

Designing *Tala Sound*, or the emergence of a new multidisciplinary and social research methodology for health

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Design practice is given a plurality of titles: thinking, social, ecological, graphic, space-based, etc. This discipline influences all fields of research and engineering, enabling them to go beyond their historic perimeter and target varying areas of public and private services. On the other hand, the sound domain, and more generally acoustics, is more strictly categorized: musicology, psycho-acoustics or electro acoustics (see Figure 1, which provides a relatively comprehensive overview of this domain). It is in this universe that evolves the discipline of sound design, with a priori mostly industrial or environmental targets. But could sound design also mix, more unexpectedly, with health design and, if so, in what form? To answer this question, we review below the links between art(s) and health, links that aroused the interest to draw a parallel with the world of design, then discuss their possible integration in the medical community. We provide, as an illustration, some details about our own research in sound design, in connection with Indian music.

1. Art therapies and Design

The links between art(s) and health in the modern sense have existed in hospitals and medical centers since the 1980s, as observed by (Bubien, 2004): "thanks to culture, the patient is considered in his globality, and arts can help him in the healing process." These links can even be quantified: what is termed *therapeutic observance* (Haynes et al, 1978) is a method that makes it possible to verify, from numerical data such as blood pressure, whether or not there is a health benefit of an artistic practice. Art therapy, in general, is an additional tool to non-drug-based management, this practice sometimes helping the patient to recover abilities through the only artistic practice, as mentioned in (Brioulet, 2016): "The art-therapeutic work oriented towards the restoration of the executive functions, even if it did not allow an

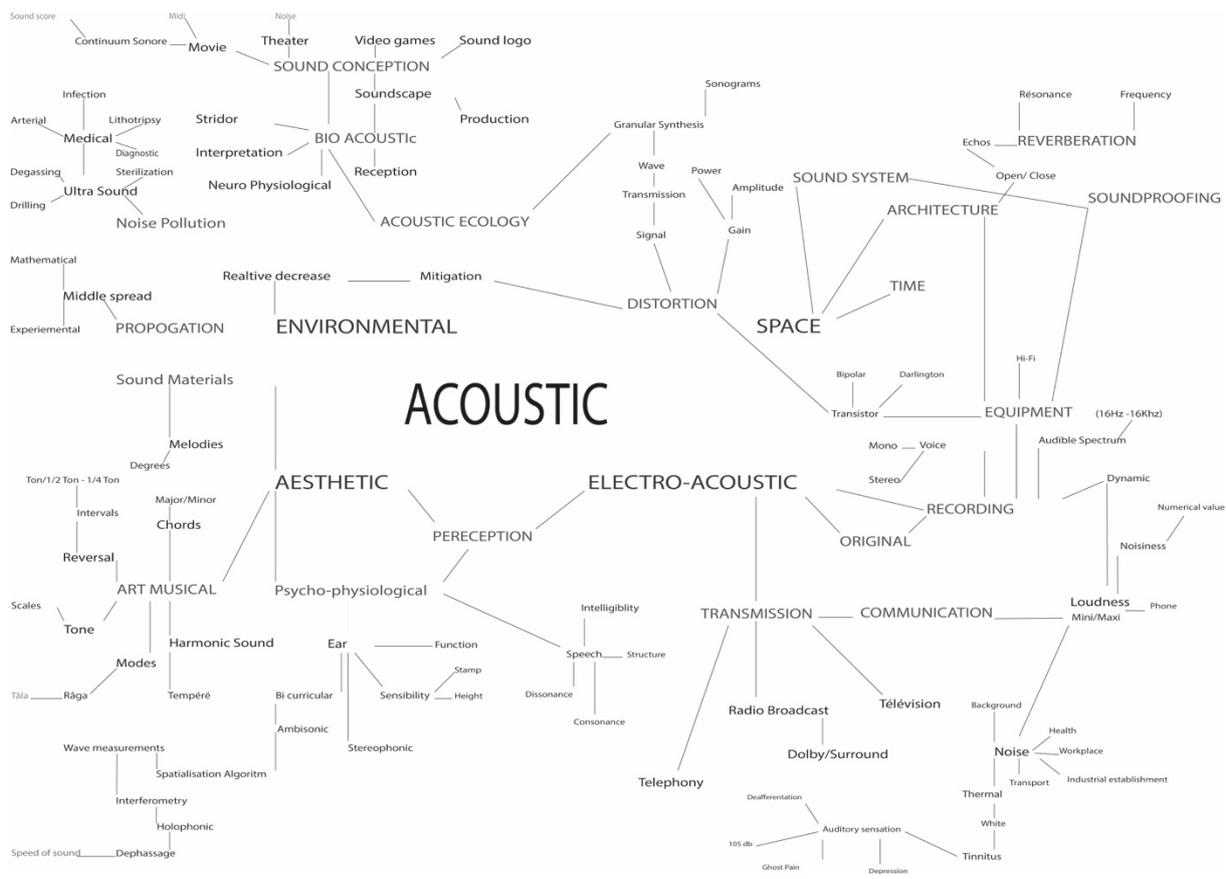


Figure 1: Mind map of the word "Acoustic".

effective improvement of the executive functions out of session, contributed to the maintenance of a relational commitment in the project of care of the patient."

Moreover, in recent years, there has been an increase in art-based therapies in France, as noted, for example, by (Oland, 2016), in the field of mental health: "In recent years, new brain-stimulation techniques have emerged in psychiatry. These are non-invasive and painless techniques. We can assume that patients see this as an improvement in their well-being and use it as a substitute in their daily lives." Many other artistic approaches are used in the medical community, even if they are not always recognized by the profession. A striking case is that of music therapy, which has existed since the 1960s in France. "In the years 1960-1970, a first French center of music therapy was created, in Paris, under the name Association de recherche et d'application des techniques psychomusicales (ARTP)." (Vrait, 2018). The therapeutic method consists here of using reminiscence by passive listening: the patient listens to music, and that awakens in him/her some memories.

There is also a so-called *active* variant of music therapy: the patient then participates in a choir or practices an instrument. The study of (Chevrau, 2016) notes, in the field of dementia: "The musical memory is resistant enough to the cognitive deterioration observed in neurodegenerative pathologies. By musical memory we mean the capacities related to the production of music (the practice of an instrument, the singing of an air or a song) and the semantic knowledge related to musical works." This musical practice is thus widely used in all domains that are related to neurodegenerative issues. (Platel, 2011) even remarks: "In the field of neurodegenerative diseases, music is an interesting medium in the regulation of mood, but seems above all to be a cognitive *stimulator* that has allowed us to reveal preserved abilities of implicit learning up to an advanced stage of pathology."

In recent years, the field of design has been able to integrate the field of health, because its approach to the social sciences resonates in the medical environment, as suggested by (Ruby, 2011) in his study of the relations between design and science: "At first glance, and from a rapid perspective, this question has nowadays become that of design, that of an articulation into a single thing of an aesthetic, technical aspect (the usefulness and the formalization of human gestures) and sometimes scientific." Design tries to connect to the research and problems resulting from hospital constraints. The *Sciences du Design* n° 6 journal issue offers case studies illustrating the role of design in the context of patient experience, aging, participatory design, etc. There is also a proposal to define a methodology *by design* (Findeli, 2015) in the context of issues arising from the daily life of a hospital or medical center.

2. Sound design and Health

An often neglected and yet systemic aspect in the field of health is that of the sound environment in a medical context. In the field of medicine, sound design was at first simply limited to considering acoustic or psychoacoustic phenomena such as neonatal sound processing. As noted in (Khun, 2016, p.167), since "any neuronal activation after sensory stimulation is accompanied by an increase in oxygen consumption that is measurable in NIRS¹", the quality of the sound environment also had to be controlled. Then caregivers became aware of the benefits of noise reduction in hospital rooms, because patients often kept their TV turned on at a high volume, as found in the study of (Leroux, 2006, p.22): "The background sound of the early afternoon also impacts the atmosphere of the space concerned. In many services, the television set is on and/or a musical background is broadcast. The

¹ *Near Infrared Spectroscopy*

volume and choice of television program or type of music vary depending on the choice of caregivers rather than residents. "

Beyond music therapy, sound was thus for a long time only a secondary element in the search for the good of patients. For the last three years, schools or institutions in France such as ENSCI, Sciences Po, Ircam, TALM, EnsAD and MINES ParisTech have tried to meet the needs of patients using sound design. Seminars and symposia have punctuated this awareness. Thus, even as recently as 2018, the seminar "*Design in health: how to change scale*"² saw many designers, architects and caregivers gather to discuss issues related to the hospital as a space layout to provide care, therapeutic objects and health technologies, but also issues around sound in general. During the symposium organized, again in 2018, at Le Mans "Art du so(i)n: sons, espaces et à l'hôpital"³, Master students presented their various projects and research in the field of sound for health; the debates, which were very interesting and informative, discussed in particular the delicate question of the research protocols set up in EHPADs (private or public French institutions where elders are cared for). The 8th Symposium on health has taken place in Marseille, thus confirming the crucial nature of this issue.

Health has thus become a means of capitalization and profitability of the Silver Economy (Numa, 2015). For example, the "private equity firm Innovation Capital announced on February 25, 2014 the launch of a Sector Fund for the sector of the Silver Economy dedicated to funding innovative services for the actors of health and autonomy (SISA). SISA will start its first closing for more than 40 million euros." And the proliferation of fab labs in medical centers only reinforces the link between these two worlds, as described in (Fabbri, 2016): "Alexandra Le Chaffotec opens the section devoted to specialized spaces on the case of a living lab dedicated to innovation in health. She finds that the space and time units specific to this type of space stimulate and enhance the innovation process by placing the patient at the center of the innovation process."

3. The Tala Sound project

It is by taking into account the current status of the medical field, music therapy and sound design that our research tries to encompass and make coexist their interdisciplinarity, despite the ensuing difficulties (Gentes, 2015, p.103): "The difficulty in grasping it is therefore linked to its very status as inter-discipline and to the fact that the disciplines it uses, whether it be the hard sciences, the life sciences, the social sciences or the humanities, work with different

² Seminar organized by the Sciences Po Chair of Health from January 12 to 15 2018 at the Paris Diderot University.

³ Organized by the School of Art and Design of Le Mans and IRCAM, on December 6, 2018 at Le Mans, in collaboration with the Hospital Center, the Victor Hugo Clinic and the Jean Bernard Center and with the support of Mans Acoustique and Mans Innovation

discipline modalities and use different concepts." Moreover, we did not hesitate to assert right from the start a biased sound world (Ponge, 1967) in ethnomusicology: that of Indian music. In addition to the fact that this type of language is poorly studied in France, one of the authors, originally from Pondicherry, in the south of India, wanted to develop a music-controlled device, called Tala Sound, based on Carnatic rhythms, thus positioning it in opposition to the traditional methods of listening "classically" encountered (in the social sense) in hospitals by offering a more interactive listening experience.

While our approach draws inspiration from sound and design research, it is also inspired by medical methodologies, for example leading to the development and testing of research protocols, in this case at the hospital Paul Brousse in Villejuif, France, and at an EHPAD institution in La Verrière, France. The objective of these first tests in the field was to recover metadata that would help in developing a specification for the design of a computer-operated sound device, Tala Sound, that will react in relation to Carnatic rhythmic characteristics. This musical structure, well-known in India, may be codified in the form of a circle (see Figure 2), as a cycle of time in a continuous phase, the modification of which will, in our case, be carried out via the Tala Sound computer system. Such device is intended to be used by a music therapist or nursing staff to calm patients' anxiety potentially related to their state of dementia. It will be driven by a simple software in which it will be possible to specify, for example, the volume, tempo and choice of songs.

In fact, our objective became twofold: first, to see if Tala Sound-enhanced listening to extra-European music can improve patients' behavior (Perera et al., 2019)⁴ and, secondly, to integrate within this multidisciplinary approach a methodology that could be inspired by social design (Gauthier et al., 2015): "Therefore, any design practice is necessarily social, in the sense that one of its fundamental problems is to implement a social and philosophical anthropology of the appreciation of ordinary life in the world, life with objects, places,

⁴ This paper is an extended version of the present work, in French.

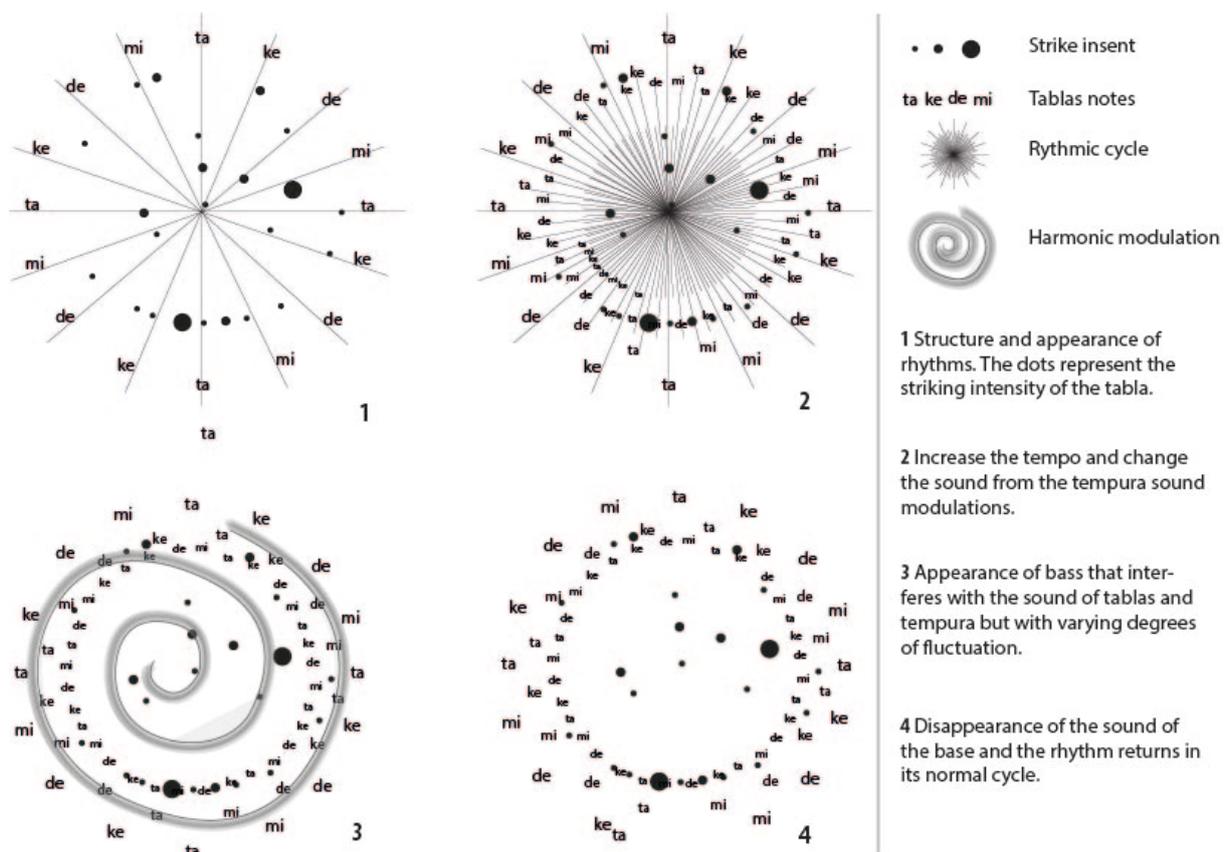


Figure 2: Cycle changes in Carnatic rhythms.

services, institutions and organizations." The social aspect of our project comes from the involvement of high-school students in the design and implementation of Tala Sound, under the supervision of teachers well versed in technologically inspired projects (Savigny-sur-Orge, France).

If the Tala Sound device proves effective (something that will be assessed in the near future), we will have rallied three different disciplines, namely health, sound and design, around a common socially rooted project for the well-being of patients and hospital staff.

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