

The following is a translation of a podcast transcription. There are moments (fillers and walk-backs) in the transcription that have been edited for clarity. The original podcast was recorded in French and some key words have been intentionally left in the original language to preserve meaning.

PouvoirDuSonEp1 – La Science du Son

ANA [00:00:14] Hello!

ALEX [00:00:15] Hello! My name is Alex Goldich

ANA [00:00:17] And my name is Ana Carvalho.

ALEX [00:00:19] And we are students at UNC and we are studying sound and the power of sound during the Enlightenment.

ANA [00:00:28] For our final semester project, we decided to make a podcast to further explore this subject a bit more.

ALEX [00:00:39] Power is something that is extremely important in sound study, because it is power that decides who is capable of making noise and who does not have the right. We will explore sound and power through sound by studying elements of sound like resonance, frequency, as well as the science of sound itself.

ANA [00:01:07] Each episode looks at the subject in a different context. The first concerns the science of sound itself, the second revolves around the church, the third examines the state and the fourth episode talks about the general public.

ALEX [00:01:47] Our subject for today is on the science of sound. Ana, I don't know much regarding the technicalities of sound or the science surrounding it. What do I need to know?

ANA [00:02:06] To begin, you don't need to know anything.

ALEX [00:02:11] Really? Nothing?

ANA [00:02:14] Yes, in order to really grasp the subject matter, all you need to know is what the great thinkers of the time knew.

ALEX [00:02:28] Nice! let's do it

ANA [00:02:30] Let's start by letting go of any definitions or preconceptions we may currently hold.

ALEX [00:02:41] So, I know that sound travels in waves, but what did they think during the Enlightenment?

ANA [00:02:49] Right, so this wave theory was founded in 1546 Girolamo Fracastoro. He was the first person to propose this theory, but it wasn't utilized or widely accepted until later on in the Enlightenment. At first, they believed that sound was just a movement of either interior or exterior air that was capable of being heard.

ALEX [00:03:36] Ok, but I know that I can move air, but there are different volumes. If I move my hand, it makes sound and noise, but when I talk its much louder - way more than the body's movement.

ANA [00:04:00] Right, and this idea was one that really troubled the great thinkers during this time, particularly the question of what makes a movement of air capable of being heard. In fact, this led to theories that sound isn't just a movement of air, but that it's in fact an agitation.

ALEX [00:04:30] And in this context, what's the difference between movement and agitation? The word agitation, for me, it feels a little bit more violent than the idea of movement.

ANA [00:04:44] Yes, it's true that agitation is more violent. In fact, there's this term, « concutere » which is used often in the context of sound in this period, and it's defined by agitating in a violent fashion. But the main difference between movement and agitation is that that movement is the displacement of a particle or particles of air from one place to another whereas agitation is just the movement of those same bits of air in one place.

ALEX [00:05:49] And where does that term come from, « concutere »? What does that mean?

ANA [00:05:57] The term was coined by Descartes. In fact, he believed that the person was comprised of the body and what he called *res cognitae*. He came to this idea through exploring three different concepts of sound he refers to as *resonare*, *sympathia*, and *concutere* with « concutere » being particularly related to the idea of awareness, specifically the relation between the frequency of agitation and the pitch in the context of consonance.

ALEX [00:06:49] And so, how did they go from this idea of sound as agitation to the idea of sound as waves?

ANA [00:07:05] This transition was actually a collaborative effort between the great musicians, scientists and mathematicians, think Mersenne, Descartes, Galileo, Kepler, and all of the great minds of the time. But, I would say that it really began with the idea of the pendulum and examining chords in stringed instruments and how those chords move.

ALEX [00:08:03] Really? so people saw chords vibrating and from that they came up with the theories behind sound waves that we still use today?

ANA [00:08:19] Yeah, in fact in 1638, Mersenne, Galileo, and Kepler worked together on this idea that the movement of sound is the same as the movement of a pendulum, which is in fact oscillatory. They saw this movement and how they could use it to describe sound, as there were so many characteristics of sound that were defined by the same oscillatory movement of the pendulum swing. In fact, the oscillation of the pendulum was named "percussion", which comes from the word « percutere » which is heavily tied to Descartes's « concutere ».

ALEX [00:09:35] And so, after the creation of all of these theories, what were the implications of that in the lives of human beings? How was life changed by these theories and their existence?

ANA [00:09:52] Descartes, Mersenne and the majority of the philosophers of this time believed that sound, after entering the ear and before arriving at the brain passed through « l'esprit ».

ALEX [00:10:10] And this spirit, it's not the soul as we know it today, right? It's something different.

ANA [00:10:18] Right, it's a bit less defined and each philosopher has their own definitions but in essence it was regarded as the part of the human being that makes us human.

ALEX [00:10:41] And so it's that, the thing that makes us human and not just animals?

ANA [00:10:48] Yes, it's that which goes beyond our physiology.

ALEX [00:10:57] Ok

ANA [00:11:00] According to Descartes, nerves were these tubes that transmitted physical movement to the brain, and when they arrived at the brain there were these little pores that contained the "animal spirit", as he called it.

ALEX [00:11:24] And what is happening in the soul, or the idea of the soul during this time?

ANA [00:11:32] That really depends on who you ask. According to Diderot, he believed that in the soul, it was a place where one could hear themselves in silence and obscurity. And so, one idea can affect another in the same way that plucking a string on a harpsichord makes the others quiver.

ALEX [00:12:04] So what Diderot is saying, is that the same as resonance?

ANA [00:12:09] Yep it's the same idea. Resonance is the effect that reverberates in the soul. And more scientifically, it's simply an augmentation of the duration or the intensity of sound that comes from an alignment of frequencies.

ALEX [00:12:35] So, now I'm thinking of another moment, where we have this idea of social resonance, which is a bit different from the scientific term.

ANA [00:12:47] Right so social resonance is more the power to evoke an emotion, an image, or a memory through the use of a stimulus.

ALEX [00:13:06] And with these stimuli that create these emotions, how does that contribute to our discussions of power?

ANA [00:13:21] Well, at the same time that these philosophers were asking these questions, the church and the state used sound, and particularly through music and the voice as a vehicle of power. They used the fact that music and sound are able to elicit emotions in order to evoke the emotions they wanted by employing resonance and pitch in the background. In fact, pitch is just a resonance between the waves and the ear. And consonance and dissonance come from this same idea of pitch and are actually governed by mathematical principles.

ALEX [00:14:51] What is the role of mathematics in all of this?

ANA [00:14:58] Mathematics, according to philosophers, governed the emotions and responses that a person would have to a certain sound. For example, for Mersenne, he said that thirds are more pleasant than fourths. While Descartes believed that no, it was the octave that was the most pleasant, if only because it was the most consonant. In either case, being that fourths are closer to the octave, which is the most consonant led to the majority of philosophers to agree that consonance must be the thing that most pleases the soul. But, according to Descartes, pleasure

came from the variation in the sound, and that it should be predominantly consonant, saying that if it's all consonance it's boring and if it's too dissonant, it becomes too difficult for the brain to make sense of the sound. And so, there needs to be a mix of both.

ALEX [00:16:36] What you're telling me is that through a sound that I can make, I can influence the brain or the head, and the thoughts and emotions of someone else?

ANA [00:16:50] Yep!

ALEX [00:16:51] That's incredible.

ANA [00:16:52] Yes, and the church thought the same thing because they used this principle to promote the Christian religion.

ALEX [00:17:08] And so by using pitch and resonance in music the church and others were capable of influencing the thoughts of others? Is that it?

ANA [00:17:22] Yes, though it's not the only way to influence using music. In fact, lyrics play a huge role in the transmission of information and that became more and more important for the general population at the time.

ALEX [00:17:50] So that then must raise the question of who has the right to speak and what about, I imagine.

ANA [00:17:58] Yes

ALEX [00:17:59] And so then if one social class writes more lyrics, then perhaps they would have more power to influence others.

ANA [00:18:12] Yes, and half of sound is the production, but the other half is the reception. There is a power in both deciding who gets to hear and what one wants to listen to.

ALEX [00:18:34] And so there's a relationship between the creation and the reception, but even past that into the transmission of something that was heard and the way that one chooses to share those ideas, whether it be through the music or the lyrics.

ANA [00:18:53] We will see that all of these musician/philosophers used different means for transmitting the same ideas including songs, letters, and discussions.

ALEX [00:19:24] It's just like us today, using this podcast to share these ideas through the sound that we have to power to make.

ANA [00:19:33] Yes, exactly. Today, we are like Descartes and Mersenne. And tomorrow, we'll talk a bit more about the church and its relation to the power of sound.

ALEX [00:19:52] Yes, and in particular we'll be discussing power in the context of power over the human body and the castrati.