

# ARTIFICIAL ENVIRONMENTS

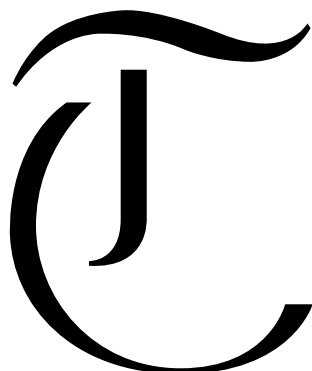


**Alberto Cattani**



# A machine rethinking





The project is an ongoing attempt to research the deep learning method as an instrument of study over different aspects of sound and language. It includes different works that try to investigate how we deal with different issues of sound and artificial intelligence. The research mainly focuses on the ecological environment as a possible database for the deep machine learning. This particular technique permits to give computers, through a multi-layer network, the ability to recognize objects and to self-improving in the model representation. The training process consists in *showing* to the network many examples of the interested object.

The aim of the project is the creation of a vast sonic archive, collected from our external world and building up of an instrument thought to be an artificial environmental memory. The learning method is made by an algorithm in Python programming language and with an important implementation of Tensorflow – a Google open source machine learning library, first released in 2015, which permits an accurate learning on the application of neural networks. Most of music neural network technologies use a describing audio dataset, such as MIDI or other text informations, whereas WaveNet (always a Google's owned company), a developing technology used in the project permits a learning method based on raw data. WaveNet works on a sampling level, indeed, digital audio files are generally made by 44100 data points per seconds. These samples shape a waveform that is then converted in sound and played back throughout the speaker. The training technology is based on these notions. Basically, the algorithm tries to recreate a model just coding tiny samples in order to have a raw data file that afterwards will enable to convert it in a usable file, according to the needs.

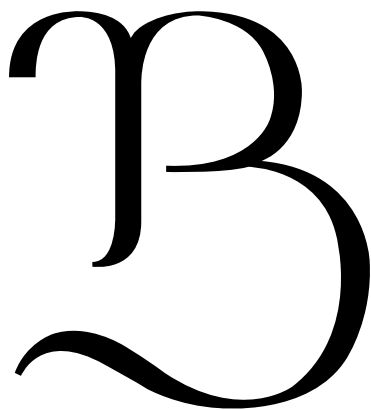
# The Aeolian Harp as an environmental acoustic poetic



Joseph Mallord William Turner, Thomson's Aeolian Harp (1809)

“A certain music, never known before  
 Here lull'd the pensive melancholy mind  
 Full easily obtain'd. Behoves no more  
 That sidelong, to the gently waving wind,  
 To lay the well-tuned instrument reclined;  
 From Which, with airy flying fingers light,  
 Beyond each mortal touch the most refined,  
 The God of Winds drew sound of deep delight:  
 Whence, with just cause, the harp of Aeolus it hight”

— James Thomson, *The Castle of Indolence* (1748)



By this knowledge, the project has been split in two different works. The first one is named *Artificial Ecology* and is thought to be expressed through a live sound performance where the samples are reproduced and sonically manipulated. In particular, it tries to assert to the question: what happens when an artificial intelligence tries to recreate our world in a sonic level? The idea behind is to create an acoustic experience, giving to the audience the possibility of listening to our world, sonically recreated by an artificial intelligence.

The aural approach deals with a heritage of self-generating music. The tradition of sampling and transforming our environmental data, which existed already before the introduction of the electronic tools. Ancient Greeks' Aeolian Harp is a very clear example: a wooden box resonates by the blowing of the wind across of its strings. It is a deep knowledge of our environment through the acoustic space. We learn our surroundings with the surroundings' sounds. Listening to the environment is an important act because it creates an intimate connection to the dynamic activities of life both human and natural. Listening and hearing produce an aural knowledge of our world, but how do we recreate think awareness? The research tries to pose some questions about the habitat's memory, as an archive can become a training data of an artificial intelligence to sonically recreate our soundscape.

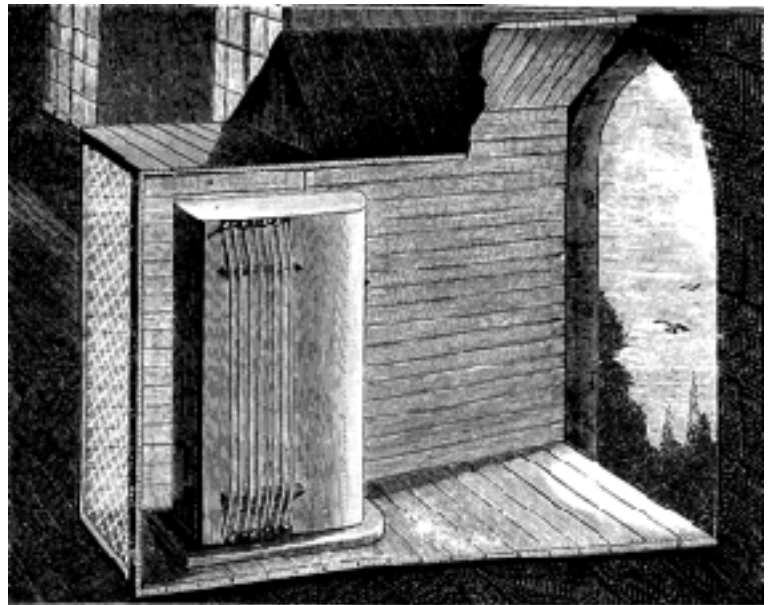
The British poet James Thomson in his poem “*The Castle of Indolence*” wants to remark with a strong proto-romanticism sensibility, the unconditional superior delicacy and variety of accents that can have an instrument played by Nature, compared to those who are reproduced by the hand of the Man. The metaphor of Aeolus's Harp introduced a passive conception into the nature of artistic inspiration, which is clearly in contrast with the historical vision of art as an expression, an effusion, a projection of the human spirit from inside to the external world. The 18th century environmental poetic introduced a contraposition between passivity and activity, but it would be a mistake to consider the poet's approach in standing in front of Nature as *passive* being. For the romantic it is not a question of supinely undergoing the impulse of Nature, but rather of actively responding to its activity. Listening to Nature serves to become creative and musical like the music itself. And it is not possible to act differently, because music is in Nature. Man becomes musical, poetic, responding to the musicality that intrinsically lives inside of the Nature. It is Nature, even before the poet, to be an Aeolian harp.

The Aeolian harp is much more than a curiosity in the history of musical instruments: it is rather the privileged way of access to the whole world of natural sounds, a world that seems as vast as it is substantially unexplored. It is the fruit of the intervention of science in the sphere of natural music, in which the Aeolian harp allows us to penetrate, becoming a precious medium, and making an interpreter capable of translating the incommunicable languages of nature and artifice into each other.

The poet Bysshe Shelley uses the example of Aeolian Harp to describe the artistic process of creation, in his case the poetry, as the expression of imagination: *“Man is an instrument over which a series of external and internal impressions are driven, like the alternations of an ever-changing wind over an Aeolian lyre, But there is a principle within the human being, which acts otherwise than in the lyre, and produces not melody alone, but harmony, by an internal adjustment of the sounds or motions thus excited to the impressions which excite them.”*

The most romantic of the instruments explains directly the meaning of conversion from the environment to sound. The Aeolian Harp is a deep metaphor of the process of ecological translation with the artificial intelligence. When the network starts a training method, a process of translation is going on. The machine learns the external inputs, de-codifies these values and reinterprets them. These translations are themselves translated: it's a translation of a translation. And since translation means *transduction*, a mistranslation through something, the Aeolian Harp provides us a conceptual tool of understanding towards a world where the passivity of listening is replaced by a physicalist realism. *Sonic artificial intelligences*, as the Aeolian Harp, are able to create sounds without the material presence of the original source, the sounds are disembodied and without the visual compromises. They are created from an immaterial source in a “*acousmatique*” sense. The sound pieces are a rethinking of the acoustic practice of field recording through the neural networks and analyze how an artificial system sees and interprets our environment. It is a discovery of the real world in a new hybrid reality and the shaping of a new artificial environment, trying to define a place. It allows the audience to listen to a building up of a new temporary dimension of acoustic experience.

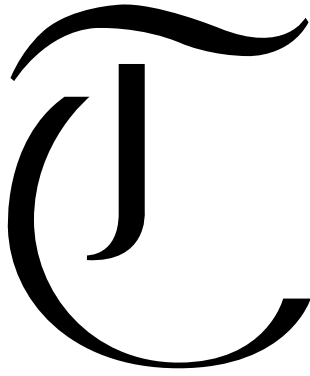
The Aeolian Harp and the deep learning both create a process of rendering of sonic production in a technical sense. They are able to generate an immediate sense of world tearing in pieces the aesthetic element separating the perceiving subject from the object, which can simulate more or less consistent sense of atmosphere. Self-generative sounds remove the subject from its context and then re-code it through the sound for a deep imaginative expression.





# Artificial Crowds





The second work focuses on a different aspect of sound. This part of the project aims to explore the sound in the social context and the idea of participation as a manifestation of power and identity.

Using as main reference “*Crowds and Power*” by Elias Canetti (1968), the work is inspired by his idea of the Maori’s haka and the football supporters’ subculture as two particular manifestations of a collective uniformity. The work sees the football hooligans as a western contemporary haka — a moment where the human body experiences an excitement peak. The supporters during this manifestation of *pathos* can feel as singular element and nothing but *psychical* exhaustion can stop them, they are mixed and they move together as single body, like in a war



dance of increasing straight. All the fears are vanished inside the crowd. The affect of growing fear in a social sphere shapes an increasing environment that leads to the formation of the crowd. Inside of stadiums’ tribunes, there is a process of *massification* occurring, eradicating all the differences towards a common goal, a necessary step for a collective process of empathy.

The increasing density of people uses the tool of sound as a weapon, as the Haka, and the noise of their chants are deafening. The sound is an important factor inside the stadium, it’s a demonstration of power, it becomes an acoustic weapon against your opponent. The sonic repertoire is a fundamental tool of expression with an intrinsic cultural mark. It owns many different levels of identities’ values. What you are singing says who you are, where are

you from, what’s your identity. The crowd’s behavior creates a sense of a common social framework.

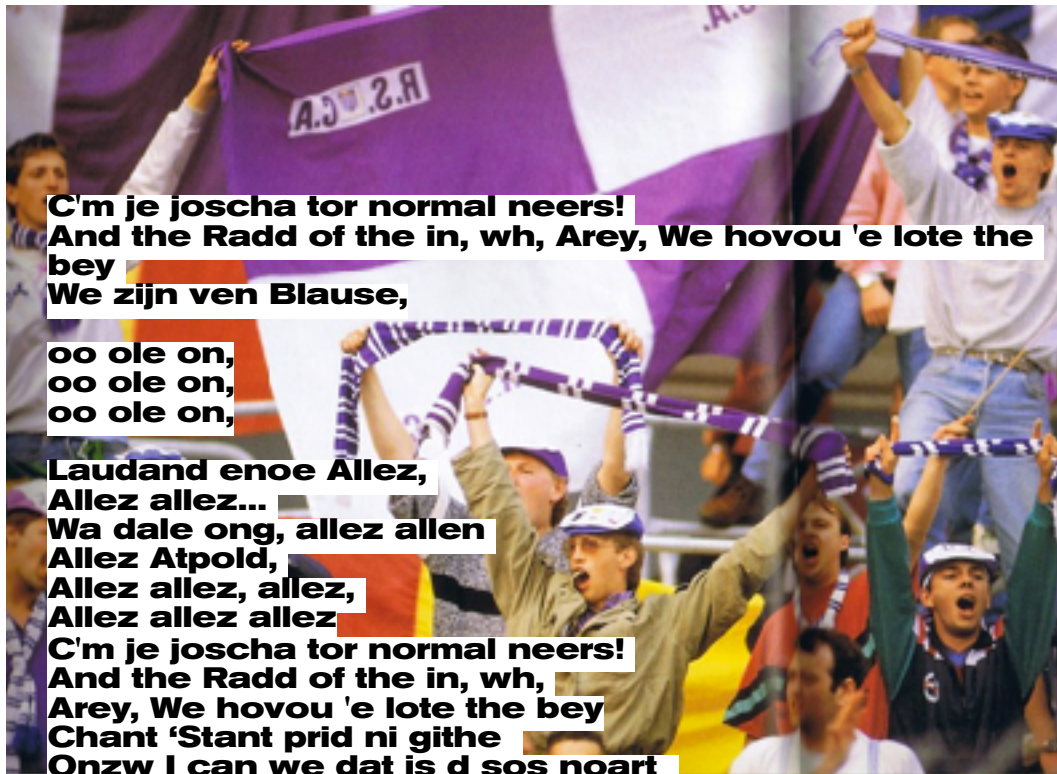
The collective increasing act turns the language into a social affect tool of fear, playing in a turbulent boundary between war and sound. In this case the neural network is fed with a vast dataset realized by collecting various supporter’s lyrics of Belgian football teams. This experiment analyzes the hooligans’ dialectic *music scores*. It is particularly interesting to observe these cultural differences between the various identities of Belgium, a country characterised by multiple inner cultural backgrounds, customs and traditions, and trying to bring this symbolic awareness into a new context. The aim of the research is to understand what happens when we try to rebuild the consciousness of this violent dialogue between different factions using the semantic generation capacity of a neural network. Artificial intelligence recreates in larger scale the uniformity of supporters, embedding all the Belgium’s factions.

The single body generated by the artificial intelligence synthesizes all the infinite and chaotic values — the futurists argued that rhythmic motions of a noise can be infinite — through a tool of language intervention. In this

process of synthesis the dialectic becomes a mix of cultural identities in a new rhythmic phenomenon. The obtained results are new lyrics, new chants constructed by a

*non-language* and composed by a machine that anyway conserves a certain human schizophrenic presence of various languages. The self-generated language appears abstract in its structure, however, the violent range of terminology is still present. The words are changed and the intrinsic meanings are shifted into a new level of communication, created by mimetic terms only perceivable and not immediate. The sonic warfare has been mathematically translated by the algorithms in a new artificial form able to standing on its own, structured by infinite rules of self-trainings and self-generations.





**C'm je joscha tor normal neers!  
And the Radd of the in, wh, Arey, We hovou 'e lote the bey  
We zijn ven Blause,**

**oo ole on,  
oo ole on,  
oo ole on,**

**Laudand enoe Allez,  
Allez allez...  
Wa dale ong, allez allen  
Allez Atpold,  
Allez allez, allez,  
Allez allez allez**

**C'm je joscha tor normal neers!  
And the Radd of the in, wh,  
Arey, We hovou 'e lote the bey  
Chant 'Stant prid ni githe  
Onzw I can we dat is d sos noart  
fat nocen wie wit supporters ala fater**

**oo ole on,  
oo ole on,  
oo ole on,**

**We zijn ven Blause,  
We wante geve fulchop,  
We scong gogranwy!**

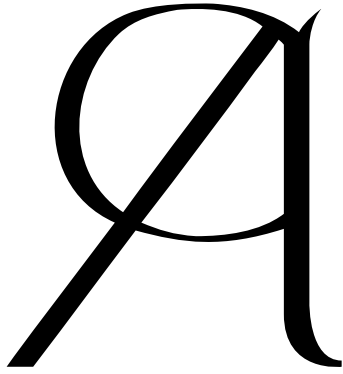
**Lalalalalaaaaa,  
Lalalalalaaaaa,**

**Je aln boots hot lezen en maat,  
And whe Racing is alle sted  
En and we're st blaage loene  
We all kol koot we love sup,  
Wo won the Dechos On whe't the in the samen,  
We date geder nie!**

**We zis no gs gants,  
Wil iedee moels hin zen  
We Pollik tha varemepre maakt du allijd ban ju**







Artificial generations and artists are able to generate constructed universes of rules from our existing knowledge. They use pattern informations to simulate artificially created worlds; in the same way this research uses artificial acoustic elements and artificial language intervention to create a new artistic narration from a preexisting data. Neural networks are a tool that furnish us notions about things as formed matter, deconstructing and reconstructing their essence. They are more than a mere deception and illusions, neural networks are a fundamental tool for creation of new artificial environments.