

ACOUSTIC COMMUNITIES: PODCAST

Transcript

I would like to begin this talk with a disclaimer. None of what I'm about to say is my own work but has been developed, researched, written and talked about over the past decades by many people around the world. I owe much to Almo Farina's pioneering work in the field of ecoacoustics and for his formulation and refinement of some fundamental concepts such as acoustic community and ecofield, and of course to all the other researchers who are working in this fascinating field.

Other names that have been important for my work are Malcolm Ferdinand, Pauline Oliveros, Donna Haraway, James Bridle, Marcello Sorce Keller, Melanie Challenger, Joanna Zylińska, Alice Eldridge, Jaburi Gatsuli and Fikret Berkes. Finally, I owe a great deal to my father, an ornithologist, who took me with him on countless excursions, not always with my enthusiasm but from whom I learned a lot of things. Having said that, let's get started.

Introduction. A few definitions. When it comes to somewhat undefined things like non-human music, it is easy to have misunderstanding or make assumptions.

So I want to start clarifying two important words. The first one is anthropocene. This word is becoming mainstream but is indeed a very misleading one because, as Malcolm Ferdinand writes, it perpetuates this abstract gaze that impedes to recognize that the we in the ecological crisis is neither given nor self-evident, also a very discriminatory universalism.

This humanity as such, as the agent of history, is at the basis of environmentalism as a white utopia or of the white imaginary of the ecological crisis, and it raises in block racial, colonial, gender and class oppression and exploitation and relationships of power and violence that are the real causes of the crisis. And on the other side of the coin, rich white guys tell us how to save the world. Donna Haraway have suggested naming the epoch instead the capitalocene, but there is a word I like more and this is plantationocene because it calls attention to the role that plantation agriculture in colonial context has played in the consolidation of capital and in the rising of industrialization.

Colonialism indeed is a very important concept in order to understand the ecological crisis. It is this asymmetrical relationship that determines this division, this fracture between colonizer and colonized, oppressor and oppressed. While the oppressors are civilized, progressive and advanced, the oppressed don't have neither a proper culture, rather they have a nature and are compared to animals.

Because of course you need to dominate them, therefore you must create this division between you and them. And this happens not only between humans, but also between a part of the humans and non-humans. The second word is music.

The broadest definition of music we have comes from Edgar Varese. Music is organized sound. Broadest, but still kind of limited under many aspects.

This music thing, as we westerners imagine it, is not universal at all and the word itself is not even found in many languages. Just to give an example, the Mi'kmaq people of Newfoundland have no words like music, but rather an expression that literally means it sounds good. This refers to the quality and experience of sound, rather than to a particular way of producing it.

Among many communities living in New Guinea and the Amazon rainforest, human-made sounds are often conceptualized in the same terms as non-human sounds. The Nezeli group of Inuit, for example, also considers songs as simply one type of natural sound. Even if the concept of music in the Euro-Western space has changed and became wider in the last centuries, it is still strongly tied to the idea of individual creation and of a mostly two-dimensional, univocal, asymmetric, non-interactive sonic space, and of course to capitalism.

Then, in the context of a dominant global culture, what happens is that either what does not fit into its parameters is forcibly assimilated or trivialized, commercialized, mosaified, or it is simply categorized as not. Not culture, not art, not music. And the easiest and most immediate use we have of it is as tourists.

We are in fact tourists to a lot of things. To picturesque places, cultures foreign to us, exotic customs, ethnic music, even our past, but also, of course, to the soundscape of a forest. And tourism is somehow a form of colonialism or tied related to it.

In any case, it presupposes that rift, that division mentioned earlier, and a certain blissful ignorance. As you can imagine, not every human on earth has experienced this rift. Some did not, actually.

But I, and perhaps many of you, also do. Chapter one. What we do not hear.

These that we are listening to are all soundscape. This last one has been recorded in Germany, in Schwarzwald, and it's interesting because it's the sound of a dying forest. Spruce trees are in fact dying all around Europe because of climate change.

So we see that even so, at a superficial level of analysis and comprehension, a soundscape is an important source of information about the state of health of an ecosystem. Actually, this is not even a real soundscape. It's just a recording.

One must consider the soundscape not as an acoustic context common to all species, but as an acoustic context that is unique to each species on earth. And because of this species-specific perception of sound in the landscape, there are ultimately as many soundscapes as there are species. And maybe so many soundscapes as individuals.

This is in fact just the part we humans can hear. A sound bubble within the 20-20,000 hertz range. The rest we cannot perceive is called the latent soundscape.

That is of course a concept relative to a specific species. The fact is that in a recording we do not have a latent soundscape either, because the recording made it disappear. One could say, who cares? We cannot hear it anyway.

But imagine, for example, a pigeon. A pigeon can hear infrasonic sounds. Or a raccoon.

Like many mammals, a raccoon can hear up to 40,000 hertz. I think they won't be able to acoustically make sense of this soundscape. Because of course, it's a fake.

And curiously, it's the presence of something we cannot even hear that is a guarantee of authenticity. Another form of latent soundscape for humans has to do with the timing scale. We process sounds in bytes about 1/20th of a second long, whereas birds discriminate up to 1/200th of a second.

This means that where we hear one sound only, a bird might hear as many as 10 separate notes. Now we are hearing a call of a Eurasian wren, a very small insectivorous bird, very common in Europe. In these 8 second birds of song, there are at least 64 separate notes that deliver information about birds' sexual status, its location within the habitat, its breeding status.

But they are also a display of skill, and most likely also pure musical enjoyment for the singer in question. Between the things humans cannot perceive, there is another interesting one that is called the vibroscape. In echoacoustic, the soundscape is actually considered a subset of the vibroscape, since sounds are vibrations too.

And the part of the vibroscape we cannot hear are these substrate vibrations and vibrations that propagate through plants. Sound and vibration are indeed two terms so commonly used in everyday life that they are generally accepted as the instinct. However, separating them in an ecosystem might be surprisingly difficult.

Likely, for a lot of species there is no clear division between the vibroscape and the soundscape. Information conveyed by vibrations on solid substrate and in the air complement each other and coexist. And although substrate vibrations are generally considered a short-range communication, the signaling range of insects on trees can extend up to several meters.

In the savanna, elephants can produce and can perceive infrasonic sounds that travel on the ground up to 16 kilometers. So it should not be surprising, but the vibroscape is much more populated than the soundscape, even though it is probably organized in a similar way. Another example of a scape we cannot hear and we can perceive but in a very limited way is the odorscape.

The odorscape, you already understand what is about, has the particularity of being quite persistent, because it's made of messages lived by means of chemicals that remain even if the emitter is absent and actually act as a kind of memory deposited across the landscape. So the odorscape is actually kind of written in the landscape and this fact probably also influences the perception of temporality in many species. Just to make an example, for a wolf the past presence of other individuals remains in the landscape for a long time, thus also changing their perception of the present, maybe making it wider.

Chapter two, what we do not see but we could see by listening to.

I would like to dive a little deeper in this concept of temporality because it's very fascinating. This is an example of synchronicity, a cricket chorus. Synchronicity erects an acoustic protective texture for as long as this signal sounds, no predator can pick one insect out from

the rest, but if a sound interference upset the synchronicity and the insect try to re-establish it, certain of them will sound individually and when that happens predators can find them. Using a model proposed by Alma Farina, we can say that there are at least three timing levels across a landscape. The first level is the biological timing of the individual, it is associated with the morphology and physiology of each organism.

A second timing level is linked to the interactions and relationships between individuals, also between individuals belonging to different species. The third level includes these bigger cycles, phases and disturbances. These go from the cycle day-night, the seasons in the latitude where there are seasons or events like a severe fires that can occur in a forest only after a long period without fire has passed and when the biomass accumulated is enough to cause the first burn or the cycle of cicadas every 7 or 13 years.

So we can say that every level of organization from cell to the entire biomes operates at a specific resolution in time and how all these synchronized clocks interacts together. If your life depends so much on interspaces communication as in the case of most species living in an ecosystem, then creating an inclusive and flexible time window inclusive of other temporalities is critically important. Our life is timed exclusively with the precise clock time but imagine if other species could influence your timing and your rhythm.

Let's have a closer look to this timing structure. I will before introduce a concept very briefly that is quite important in echoacoustic and is called the acoustic niche hypothesis. Under it, signaling behavior has evolved to partition acoustic space and minimize overlap to other calling individuals through selection on signal structure and or the sender's ability to adjust the timing of the signal.

Now this ability to adjust the timing of the signal is of crucial importance to us. Let's imagine we are in a tropical forest in Costa Rica for instance. In a particular spot in the tropical forest in Costa Rica, it's called Las Cruces Biological Field Station where this recording comes from, you can have more than 400 avian species checklisted and in an hour recording one can recognize up to 40 of them and so the number of individuals will be then much higher.

Now imagine you are one of the species, let's say a rufous breasted wren that sounds like this. We can think about a very common situation, let's say dating, you want to meet somebody for the second time but the tropical forest is very dense so you cannot really rely on visual cues. A possibility you have to locate them is to start a duet.

Birds, especially in the tropics, use duets for many reasons and to locate another individual is one of them. So you sing first, you listen, they answer, you call back and after a while you locate, you can locate each other. The problem is that there are at least other 16 species that sing in the same moment and in the same frequency range as you and that can cause a lot of comprehension problems like overlapping and interferences and the modes, I try to be louder than everyone else, would very quickly escalate and have catastrophic consequences.

So what happened? You must listen to all of them in order to be able to sing your part of the duo not only timed with your mate but also with all these others. I tried to imagine a similar human situation but I couldn't find anything comparable, maybe like you are meeting a person in a square and you cannot see each other, you are very far away and the square is

full and so you have only to call in order to locate the other person. The thing is that when we do duets we come enough close to blend everything else out.

Back to our forest, we have also to be very attentive in the background to catch alarm calls from other species that could signal the presence of a predator. Birds know very very good all these alarm calls that are different from species to species and also different in relation to the threat they are signaling. So if you want to use the terminology of Pauline Oliveros we can speak of a complex multi-layered focal attention on the foreground and of an always present global attention in the background.

This is of course only an abstraction, we don't know which processes are going on but it's useful in order to try to understand the complexity of this kind of listening that I find quite mind-blowing. We also should not forget that we are not only listening but we are also producing sound at the same time and most of the time at a very complex level. We indeed tend to think that non-human animals also have this dyadic relationship, a signaler and a receiver, but as we have seen there is a much more complex network of signalers to receivers that creates at the end an acoustic community.

There are many possibilities to define an acoustic community. Barry Truax in 1984 defined it as any soundscape in which acoustic information plays a pervasive role in the lives of the inhabitants. In short, it is any system within which acoustic information is exchanged.

This could be an okay definition but I suspect that most of human acoustic communities require much less listening and are not interspecies. If we take a definition more tailored with the context of an ecosystem we might define an acoustic community as an aggregation of species that produce sounds by using internal or extra body sound producing tools and is based on mutual listening among the individuals and the spaces that inhabit it. Acoustic communities are not fixed, they are very changeable, for example on a daily scale there are daylight and crepuscular communities made of songbirds, insects, there are nocturnal communities made of insects, frogs, bats, fish, snapping shrimps.

In acoustic communities following a day-night cycle the highest sound levels typically occur twice at sunrise and sunset, however some species like cicadas sing when ambient temperature is at its maximum. Fish often form carcasses during the night time, in terrestrial habitats seasonal variations are more pronounced at higher latitudes with peak activity in June-July and in autumn because of migration. There are also some particular kinds of acoustic communities, so now time for some fun facts.

Eavesdropping is an example of it, in german one would say mitöhren. Eavesdropping is common for several species that receive a signal indirectly from another individual or group. Let's make an example.

Choruses of northern leopard frog have been shown to help nocturnal migratory birds orient during the trip toward polar regions. This chorus of frog are quite loud and sounds offer important information to migrating birds regarding the typology of land and the velocity of the wind and probably birds can estimate their altitude based on the fact that altitude function as a low pass filter. Another fact about the chirping of crickets, the frequency of chirping varies according to temperature.

So to get a fairly good estimate of the temperature in degrees Fahrenheit you can count the number of chirps in 15 seconds and then add 37. The number you get will approximate quite precisely the outside temperature and I would be really surprised if this precise source of information is not used by any other habitat dwellers. Individuals belonging to different species have learned to decode foreign languages so to speak, in particular birds.

Black-capped chickadees, sounds like this for instance, encode information regarding the size and risk of a predator in their alarm calls and red-breasted nuthatches, that sounds like this, recognize and use this information. And so interspecies communication appears particularly common in birds and in birds we have also this case when alarm calls are used deceptively to access food. For example, between great tits there are subordinate and dominant individuals and I've been observed that subordinate individuals use this strategy to reclaim a feeding site from a more dominant conspecific.

They make a fake alarm call in order to have the dominant individuals to fly away. So one thing that at the end can be said about these communities is that nothing happens outside of them. To live, to sing, to mate, to build, to reproduce, to learn, to make music, everything happens in an exchange within these communities.

To better understand how these acoustic communities actually work, I want to introduce a last concept which is the ecofield. This is a somehow abstract scientific tool but I found it very useful for me as western to understand why we are so disconnected with the ecosystem. In the ecofield model there is this entity, the field, that connects internal needs of an organism with the resources necessary to satisfy such needs using intermediate passages.

So the ecofield, actually a contraction of ecological field, is at the end essentially a spatial configuration of objects perceived in a current way according to function triggered by needs and carriers of meaning. So species assign a meaning to specific spatial arrangement associated with resources. This is kind of close to the idea of the *Umfeld* but an ecofield is more than this, is more than a subjective species specific surrounding because it is at the end a spatial configuration of object to which semiotic processes guided by internal needs attribute meaning for a specific resource.

So it's a meaningful field and every function that a species activates need this specific spatial meaningful configuration that is recognized by innate or cultural mechanism and species settles where such configuration exists. Holistically a species habitat is the summation of all the different ecofields inherent to an individual. So if an individual relates to its surroundings through interaction mechanism must exist for this interaction to occur in a meaningful way.

Most of humans do not satisfy their needs and do not collect resources anymore within these ecosystem relationships we were talking about. So we do not need an ecofield and we do not build interspecies communities. Actually the only remaining of a possible ecofield is a touristic one as we were saying at the beginning because of course walking in a forest is a source of well-being therefore is a need.

We can indeed try to build wilderness sanctuary of undisturbed nature separated from us but that's not going to change the way we relate with the earth that follows the model to

come to destroy and to take or to come to take and destroy colonialism in other words. Conclusion how to imagine sound. So at the end we are out of the game because we collect our resources in a destructive and colonial way so we cannot build meaningful relationship inside an ecosystem and the only relationship we build is a touristic one.

But we can also maybe do some very small steps for example by telling stories and using our imagination. I think this is a very powerful way to create connection between events, organisms, sounds, phenomena between us and the ecosystem even that of course requires times, patience, care and open mind. And maybe we can learn from other people too.

So just to give an example I would like to read a passage from an Italian text from the beginning of the 20th century that talk about how people in rural communities in the Alps region were describing the singing of the chaffins, this one. These rural communities have been living isolated for many centuries until the construction of modern infrastructure and mass tourism and have had an economy of subsistence based on the resources they could find in the mountain. And I find it a beautiful example on how sound imagination can be used to learn about the complexity of an ecosystem without at the end using any scientific tools.

«One verse of the finch, the most common, we call “francesco mio” because the bird terminating, it seems, saying those two words quickly but clearly. Another we call “barbazio”; another “ceschrio”; and we then christen with the name of the verse the finch that owns it. To a certain musician we give the title of “ribaltone” from the jolting modulation of the song, from the overturning (ribaltare) of the notes; to another, of “striscione”, from the smearing (strisciare) of the beats; to another, of “Monte Giove”; to another of “boschereccio”, which is a shorter, scrambled “francesco mio”. Some are in their singing so tasty, not much for the harmony as for the sonorous voice. They are also different in their singing, for some make a single cantata and in finishing some do the “sfrin”, some the “nicchio”, others double, triple the cantata with much taste, others keep it long and with so much voice, that it is wonder regarding their littleness. And how many varieties in the spring! There is, they say, the “bucio”, the “gruccio”, the “gricio”, the “bocio”, the “grùspacio”, the “totozio”, the “dorochè”, the “giorgiobio”, the “cibè”, and down to twenty-six different endings. These are curious but apt names to determine the variety of the song. And it is curious that they always keep the same place those who sing the same finale, so that in the Pinè valley “bocio” abound, in Salorno “gruspacio” in Faedo “gerlo”, and others in other places. Some finches make the finals on the dot, according to the said manners of singing, but then they conclude with a firm vibrato point “cit” and are called “beating” finches. These are found in Pinè, in the valleys of the Avisio; in vain would they be sought in the Adige Valley. I remember hearing only one of these in Campotrentino: it was heard and admired as an event. And what is curious is that in the places I have mentioned, you find a little valley and the finches all have the “cit” ending, you pass into another, even at a small distance, you no longer find one»