

Project title
BEYOND ABSOLUTE

Project duration
10 months, June 2019 - March 2020

The Project

Beyond Absolute is an artistic research project in collaboration with medical professionals, photonics researchers and thyroid cancer patients, suggesting a new way for communication that takes place in the doctor's office. The project provides each patient with personalized acousmatic soundscapes, along with the conventional medical exam data, after the screening of thyroid using the LUCA device at the doctor's office. The aim of this project is to offer sounds with physical and psychological conditions of the patients at the moment represented, something other than data which shows "normal" and "abnormal" numbers. The project was created in hope for sparking another kind of conversation in the doctor's office which values patient's subjective view of physical and psychological condition, as well as acknowledging and legitimatizing abstract and fluctuating symptoms that are often associated with thyroid conditions.

The core part of the soundscape is based on the audio questionnaire, in which patients navigate through questionnaires created entirely with sounds. Therefore, it gives patients a tool and time to reflect on their symptoms without using words, which is directly represented in the final outcome.

The project's purpose is not a medical diagnosis. The focus of the project is a personal reflection of the physical and mental state of the patient, and a communication between the patient and medical professionals. The title of the project refers both to the representational character of the project (as opposed to absolute music), but also to the effort it makes to transcend, without denying, the objective physiological measurements at the root of modern scientific medicine.

LUCA (Laser and Ultrasound Co-analyzer for Thyroid Nodules)

Excerpt from www.luca-project.eu

The Horizon 2020 project Laser and Ultrasound Co-analyzer for Thyroid Nodules (LUCA) aims to develop an innovative technology for thyroid cancer screening that will provide doctors with enhanced information required to provide better and more specific results in thyroid nodule screening and enable better diagnosis.

Thyroid cancer is a major and growing health challenge with around three hundred thousand new cases diagnosed worldwide annually. Current methods do not provide sufficient support to surgeons in their decision on the appropriate course of action, which

leads to significant number of unnecessary surgeries and a reduced quality of life for patients. This calls for an increased sensitivity and specificity of the conventionally applied screening process.

LUCA tackles this need by producing a novel, point-of-care, low-cost device for the screening of thyroid nodules. The device will combine two photonics systems, near-infrared diffuse correlation spectroscopy and time-resolved spectroscopy, with a multi-modal ultrasound system and a probe that enables multimodal data acquisition for the screening of thyroid nodules for thyroid cancer. Once successful, LUCA will save millions of euros over the coming decades and improve the lives of millions of Europeans.



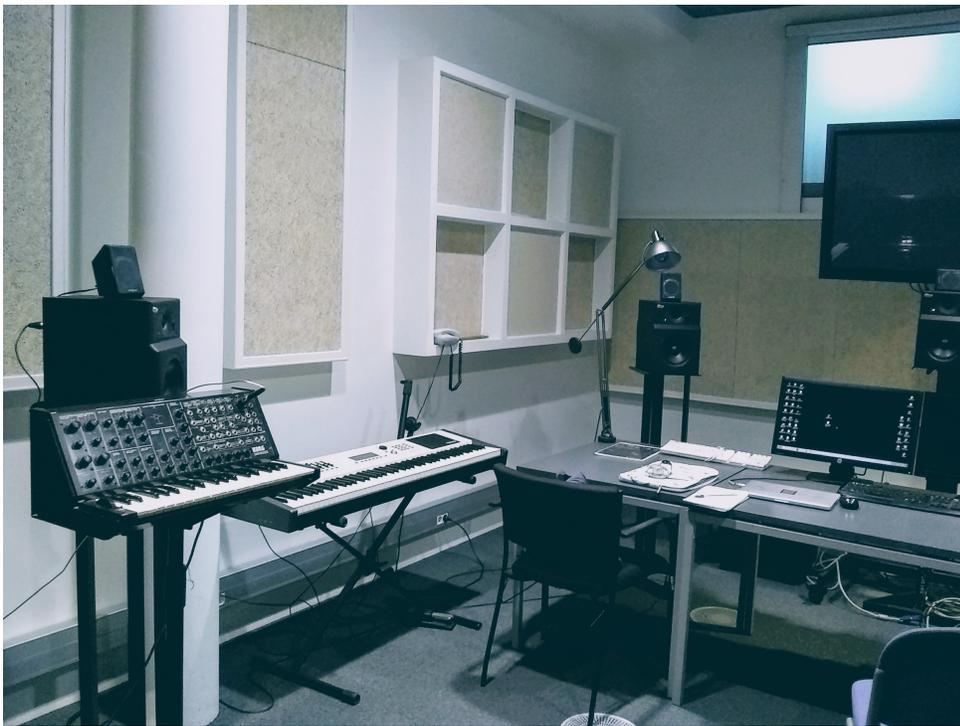
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Initial phase of the project

Much of initial phase of the project was spent to meet and to get to know originally intended collaborators and newly acquainted scientists, medical doctors and musicians, some of whom have become invaluable collaborators for the project. This process also included getting accustomed to the culture around large scientific institution, handling medical data and interacting with patients. One of the big challenges for the project was to get an approval from the ethics committee for using personal medical data for the project. Because the committee meets about once a month, and it coincided with summer vacation period, this process has taken quite a long time. Meanwhile, I was able to visit the hospital clinic about once a week to learn about the LUCA device, as well as the method that the researchers have been using to measure thyroid data of volunteer patients using the LUCA device.

Since there is no proper sound studio at ICFO, Phonos foundation at Universidad Pompeu Fabra in Barcelona generously offered the sound studio where I can work as a composer-in-residence. This has been enormously helpful for the project.

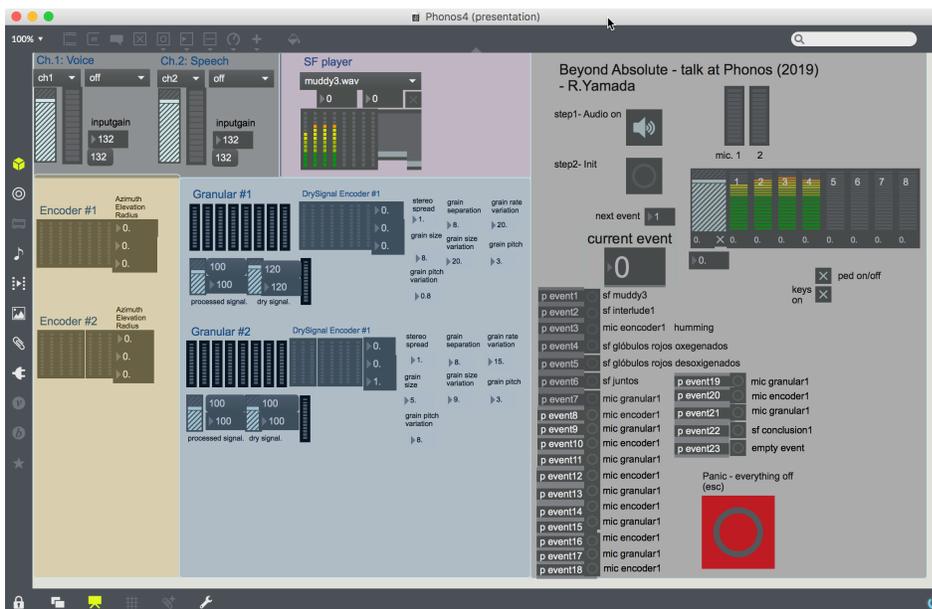
At this moment, in order to have members of the research team updated with my work, I have started the project blog: <https://reikoyamada.tumblr.com/>



Sound editing studio at Phonos (UPF)

Middle phase of the project

After acquainted with several musicians in the local area, I have hired soprano singer, Ilona Schneider for the project. Much of the second phase of the project had been spent in the studio, composing sound gestures, editing and categorizing sound gestures, and programming a patch. In addition, with the help of the sound engineer Jose Lozano at UPF, we had several recording sessions using the recording studio at Phonos.



I also gave a seminar talk at ICFO, hosted by Prof. Maciej Lewenstein, entitled “Of Randomness and of Imperfection” and an experimental talk performance at Phonos, entitled “From scientific data to musical aesthetics: a composer’s perspective”

Above: Max patch for the performance at Phonos

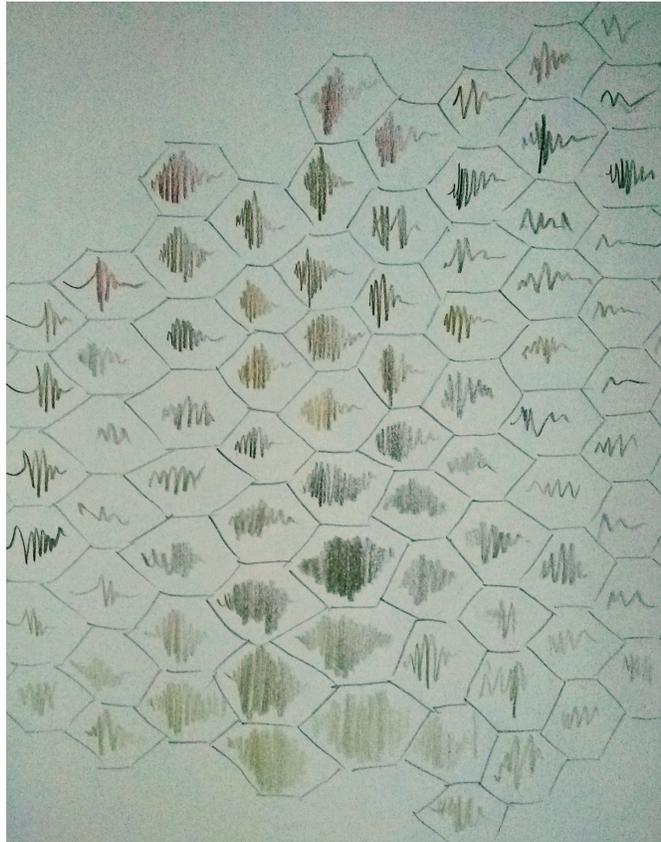
At this time, we have received the approval from the medical ethics committee for handling personal medical data in this project.

Last phase of the project

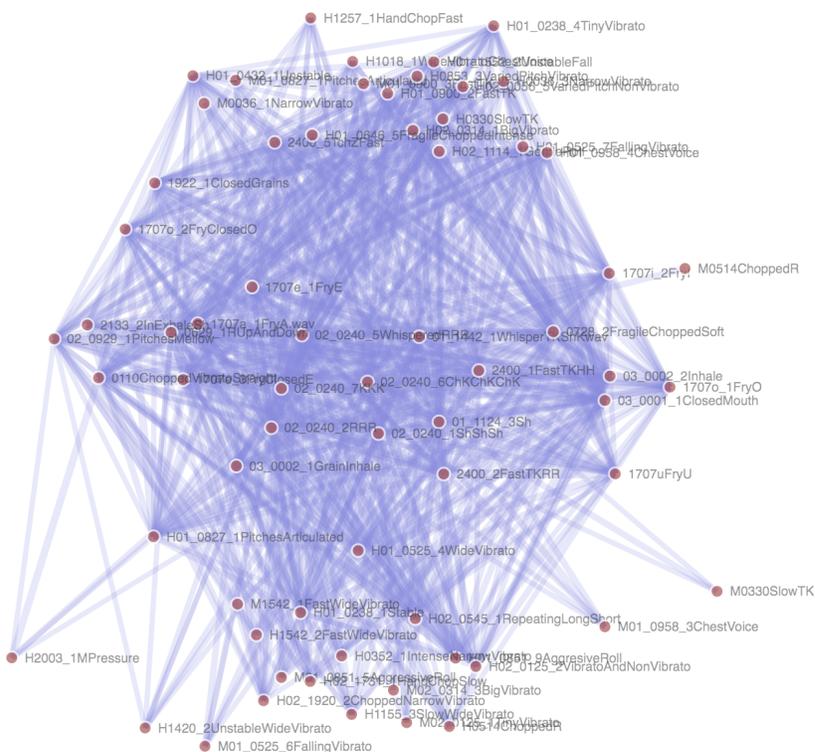
As a part of the audio questionnaire portion of the project, I have looked into several literatures and methods on music-emotion research and applications. To create a platform for patients to navigate and select audio gestures that best matches their psychological state, I have been exploring different methods and exploring some specialists on data mapping and modeling. I have been in discussion with the team at Nokia Bell labs working with Boid model, as well as Dr. Franjo Weissing, professor of evolutionary biology at University of Groningen in order to create a best model to navigate through all 70 sound gestures.

At ICFO, Dr. Antoine Reserbat-Plantey and PhD. Student, Maximilian Heithoff helped me explore a force-directed graph drawing to show the relationship among all sound gestures with 10 different parameters. This portion of the research is on-

Below: visual representation of audio gesture mapping



going and it will be readjusted as the project progresses into the future, possibly in different forms.



After participating in STARTS Residency Days in Paris, a prototype version of the patient-audio platform was implemented and ready to be experimented at the hospital clinic. However, with the recent outbreak of

COVID-19, unfortunately this last phase of the project has been on hold up to now (March 16, 2020). Currently, ICFO and I are working towards extending my contract so that I would have a chance to complete this portion of the project as soon as the situation with COVID-19 settles down.

Feedbacks from collaborators

During the project, I most closely worked with Dr. Lorenzo Cortese and Dr. Giuseppe Lo Presti from ICFO and Dr. Gloria Aranda from IDBAPS / hospital Clinic Barcelona. They have shown great interests to the project from the very beginning, and stayed open and cooperative throughout my residency. People whom I've collaborated and communicated with appreciated different perspectives and approaches I have brought into their respective fields and day to day tasks. At the same time, they have mentioned, especially towards the end of my residency, how similar our fields, art and science, are in the end. They have discovered that many of my creative process involves technology, from programming, computer assisted composition and analysis, to modeling patients' responses to sounds. Although we do not speak the same language for the most part, we share essential qualities, curiosity, creativity and diligence.

Outcome and public presentations

"From scientific data to musical aesthetics: a composer's perspective", Experimental Talk-Performance, November 26, 2019 at Phonos, UPF, Barcelona



“In an experimental setting combining performance and lecture, composer and sound artist Reiko Yamada (Phonos composer-in-residence / ICFO artist-in-residence) will introduce her ongoing project Beyond Absolute, with the help of vocalist Ilona Schneider. The project is an interdisciplinary artistic research project involving photonics researchers, medical professionals and thyroid cancer patients. The event was delivered both in English and Spanish.”

“Of Randomness and of imperfection”, Seminar Talk, October 7, 2019 at ICFO, hosted by Prof. Maciej Lewenstein

“Much of what we consider “random” phenomena consists in events that are in fact, given sufficient data and computing power, predictable. However, quantum theory is opening up new approaches to randomness that escape such limitations. This, in turn, raises questions with profound scientific but also philosophical implications on how we should define “true”, “false”, “perfect” or “imperfect” randomness. Such questions find an echo in the work of Reiko Yamada, who has spent the last decade exploring the imperfection as an aesthetic concept and collaborating with scientists. In this seminar, Yamada will draw on her experience as a composer and sound artist as well as her collaborations with biologists on the relationship between fruit flies and humans in the “Small Small Things” project and with the LUCA team at ICFO to explore the collaborative possibilities that quantum randomness opens up as a field of artistic and scientific research.”



"Bridging STEM to STEAM: Why art can be more than a communication tool in science and technology", Panel discussion, European Researcher's Night, September 27, 2019 at FabCafe Barcelona

"Art and science- they seem like polar opposites, one driven by data and the head, the other by emotion and the heart. One often associated with technical introverts, the other with expressive eccentrics. Although processes may initially look very different, both fields follow a similar route: Artists and scientists tend to approach problems with a similar open-mindedness and inquisitiveness — both imagine, interrogates, challenge current standards without fearing the unknown. However, in many cases arts and design are treated as a communication tool for scientific results.

In this panel discussion, the two artists Carolin Vogler (fashion designer) and Reiko Yamada (composer/ sound artist), who are currently collaborating with two research centres in Barcelona, will discuss with two scientists, their experiences in interdisciplinary projects and how art can contribute more to science by collaborations from the offset in the navigation of the scientific unknown, resulting in unexpected outcomes."

Other presentations and media coverage

Performance, LUCA Final meeting, June 5, 2020 (Forthcoming)

Performances, STARTS Residency Days, 104 Paris, February 29 and March 1, 2020

Panel "Art and Medicine" STARTS Residency Days, 104 Paris, March 1, 2020

Project Video, Merging Art and Science: from LUCA to Beyond Absolute, published on February 28, 2020 https://www.youtube.com/watch?v=ddudKWmbiSQ&feature=emb_logo
<https://vimeo.com/393630920>

Presentation at LUCA general meeting, Politecnica Milano, November 28, 2019

Presentation at LUCA monthly teleconference, October 2019

ULYSSES Platform Focus On article, Art as a driver of technological innovation: the STARTS initiative, published on September 23, 2019 <https://www.ulysses-network.eu/focus-on/art-driver-technological-innovation-starts-initiative/>

Acknowledgements

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Dr. Gloria Aranda (IDBAPS - hospital Clinic Barcelona)
Ilona Schneider (soprano singer)
Dr. Andres Richter (director and founder, Phonos / UPF)
Dr. Angél Feraldo (artistic director, Phonos / UPF)

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