter demo 'A capella'
0:27:38 'Donald Sherman orders a pizza using a talking computer' (Artificial Language Laboratory, Michigan State University, EE.UU.)
0:27:59 'The boy saw the girl in the park' (Centre for Speech Technology Research, University of Edinburgh, United Kingdom)
0:28:13 Hidrogenesse, 'Dip the apple in the brew'
0:28:37 386DX, 'Smells Like Teen Spirit'
0:30:50 'Let me Sing (Écoutez ce chant binaire)' (IRCAM-CNRS-STMS, France)
0:31:54 Stratovox Arcade Game (Taito)
0:32:19 'Hello, ladies and gentelmen' (IBM 7094)

[Flame Talking Synth]

0:32:20 Meiko (Vocaloid), 'Alejandro'
0:34:11 Hatsune Miku (Vocaloid), 'Bad Romance'
0:34:57 Hatsune Miku (Vocaloid), 'We Found Love in a Hopeless Place'
0:35:64 386DX, 'Anarchy in the UK'
0:39:26 Kraftwerk, 'Die Roboter'
0:41:16 'Electronic bass, computer rock' (General Instrument SP0256-AL2 chip)
0:41:37 Grandmaster Flash & Furious Five, 'Scorpio'
0:42:13 Astrud, 'El miedo que tengo'
0:42:37 Beastie Boys, 'Intergalactic'
0:42:55 Stevie Wonder, 'Sesame Street'
0:43:12 Terry Miles, 'Mr. Blue Sky Vocoder Tutorial'
0:43:58 E.L.O., 'Mr. Blue Sky'
0:44:14 Daft Punk, 'Around the World'
0:44:42 'Yellow Submarine' (unknown source)
0:45:19 '/ch/ sequence' (VocalTractLab)
0:45:13 'Summertime' (Dept. of Speech, Music and Hearing, Kungliga Tekniska Högskolan, Sweden)
0:45:28 '/s/ sequence' (VocalTractLab)
0:45:35 '/f/ sequence' (VocalTractLab)
0:45:39 Kraftwerk, 'Numbers'
0:46:14 Laurie Anderson, 'O Superman (For Massenet)'
0:47:11 Hidrogenesse, 'Christopher'
0:49:33 *Sparky's Magic Piano* (Capitol Records, 1947)

03. Credits

Curated and mixed by Genís Segarra. Mixed with Digital Performer.

04. Copyright note