

Tangible Radio: Deaf studies and sound studies coalitions

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As a medium for information, entertainment and communication, radio had taken precedence over television for decades, at least in terms of its accessibility in all households. Television and later the internet never completely annulled its aural condition, while its form altered to keep up with developments in terms of asynchrony or subject areas. Today it is considered the predominantly ‘cool medium’. Recent developments in television and the internet’s ways of operating render it a more detached medium than the alternative, given that a medium can change ‘temperature’ over time depending on the use (Levinson 2001: 108). But what about its accessibility to d/Deaf and Hard-of-hearing groups? Are these communities excluded by default from radio programmes and artistic creation through radiophonic media? In this article I analyse a case study, ‘Tangible Radio – Class on Air’ workshop, as part of B-AIR Creative Europe programme, as well as the convergences of sound art and the deaf experience in terms of co-creation, participation and educational processes. I will argue that radio as a medium can very successfully include the d/Deaf and Hard-of-hearing communities if relevant methodologies and technologies are encompassed to its processes.

In this article, I will present the project in detail and interrogate central issues of participatory artistic creation, the deaf experience, and the possibility of including d/Deaf and Hard-of-hearing groups and individuals into the radio artistic experience. Moreover, I will mention previous researches on the topic, although this is an emerging field and not many projects address the specific communities due to a ‘naturalised exclusion’ of the d/Deaf and Hard-of-hearing from sound and sound art. Next, I will describe all the workshops of the programme separately, including technical details and methodologies. Furthermore, I will reflect on the project based on the team’s research and practice. These reflections are both theory and practice led, and in no way can they serve as a statute for the convergence of sound radio art and the deaf experience. Instead, they can successfully contribute to an inclusive broadening of the field, and engage the reader in dialogues within Disability and Deaf Studies, Sound Art and Sound Studies, and that of artistic education.

1. INTRODUCTION

This article explores the relation between radio art, creativity and the deaf experience, by studying the case of ‘Tangible Radio – Class on Air’,¹ a project that took place at Argyroupolis’s Special School for the Deaf and Hard-of-hearing² in Athens, Greece during autumn 2022. The project was one of the three-year activities of ‘B-AIR: Art Infinity Radio, music for babies, toddlers and vulnerable groups’,³ a Creative Europe Program that delved into the topic of radio, sound, space and inclusion. This project involves the development of a prototype vibratory radio device and the creation of a radio show exclusively crafted by and with the Deaf students from the aforementioned school.

2. SOUND STUDIES AND DEAF STUDIES COALITIONS

To begin with, there are issues of identity and diversity within Disability Studies that merit mention here above all literature review. On the one hand, there is a divergence between various categories of disability and Deaf identity. Deaf individuals and collective bodies, under different contexts and positionalities, appear to either appropriate or resist being included in the category of disability (Harvey 2008), and instead define themselves on the basis of the use of Sign Languages as a linguistic and therefore cultural category. An illustrative example of the aforementioned contradiction between the two approaches is the inclusion of Children of Deaf Adults (CODA) in the Deaf community. CODA, even if they are not deaf themselves, can speak the Sign Language of their country as their mother tongue. At the same time, people who experience hearing loss but do not sign are not considered members of the community, such as

¹For more information on TWIXTlab’s official site, see <https://twixtlab.com/2022/09/25/tangiblerradioresidency/> (accessed 12 May 2023).

²For more information on the school’s official site, see <https://dim-ekv-argyr-new.att.sch.gr/> (accessed 10 March 2022).

³B-AIR’s official site, <https://b-air.infinity.radio/en/> (accessed 4 May 2023).

people who experience hearing loss due to age, accidents and other reasons.

On the other hand, we note that there is a plethora of interpretive frameworks and models for understanding and defining disability in general, and more specifically the deaf experience, such as, for example, the medical approach and medical model, the social approach, the humanistic approach, the religious approach and others. These distinctive approaches are crucial, both for understanding the experience and for policy-making (Friedner and Kusters 2020). In the case of the deaf experience, the distinction between hearing loss and cultural identity is conventionally encoded by the use of the terms 'deaf' (with the 'd' in lower case) for people experiencing hearing loss, and 'Deaf' (with a capital 'D') for people who are part of the Deaf community and culture, with the use of Sign Language as its cornerstone (Woodward and Horejes 2016).

As for my positionality, I belong to the 'listening majority'. Moreover, I have been involved in very specific 'listening techniques', as defined by my empirical, theoretical and artistic fields: sound studies, acoustic ecology, music and sound art. I have participated in listening, composing and walking art projects, recording and creating soundscapes and geo-located audiowalks, as well as facilitating workshops of creative experimentation with the aforementioned tools together with different groups and in different educational settings and levels. But I do not perceive conventional hearing as a barrier to a study of the deaf experience. On the one hand, sound phenomena are perceived through a variety of sensory channels, while the focus on the function of the ears in terms of sound perception constitutes, to a large extent, the result of a long ocularcentric epistemology and the absolute segmentation of the human body's sensory perception.

The preceding theoretical and artistic influences are combined with methodological approaches that the team of 'Tangible Radio – Class on Air' drew from the toolbox of art education and assembled them experimentally in the research field. Our experience of these educational processes made it clear that 'listening' is manifoldly dependent on other sensory perceptions, beyond hearing, the human ear and its physiology. This approach is consistent with the broad discussion in the Anthropology of the Senses, in regard to the multisensory nature and arbitrariness of the partitioning of the body and human perception into sensorially separated and sealed spheres of stimuli and impressions. In short, we aimed as a team to include d/Deaf, Hard-of-hearing, their Deaf voices and their agencies in music education, sound art processes, and radio broadcasting, fields that can too be open to diversity and heterogeneity.

Although one might consider these fields as incompatible, there are nevertheless common pursuits between Deaf Studies and Sound Studies, with many convergences on a theoretical and artistic level (Friedner and Helmreich 2012). Indicatively, I will mention the work of anthropologist of sound Panayotis Panopoulos (2021). Central to Panopoulos's approach is the relation between voice and language, which, in the case of the understanding and use of Sign Language, becomes particularly important. The emphasis is placed more on the phenomenological, sensory and artistic dimension of the deaf experience and less on the politics of identity or the various strategies of inclusion or exclusion, identity and otherness. The voice as materiality, as an expressive and performative medium, but also as a fundamental metaphor for political power at the collective level, becomes in the case of deafness an open field for artistic intervention in issues of visibility/audibility.

At the same time, a relevant article describing exactly these convergences was published by Michele Friedner and Stefan Helmreich (2012). What might these convergences be between 'the people of the eye'⁴ and the aural environments created by sound art? As Friedner and Helmreich point out in their article, programmes such as the Deaf Music Camp in Michigan enabled Deaf adolescents to experiment with the visuality of music and sound art.⁵ Moreover, sound frequencies that balance between the spectrum of audibility and vibrotactility, a condition of interest to the Deaf, Hard-of-hearing and the listening individuals, can become such an intermediate area of interaction. In 2009, artist Wendy Jacobs created a three-level, 3.5 × 3.5 metre platform vibrating with sounds and reverberations as part of MIT's Waves and Signs conference, in collaboration with faculty and students at Gallaudet University and MIT's Centre for Advanced Visual Studies. The artist hosted workshops and used the platform in such a way that it challenged the hearing–deaf dualism. She conveyed the experience of listening at such low frequencies that all individuals, regardless of their hearing, could only hear through vibratory stimuli (Friedner and Helmreich 2012).

Another point of convergence is of course the voice. At the same time, and beyond the locally established Sign Languages, the Deaf Voice (Panopoulos 2016) constitutes an intermediate acoustic and linguistic space. The Deaf Voice is the voice that comes from an individual who cannot use their hearing in order to

⁴A quote of George Veditz, seventh president of the National Association of the Deaf from 1904 to 1910 (cited in Friedner and Helmreich 2012: 73).

⁵For more information on the social media timeline of the action, see <https://mobile.twitter.com/deafmusiccamp> (accessed 12 April 2023).

control the outcome of their vocal expression (Wirz 1991). Deaf voices are recognisable, different for each individual, and can be taught and cultivated with the help of logotherapy. The voice, as a metaphor for social visibility and assertion (Johnson and Kennedy 2020), holds a strong symbolic and, above all, political significance in terms of the inclusion and representation of the d/Deaf and Hard-of-hearing in the public sphere (Lawy 2017). The Deaf Voice can function as a common acoustic point between the Deaf community and the wider social sphere, contributing decisively to the diversity of oral communication.

In terms of the pedagogical contribution of these two fields combined, the engagement with sound, voice, recording and radio narration through the educational process can provide the d/Deaf and Hard-of-hearing students with a framework for personal and artistic expression, as well as familiarity with collaborative creation and other important skills that, ultimately, have little to do with the perceived 'proper' functioning of the ears. Most importantly, the preceding actions can help to eradicate the exclusion of Deaf and Hard-of-hearing students from these educational opportunities and the corresponding benefits. Engagement with music, sound art and radio is not exclusively aimed at developing sound skills and musicality. On the contrary, such an artistic gesture can contribute to broadening or even radically revising the perceptions regarding the boundaries of the students of Special Schools for the Deaf and Hard-of-hearing, leading to broadening their activities, and not defining those in terms of lack, instead of possibility. The exclusion of Deaf and Hard-of-hearing individuals from radio, and the artistic fields of music and sound in general, continues to be understood as 'natural', resulting in the discouragement of the d/Deaf and Hard-of-hearing from attending sound-oriented programmes in their education (Hash 2003). Nevertheless, there are relevant educational methods that have been used in the past, such as that of William G. Fawkes, who taught at Mary Hare Grammar School from 1962 to 1985, encouraging the learning of musical instruments to Deaf and Hard-of-hearing children (Fawkes 2006).

For their part, Andrew Hugill and John L. Drever introduce the term 'aural diversity' (Drever and Hugill 2023) to highlight the specificity of each individual to perceive sound stimuli in a unique way, not only in proportion to the physiology and capabilities of their sensory organs, but also in relation to their cultural background, or their personal experiences. The term clearly refers to neurodiversity (Singer 2017), coined in 1988 by sociologist Judy Singer, and became particularly popular in the decade that followed, as it became associated with the emancipation movement and the emergence of the social model of disability, while

highlighting the intersectionality that emerges in relation to gender, class, ethnicity and more (Milton 2020).

As of 2019, Hugill and Drever's approach to acoustic diversity has been consolidated with the 'Aural Diversity' project in the UK. In this context, they approach the concept of auditory diversity beyond what is considered 'normal' or 'correct' hearing, in an attempt to deconstruct the 'golden ear', that is, medically normalised hearing, against what are considered 'deficit' versions of it. On a practical level, they put their analysis in conversation with artistic practices and discourses developed within the context of the sound arts (Drever 2019).

So how can there exist an aural diversity in music, in sound art and consequently in the radio? The answer to the first two questions is given by two musicians. First, the famous deaf musician and music educator for deaf children Evelyn Glennie closely links hearing with the other senses (Glennie 1990) and invites us to alternative ways of listening and relating to our sound environment (Glennie 2003): 'Hearing is basically a specialized form of touch. Sound is simply vibrating air which the ear picks up and converts to electrical signals, which are then interpreted by the brain. The sense of hearing is not the only sense that can do this, touch can do this too' (Reisler 2002: 42–3).

In the meantime, in the field of Sound Art, the deaf artist Christine Sun Kim systematically examines her relationship with sound, observing its effect on materials (e.g., paint, threads, membranes) and people. On this empirical basis, she uses these materials in artistic workshops, proposing them for artistic use to d/Deaf, Hard-of-hearing and hearing participants. With her work she poses issues of subjective sensory perceptions. Artistic expression, exclusion and inclusion through art as a social experience are put into constant negotiation and discussion in her workshops. Moreover, the artist mentions – in one of her many public lectures – that she understands sound by observing hearing people and how they behave and respond to sound stimuli as if they were her 'speakers' (Sun Kim 2015).

In addition, the project and exhibition 'Other Abilities',⁶ curated by Eva Fotiadis and Adi Hollander, managed to connect vibrotactility, space and disability through artworks created on these topics. Similarly, artists David Bobier⁷ and Leslie Putnam,⁸ also part of the 'Other Abilities' team, have created a plethora of individual works on sound, sculpture, deafness and vibration, and have previously

⁶For more on 'Other Abilities' artists and artworks, see <https://otherabilities.org/> (accessed 28 July 2023).

⁷<https://bodiesintranslation.ca/david-bobier/> (accessed 1 August 2023).

⁸www.leslieputnam.com/ (accessed 3 August 2023).

engaged with vibratory technology in performance spaces. David Bobier and Leslie Putnam participated in the B-AIR project's 'Audibility' programme as artists in residence.⁹ Furthermore, together with Panayotis Panopoulos and Eva Fotiadis, we created a series of podcasts/audio papers, which were presented at the Venice Architecture Biennale 2023 in the French pavilion 'Ball Theatre – News from the World'.¹⁰ Moreover, Surface Dance Theatre¹¹ use a specially designed technology of vibrating vests to enable inclusion, called Subpac.¹² The team, together with the corresponding vibratory technology, has travelled and performed worldwide at festivals and performance spaces. Finally, the inCide¹³ project is engaged with composing music for cochlear implant users. InCide is a programme of the Aristotle University of Thessaloniki and is 'a research project that aims to explore new ways of composing music that is more accessible to users of cochlear implants'.

As can be clearly understood, many projects have been created with regard to the convergence of sound art and deafness. In the field of radio, however, less has been done, and perhaps more limited, I presume because of the nature of the medium and its difficulty in combining senses. Indeed, an internet radio station can provide visual aids, subtitles, sign language interpretation of text and/or song lyrics, and much more. For example, the MEDIANE (Media in Europe for Diversity Inclusiveness)¹⁴ project, with researchers Fábio Ribeiro and Luís Pereira, has worked precisely on this possibility of creating inclusive content for radio, either through digitisation of files or through inclusive new formats for the radio experience and deafness. Similarly, the Creative Europe B-AIR project, of which Audibility is one of its significant interests, studies radio in conjunction with several fields: music for babies and toddlers in hospital settings, vulnerability in public and private spaces, music for the elderly, and sound art and deafness.

In the context of the radiophonic condition, this convergence of Sound Studies and Deaf Studies may offer a unique scope for new forms and new adventures. Verbal diversity can be enriched when combined with a suitable sound design, Deaf Voice can gain 'audibility' in the public sphere, visual aids

can enhance the meaning in online radio versions, and many technologies can act as augmentation rather than replacement of the aural experience. At the same time, there is always the potential for the use of personalised audiograms, either at the production stage or at the user selection stage. All the preceding are open possibilities, ready to be explored and implemented.

Particularly on the issue of the Deaf Voice, the argument has broad connotations. As listeners, we are addicted to the 'Golden Voice' canon and model, a perfectly articulated, standardised voice that we are used to hearing in the mass media, especially in the logocentric radio. Hearing different voices, accents, pronunciations, dialects and other speech varieties are not common, and it is only a benefit for this logocentric medium to be able to introduce non-perfect, non-conventional and non-standard voices, pronunciations and timbres.

Although the aforementioned might sound like a loaded statement, it draws from the term 'aural diversity' of Hugill and Drever (2023), and their theoretical approach on the 'Golden Ear'. Similarly, the radiophonic 'Golden Voice' has no accent, is appealing, easily understood, has speech intelligibility and articulation. We rarely have the opportunity to hear a Deaf Voice because of the enormous deviation of that voice from the norm. It is not only the Deaf Voice that is missing: the growing complexity of today's contemporary urban 'voicescapes', such as voices from migrants, ethnic minorities, Roma, Deaf voices and more, are generally excluded from public discourse, leading to a false representation of contemporary metropolises pluralism on the radio. Few examples broke this 'silencing', such as the *Citizens of the World* radio programme initiated by the Sto Kokkino radio station and Praxis NGO in Athens, Greece. But, although this programme was performed in other languages and contained news in many languages for all citizens of the city, it was not breaking the canon of voice diversity on the core of the radio producers. Moreover, it was subjected to national policies for immigration and refugee crisis. This could potentially serve as a reason for the abrupt termination of this radio programme, coinciding with the governmental immigration policies alteration in the borders of Europe. Moreover, local idioms are less encouraged on public broadcasting, depending on the country. Although countries with a more colonial background and possibly still holding territories overseas might be more open to various voices on the radio. However, under recent recurring Islamophobia and xenophobia, as well as the general rise of far-right and fascist concepts within elected governments in the Western world, these projects become more and more rare. In this sense,

⁹<https://b-air.infinity.radio/en/sound-art-plus/tangible-radio-class-on-air/tangible-radio-residency/> (accessed 6 August 2023).

¹⁰https://cressound.grenoble.archi.fr/son/2023_VENEZIA/RADIO_UTOPIA_ACCUEIL-EN.html (accessed 27 July 2023).

¹¹www.surfacearea.org.uk/ (accessed 27 July 2023).

¹²For more on the technology used, see <https://subpac.com/> (accessed 21 July 2023).

¹³For more on inCide, see <https://incide.mus.auth.gr/> (accessed 27 July 2023).

¹⁴For more on MEDIANE project, see www.coe.int/t/dg4/cultureheritage/mars/mediane/ (accessed 27 July 2023).

the Audibility project attempts to reinitiate the dialogue of inclusion inside the radiophonic public sphere, both artistically and politically, creating a shift in the way we approach the radio condition today.

3. AUDIBILITY

The Audibility project is designed and implemented by TWIXTlab,¹⁵ an institution that operates in the intersection between art, anthropology and everyday life. It is part of the wider European cultural cooperation project 'B-Air: Art Infinity Radio, music for babies, toddlers and vulnerable groups', co-funded by the Creative Europe programme of the European Union. The overall project is coordinated by the Slovenian Public Broadcasting Institute – RTV Slovenija, with the participation of BAZAART-Serbia, Grenoble School of Architecture, CRESSON-France, Josef Stefan Institute-Slovenia, RadioTeatar-Croatia, Serbian Public Radio, Burch International University-Bosnia and Herzegovina, TWIXTlab-Greece, and the University of Eastern Finland.

The Audibility project deals with the relationship between sound art and the deaf experience through a programme of creative encounters between sound artists, students and teachers in special schools for the Deaf and Hard-of-hearing. The encounters aim to encourage art-sound education through a series of presentations and workshops, so as to explore alternative ways of perceiving and relating to sound as an artistic medium. Through workshops, the participatory production of one or more artistic works is fostered with the synergy of artists, students and teachers. At the same time, we explore new ways of perceiving sound beyond hearing, aiming to create a curriculum and an educational methodology that serves the sound and music education of Deaf and Hard-of-hearing students, but which could be applied more widely.

TWIXTlab's participation in B-AIR started from the workshop of the artist Tatiana Remoundou, who experiments with sound, video, deaf experience and hearing loss in her works, testing the sensory complementarity of image, language and sound. With her work *Unicorn* (2021), produced within the framework of the Argyroupolis's Special School for the Deaf and Hard-of-hearing, she created a 'musical composition adapted to the incomplete but unique hearing of d/Deaf and Hard-of-hearing adolescents'.¹⁶ She worked together with the students of the school,

and adapted their personalised listening particularities and characteristics to her work.

Later, in spring 2022, the composer and performer Lambros Pigounis experimented with vibrating materials, recomposing his work *Immaterial Bodies*,¹⁷ a vibrating sound sculpture that creates patterns of salt or grindstone depending on the frequency at which it vibrates, according to the natural phenomenon of Ernst Chladni and his renowned Chladni plate. Pigounis then created a visualisation of the sound signal with laser and DIY technologies,¹⁸ together with Deaf and Hard-of-hearing students.

In the academic year 2022–23, Orestis Karamanlis, composer and assistant professor of audiovisual composition at the National and Kapodistrian University of Athens, used his own programmed software, RADAR, designed with SuperCollider, to facilitate a structured performance with d/Deaf and Hard-of-hearing adults. The framework was a series of year-round seminars held together with d/Deaf, Hard-of-hearing and hearing adults at the Greek National Opera House.¹⁹ RADAR was based on visual notation and visual musical instructions, so as to orchestrate a real-time structured improvisation, a relaxed performance,²⁰ during which everyone could participate, talk, move in space, and enjoy, in the foyer of the Opera House at the Stavros Niarchos Foundation.

As one might correctly assume that, through the activities of the program, we had the opportunity to experiment with sound processing software, spectrographs, sound and visual games, vibrating materials, but also more traditional music teaching methods and score creation (from classical to graphic scores). Indeed, we studied and promoted the relation of d/Deaf and Hard-of-hearing individuals with sound and music, while aiming to explore common grounds between all, in terms of their experience of music and sound in general. In this context, the use of sound and music in the educational process, with the collaboration of both d/Deaf and hearing artists, aimed to create a condition of co-creation and participation, with educational tools that are rarely used in similar educational conditions.

¹⁷For more on *Immaterial Bodies*, see <https://lambrospigounis.com/immaterial-bodies/> (accessed 05 May 2023).

¹⁸See Lampros Pigounis's artwork statement and video at www.youtube.com/watch?v=KvdzDaG751k (accessed 5 May 2023).

¹⁹For more on the programme in the Greek National Opera's official site, see www.nationalopera.gr/ekpaideusi-koinonia/ekapisei-tikes-koinonikes-draseis-els/item/4847-ixitiki-texni-kai-kofi-empeiria-i-akoi-os-ensomato-vioma (accessed 14 May 2023).

²⁰For more on the practice of Relaxed Performances, see <https://officiallondontheatre.com/news/what-is-a-relaxed-performance/> (accessed 2 January 2023).

¹⁵For more on TWIXTlab's activities and projects, see <https://twixtlab.com/> (accessed 21 July 2023).

¹⁶For more on Tatiana Remoundou's *Unicorn*, see <https://b-air.infnity.radio/en/sound-art-plus/sound-installations/audibility-deaf-sound-art/unicorn-by-tatiana-remoundou/> (accessed 2 March 2023).

4. TANGIBLE RADIO – CLASS ON AIR

Closer to the aims of this article, one of the actions of the Audibility project was the combination of Radio Art and the deaf experience. We tried, in conjunction with the aforementioned actions and aspirations, to make a direct connection between sound art, the deaf experience and radio art. As the Audibility project is part of the wider European project B-AIR, which focuses on connecting sound art and radio, we felt that we could experiment with this convergence as well. This was greatly helped by the previous experience of the Deaf and Hard-of-hearing students: as we chose the same school for our activities, the previous workshops acted as a bridge of knowledge between the acquired expertise and the new endeavours, thus the produced work of ‘Tangible Radio – Class on Air’ appeared as a natural continuation of the aforementioned work. We used elements such as vibration techniques, sound editing software, vibrotactility exercises, musical visualisation tools, gamification of personalised audiograms and others, so that the contact with the radio would come naturally in the educational process.

In the text that follows I will demonstrate how the workshop sessions of ‘Tangible Radio – Class on Air’ ran. Initially, in the first workshop of the series, a pilot story about a daily walk in the park was created. Kalliopi Takaki facilitated the workshop, during which the students described sounds they would hear or things they would see in the park, drawing upon their everyday experiences. She wished to create a step outline with narration exclusively by the students, using techniques such as sequencing storytelling – where each student continued the story of the previous one – joint commentary on each story by the group, free creative flow and more. The nature of the discussion between the facilitators and the participants was open and free: each student had the opportunity to add to the story *ad libitum*. As the park is a familiar and well-known experience, there were no problems with the flow of the pilot story. The group recorded the events that occurred during this walk in the park and asked the students to collectively think of an object, vehicle, or building they encountered at the end of their walk. The students decided that a spaceship was waiting for them at the end of the park, so we knew that a more distant and imaginative journey awaited us in the next stages.

All decisions about the story were made collectively by the students, and the facilitators did not interfere with the plot: they were just wrote down what was being said or signed. At the end of the second workshop, we read the story with sign language interpretation and asked the group if the story appeared interesting enough. They agreed with the

plot and the students went back to their everyday activities.

For the second workshop, facilitated by Yorgos Samantas, Dana Papachristou and Orestis Karamanlis, the TWIXTlab team had found sounds that corresponded to the objects. All the events were then sonified: sounds, encounters and events that the students had chosen for their story in the park. We had brought with us a series of sounds, most of them being recorded by us from our archives or found in creative common archive recordings on the internet. Some of the sounds were steps, birds, wind, voices of people, animals, spaceship, heavy breathing, and earthquakes. We made sure we had two or three choices from each of the sounds, so as to test the vibration of those sounds and the preferences of the students.

The way to test the vibrating qualities of the sound was through a specially designed device that the group organiser Yorgos Samantas had created. This was a vibrating wooden instrument, consisting of a wooden rectangular structure, a 2.1 amplifier, two 30 watt transducers (exciters), and a 100 watt bass shaker transducer, which acted as a subwoofer. The students would touch it and tell us which sound they preferred (Figure 1). The decision was collective, deriving from the students’ choices. This system made the structure vibrate during the playback of the sonic narrative. The students recalled the sounds they had chosen and were excited to feel them in their hands through the vibrating materials. They chose the sounds that were vibrating, so as to correspond them with the sounds they had picked for their audio narratives.

As soon as a sound was picked, we would put it in order, in the editing software used, collectively composing a busy soundscape with every characteristic sound overemphasised. At the same time, we sonified various sounds that did not have a sonic quality on them, such as the sound of the moon, the sound of the street lights, the sound of flowers and space flowers, or various creatures found in space. These sounds were produced by the students with the use of their voices, whistles, singing and other personalised techniques, which were recorded and also imported to the editing software project file. All choices were collective and made among the team of participants. The sounds were chosen by vote and debate. The initial decision of the audio samples brought in class was made by the team of the facilitators. There were indeed some specific sounds to choose from, the palette was not unlimited, but still the sounds were quite a lot to choose from. The main factors for the choice of those initial sounds by the team of facilitators were vibrative quality of the sound and availability.

After all the sounds were chosen, the team of facilitators edited the sounds, so as to highlight the

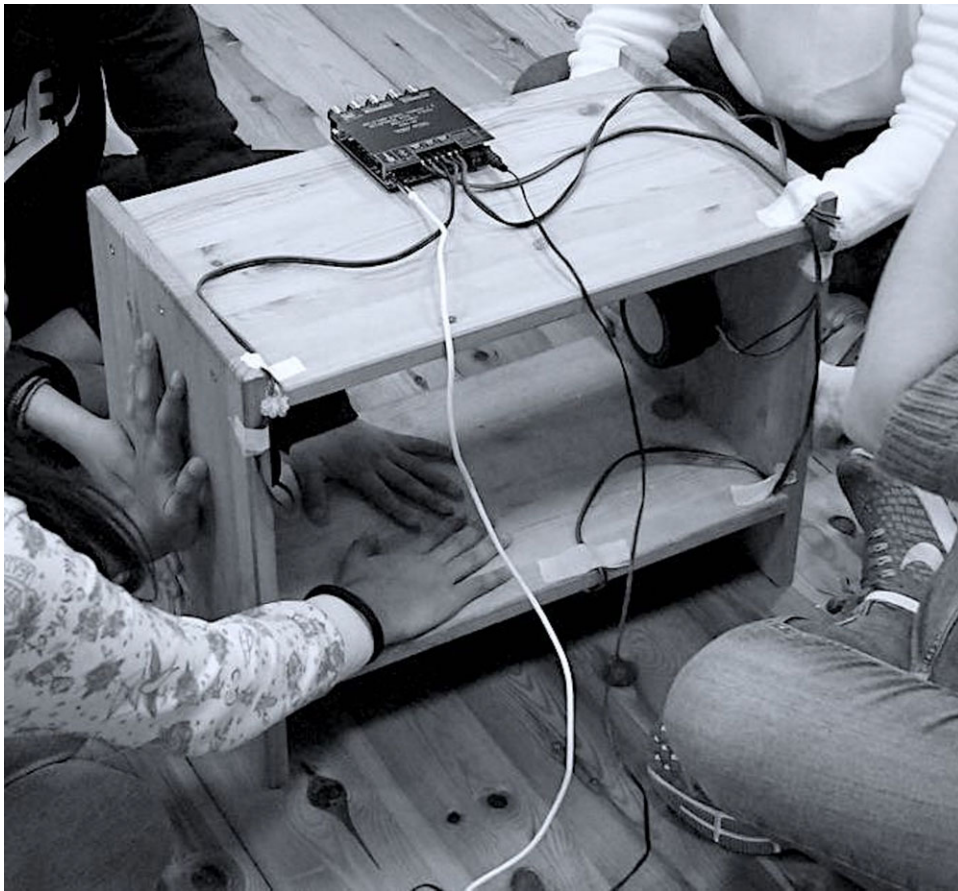


Figure 1. Wooden construction. Photo credit: Yorgos Samantas.

vibrational aspect of the final outcome, having in mind the specifically designed radio device, the materials of the device and other playback aspects. The students had already been informed on the possibilities of sound editing during previous workshops of Audibility project, so in the ‘Tangible Radio – Class on Air’ project we did not edit together with them, so as to save time between the last workshops and the final outcome, as our time together was limited due to school exams and everyday activities. Once the workshops were over, George Mizithras and Orestis Karamanlis took on the task of editing all the recordings together and composing the imaginary soundscape based on the narrative sequence. They used processed sounds, extra-musical elements, soundscapes and of course the recorded voices of the students, always in respect with the aesthetics of the radio show that were picked in class. Their work was to highlight the vibrating aspect of the work, to trim the lines between transitions, to fade-in and fade-out the sounds of the events, and to add other elements that they had been described by the students during the workshops, but were not solidly described: it is very difficult and new for a d/Deaf and Hard-of-hearing

individual of that age, that has never played, taught or listened to music or sound, to be able to describe the aural environment with precision and wholeness. This final version, was again heard and touched at school with the participants, so as to make sure the final outcome was satisfactory to them.

At the same time, Petros Flambouris started to prepare a literally tangible radio device, in a semi-spherical format, with a non-smooth surface, in order to be not only touchable but also huggable, giving the user a special vibrotactile experience. The tangible radio consisted of two stereo FM receivers, four mono amplifiers, three 24 Watt transducers and a three-inch woofer, plus the relevant wires, all glued around the perimeter of the special design. The tangible radio is managed through a controller consisting of two FM transmitters. The special structure (shell) was constructed by laser cutted plywood of 3 mm thickness by the method of unfolded geometry, which was supported together with a plastic net reinforced with liquid resin. It also included a speaker, rendering the radio audible for the listening individuals. The final outcome was created so as to highlight vibrotactility, which is already a different sense than sound. So, even

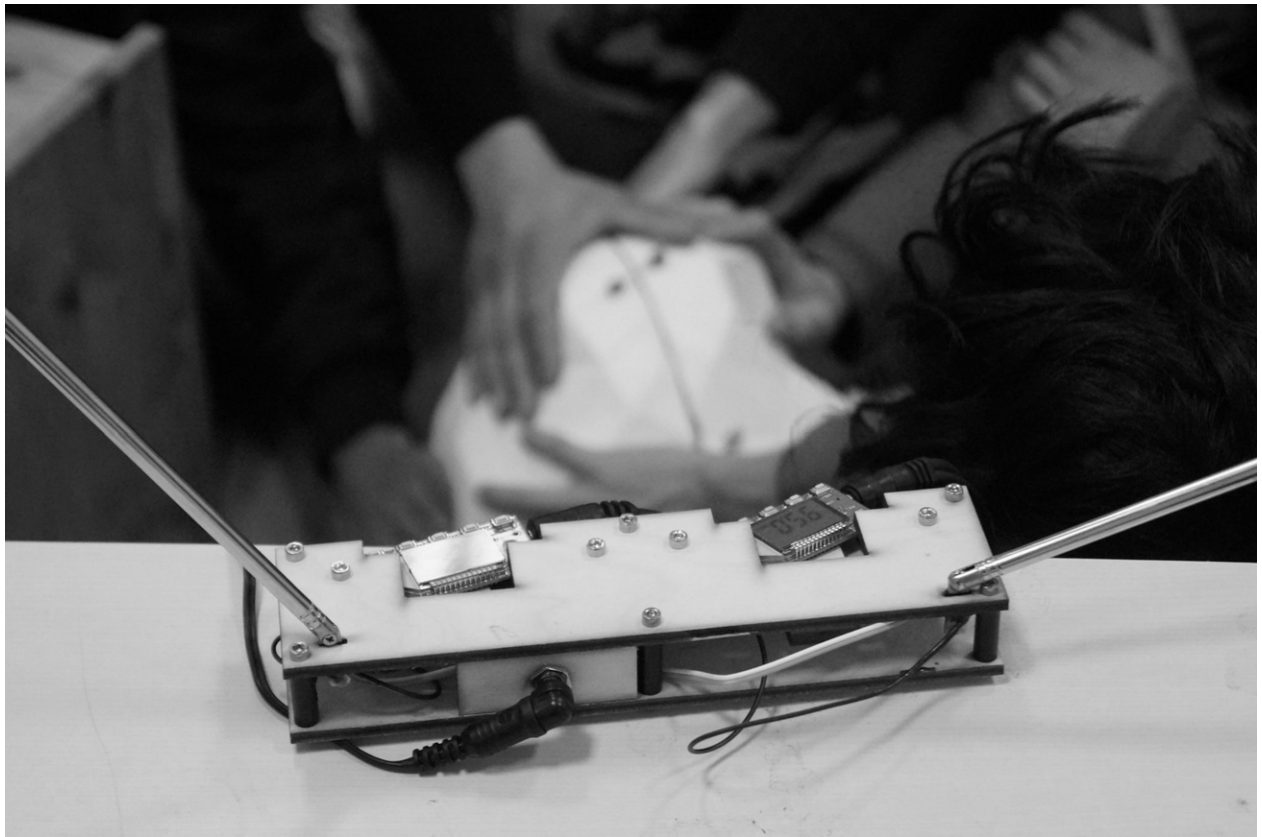


Figure 2. Tangible Radio. Photo credit: Yorgos Samantas.

without the speakers the listening majority would not feel excluded, instead they would have the opportunity to ‘listen with their skin’ via a non-cochlear listening experience. The Tangible Radio prototype was designed entirely by Petros Flambouris and 3D printed at his affiliated institution, the University of Thessaly, under the guidance of his supervisor, Professor Nicolas Rémy (Figure 2).

In the next and last workshop, the device was presented to the students, who were then divided into groups of five to listen to their broadcast through the new radio device. This was followed by a discussion on the radio device, the experience of creating the broadcast and storytelling, and the usefulness of this activity. The students were excited about the new prototype object that looked like a soccer ball, and also about the fact that they created an audio narrative that they could identify by touch. Although their voice, which accompanied and explained the audio narrative, could not be perceived through the vibration due to its indiscernible vibrating quality, we as a team chose to include it in a central role. Our aim was to make the Deaf Voice ‘visible’ in sonic terms within the world of the hearing, as well as the for the d/Deaf and Hard-of-hearing who use hearing aids or cochlear implants.

5. HOW AND WHY WE APPROACHED THE NON-COCHLEAR

Some reflections on the project are necessary here. First and foremost, when we refer to the project, we are not only discussing the final outcome. The entire series of workshops constitutes the participatory work based on these meetings. The project is a collaborative and collective endeavour. The selection of narratives and sounds was a joint effort, to the extent that its participatory aspect can genuinely serve the work within the school environment without disrupting it and without overextending it in terms of time.

However, beyond the purely artistic and aesthetic aspect, the programme, and particularly this specific series of workshops, cannot forsake its educational character. It especially cannot overlook the fact that what is needed within this educational framework is a methodology, a programme structure, boundaries within the school environment, time management, ongoing collaboration with school educators, and more. This ensures that we participate in problem-solving, in conjunction with the broader goals of the school. This is not just a participatory project involving adults, and more so hearing adults, so for them to get in touch with the sound they may have

sidelined as a sensation in an ocularcentric world. Here the participants are adolescents who hear fragmentarily or not at all, with the help of cochlear implants, hearing aids or even no help at all.

At the same time, it is important to note that this active involvement does not negate the necessity for prior groundwork, methodological planning and ongoing efforts even after the workshops conclude. The facilitators' team maintains a consistent involvement, which was initiated months before interacting with the students. Additionally, a participatory workshop, particularly when conducted in an educational environment, remains intertwined with its educational aspect, encompassing goals related to sound and digital literacy. Most significantly, it offers an alternative path to engage with a sense that might have been overlooked in the traditional school curriculum.

Essentially, a workshop of this nature imparts understanding about the interaction between d/Deaf and Hard-of-hearing individuals and the realm of sound, along with the creation of a radio show. The primary aim is not to provide an exhaustive education to students in subjects such as music, sound engineering, creative writing, architectural design, editing, and 3D printing, as these domains require dedicated, long-term studies that students can explore at a higher educational level. Nevertheless, in our roles as facilitators, we harness these areas of knowledge, striving to convey them with clarity, enlightening students about the potential opportunities, collaboratively tailoring the content to their preferences, unveiling the processes of creation, and fostering enthusiasm for future involvement in these fields, should the students express interest. In short, while decisions are collective, the preparatory and refinement phases of the outcomes did not – and could not – occur solely within the limited timeframe of the workshops.

In these circumstances, as facilitators our goal was to provide educational liberty, not ensuring our role remains educationally invisible: there is no reason for educators or collaborating artists to be as inconspicuous as possible throughout this process. On the contrary, the artists were encouraged to invent concepts and methodologies for understanding deafness and sound beyond the cochlear. Additionally, when referring to participatory processes, we are active participants ourselves. It is within our capability as educators, facilitators, or artists to employ our expertise without claiming to possess ultimate knowledge and without enforcing our viewpoint as the sole valid perspective.

Regarding the research findings, the deliverables of the programme, as well as the programme's assessment and evaluation, they were defined as artistic

creations in the TWIXTlab team's proposal. The programme resides within the realm of the artistic research paradigm, constituting both an artistic research endeavour and – akin to the wider Creative Europe programme – is firmly rooted in the symbiosis of art, research and their practical applications. Within our theoretical framework, we have authored and continue to produce discourse focused on methods of employing art for evaluation purposes. Can art function as a qualitative research tool through its artistic results? This indeed presents a substantive topic for autonomous discussion, an ongoing discourse that has already been initiated by the B-AIR project.

Furthermore, we adhered to both the social and the educational models, conducting research based on ethnographic inquiry, participatory observation and collective creativity. The personalised nature of how each individual hears is exceedingly challenging to capture through evaluative questionnaires. We believe this difficulty exists even for the listening majority, as the aural diversity of each person may be describable in words, but the singularity of distinct auditory experiences remains unique. Our aim was to reclaim radio broadcasting for the Deaf and Hard-of-hearing, so once this was attained, our research achieved its desirable contribution to the field.

Moreover, we had extensive discussion and reflection with the students, engaged in dialogue with them and watched the documentation videos together. It is certain, and I express this with all reflectiveness, that other facilitators could have produced different works: there are always finite technical possibilities, and the medium always suggests its immanent aesthetic. A radio specifically designed, specific tools and instruments, even the type of microphone can dictate specific aesthetic choices, let alone the co-creation with specific people. But this is a larger debate concerning media theory, the aesthetics of workshop-based arts, and the educational process and co-creation. Is there objectivity in these processes? And if so, why do we cling on to it? There are many events in the classroom that affect students deeply, but they are not measurable in absolute terms. We allow our work to circulate, to generate reactions or successors through art, the academy and educational methodology, a task that we are ready to submit to the Institute of Educational Policies in Greece.

As for how open the project is to everyone, indeed the project can also work for the listening majority. But that is not the issue. Surely, as I have already indicated, the project was created with speakers that vibrate solids, meaning they are still speakers that reproduce frequencies. So the listening majority is not excluded from listening, although I would not find anything unreasonable about that even if they were.

The aim of the project is to listen with the body, with the skin, with touch, with the eye and in all other ways beyond the ear. So the listening majority can benefit in multiple ways from these alternative ways of listening, as can the d/Deaf and Hard-of-hearing as well. Besides, the d/Deaf and Hard-of-hearing are not just one category. We are dealing with hearing ranges that are as many as there are participants. These ranges do not constitute a single category, even within the core of the special school for the Deaf and Hard-of-hearing. Within this diversity the listening majority, d/Deaf and Hard-of-hearing can be integrated, if all groups choose to do so.

Finally, in relation to the relevance of the project to Sound Art, this is a discussion that has many particular aspects. We presuppose that if a work does not include the audible reality, then it is not directly related to sound. But there are many ways of listening and none of them is hegemonic. They all work together and they all contribute to our individualised auditory experiences: bone conduction, cochlear hearing or non-cochlear hearing, vibrotactility, imagination and more. Who can really be confident in answering with certainty, not how sound is produced, but exactly how it is perceived/received and how it moves the human brain? Why should a d/Deaf or a Hard-of-hearing person be excluded from this emotion and experience?

Certainly, sound is a very important part of this research, but not in the sense of the organised sound, meaning music, electroacoustic or concrete music, noise, soundscapes and other established genres within the field. The sound narrative here is created and translated into frequencies that are vibrating while resounding, by people who experience the auditory experience differently, either fragmentarily or not at all. In this respect, the project is related to sound because it is defined as such by the participants and facilitators, by its funding and by the use of specific media that are audio related. The fact that the ear or auditory centre of the brain may be activated differently or not at all does not alter the sonic nature of the research. On the contrary, it suggests new ways of listening for the hearing individuals, the Hard-of-hearing and d/Deaf jointly and beyond narrow definitions of how listening should be or felt.

Last, this project does not create a new radiophonic 'language' where the broadcast functions as a replacement for Sign Language. Taking Sound Art and Sound Studies as a starting point, we are looking for alternative ways of listening beyond the cochlear. As a result, the sounds created are not descriptive. Certainly, music or sound art themselves are not descriptive either. Instead, the sound composition created was based on sound narrative, vibrations and vibrating sound environments, combined with the

material technology used to design and construct a prototype vibrating radio device. Helen Keller listened to Beethoven's Ninth by placing her hands on the radio speakers and wrote 'I could feel, not only the vibrations, but also the impassioned rhythm, the throb and the urge of the music! The intertwined and intermingling vibrations from different instruments enchanted me.'²¹ If that's not worth the relevance to sound art, then I really do not know if anything else we can compose, study or allow to move us profoundly merits that relevance.

6. CONCLUSION

To sum up, through the Tangible Radio of the Audibility project, we attempted to frame the listening experience in a number of ways in terms of radio and sound art: vibration, visualisation, tactility, corporeality, spatialisation, technology, voice and materiality are some of the elements and techniques that can serve as tools for further exploration of the deaf experience and the experience of perceiving sound beyond hearing. Contemporary radio technologies, as well as others we can devise in the near future, can act as a communication channel for listening beyond the personalised acoustic experience of each of us. By broadening the range of perceptual experience of sound, it is possible to move towards an inclusive notion of the reception of sound beyond hearing. Through materialities, sensations, languages and technological means, we discover new possibilities of sonic diversity and heterogeneity that enrich the sound experience, music and listening experience for each individual, not just for specific groups. The fields of sound art and music can be enriched by contact with more and broader 'listening' experiences, enhanced with new tools, and we hope to contribute not only to discussions around the issues of arts education, the visibility/audibility of the d/Deaf and Hard-of-hearing, but also to changing the way we perceive all the naturalised exclusions within artistic production.

This article was an example of Deaf and Hard-of-hearing students being directly involved in the radio creation and broadcasting of a radio show, the design of the sound and narrative, and in listening in aurally augmented and broaden terms, regardless of what is expected of them. Of course, one could argue that today asynchronous radio broadcasts and the facilitation of the internet can include these groups even more directly: podcasts can become videocasts, and contain visual stimulus or explanation, text or Sign Language. But in this project we have chosen to subvert the exclusions and even these conveniences, towards a

²¹For more on Helen Keller and her letter, see www.smithsonianmag.com/smart-news/what-helen-keller-felt-beethovens-ninth-symphony-played-radio-180956799/ (accessed 2 March 2023).

non-cochlear sound art (Kim-Cohen 2009). All the preceding possibilities are attainable, but we opted for our groups to become creators and gain knowledge of the relevant processes. And above all, we tried to make the students believe that radio does not have to be understood as a forbidden territory, but that it can be claimed through alternative creation and listening. We firmly believe that this awareness on a theoretical and practical level can enrich not only radio and its place in the public sphere, but also the human way of listening in general, a condition that can have multiple benefits for all of us in our negotiation of the way the world sounds.

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