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► **To cite this version:**

Joelle Le Marec, François Ribac. Music knowledge and science studies. Sounds, Sense, Silence. Revue d'Anthropologie des Connaissances, 2019, Musical knowledge, science studies, and resonances, 13, 10.3917/rac.044.0653 . hal-02423878

HAL Id: hal-02423878

<https://hal.science/hal-02423878>

Submitted on 6 Jan 2020

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MUSIC KNOWLEDGE AND SCIENCE STUDIES

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S.A.C. | « Revue d'anthropologie des connaissances »

2019/3 Vol. 13, N°3 | pages 671 à 688

Article disponible en ligne à l'adresse :

<https://www.cairn.info/revue-anthropologie-des-connaissances-2019-3-page-671.htm>

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SPECIAL ISSUE: “MUSIC KNOWLEDGE AND SCIENCE STUDIES”

MUSIC KNOWLEDGE AND SCIENCE STUDIES

Sounds, Sense, Silence

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INTRODUCTION¹

This special issue of the *Revue d'Anthropologie des Connaissances* journal is entitled “Music Knowledge and Science Studies – Resonances”. We are interested here in exploring what each of these two worlds says about and does to the other, and what these reciprocal echoes can teach us. This is an enterprise that could be summed up by two questions. What can music tell us about the sciences and science studies? What can we learn from the sciences of musical worlds and knowledge? Why take this approach?

The first answer is that music is present in most interstices of societies, in all societies, including animal ones (Krause, 2002; Rothenberg, 2013). While this presence of music is certainly not new, nor even specifically modern, the digitisation of recorded music, its increased fluidity, the abundance of objects and technical networks connected to the Internet that give body to it, and the social practices and relationships that are associated with these are such that it seems appropriate for a journal like the RAC to keep its ears open. Indeed, there is no doubt that science studies, which pay extremely close attention to technologies and to their uses, can usefully educate us about the metamorphoses of music and our own music-inflected, sonic existences.

¹ Translated to English by Kate McNaughton.

Conversely, the kinds of knowledge we encounter in musical environments can inform us about the exercise and practice of science (studies). What effect do different types of music knowledge have for example on the social sciences, which are so inclined to favour the visual, *observation*, and which often limit their use of tape recorders to gathering materials that are destined to be transformed and deprived of their sensory dimensions? What of the analysis of processes of signification when we turn our attention to the sounds of society and of the Earth? What can amateur practices (which created the Beatles and hip hop) and the constitution of their knowledge and forms of sociability teach us about the creation and range of different types of knowledge? Can music teach us to interrogate our way of knowing the world?

Thirdly, we also need to think differently, to vary our research methods, to draw on other repertoires of knowledge than the routines of science. This latter field now appears unsettled by the questions posed by standards of work and of expression, standards with which the most prestigious authors take liberties that often remain illegitimate when other thinkers try to do the same. If Michel Serres has not written a book in an academic format for a very long time (although we have not stopped reading him), if a historian of science like Peter Galison makes films, if Bruno Latour designs exhibitions and collaborates with artists, if Donna Haraway sets off in search of fabulations, if countless academics are developing collaborative practices and creating objects of knowledge outside of the sites of academic production, then it must be that the anthropology of knowledge ends up turning back on our ways of expressing and sharing our knowledge.

Finally, and along similar lines, the analysis of different types of music and the knowledge connected to them also needs to sidestep itself, and get rid of the idea that music is a language in itself that is only comprehensible to those “in the know”. Rather than criticise those who theorise their own utility (or uselessly disqualify themselves), probably the most important challenge is to understand how the black box of music can be further opened up and how it produces its sounds, that is to say its specific forms of intelligibility.

If, as we will see very shortly, such investigations were already embarked upon by other people a long time ago, there are nevertheless still many tracks to listen to and polyphonies to explore. But before outlining in more detail the various contributions that can be found in this special issue, we would like to define what we mean by “music knowledge” and “science studies”.

MUSIC KNOWLEDGE

Just as Christopher Small (2011) talks of “musicking” or Tia Denora of “music in action” (2000; 2011), we refer to as “music” the whole range of activities connected to the practice, production, listening to and circulation of music

and the social relationships that are expressed within this context through various flows, mediations, spaces and discourses.

The term “knowledge” refers to the various strata (and the interactions between them) of formal or informal types of knowledge, of skills, of equipment and instrument-based practices, of uses, of theories, of accrued and shared experiences.

“Music knowledge” refers first to the various disciplines and subjects in the academic field that have music as their main object: musicology, organology, history, geography, sociology and the anthropology of music, communicational approaches but also theme-based fields such as for example popular music studies, sound studies or cultural studies. Secondly, this knowledge also includes social spheres and all the protagonists that produce, discuss and spread music knowledge within them: musicians at all four corners of the world, ensembles, technicians, online sharing and discussion platforms, corporations working in the field of music, ordinary users etc. Generally speaking, we are interested in examining the various modes of organisation, the technical systems and infrastructures that code, distribute and broadcast music and intervene in musical practices and sociability.

SCIENCE STUDIES

The expression “science studies”, commonly referred to using the acronym STS (*Science and Technology Studies*), means research into the history and activity of science and technology. As is probably often the case when a particular body of work and authors become dominant in the academic world, and without intending here to take on the posture of guardians of the temple, we should note that the view taken of STS is often reductive. They are frequently taken to be equivalent to the sole Actor Network Theory, which itself is in turn reduced to Bruno Latour alone, or to the Social Construction of Technology (SCOT). Although these two currents of thought do indeed exist, STS are much wider-ranging both from a conceptual perspective and in terms of the fields and periods they take into account. They include not just sociologists (mainly in ANT and SCOT) but also historians, anthropologists, information and communication scholars, gender studies scholars etc. These multiple perspectives are conducive to the exploration of what we see of the professional sciences on the one hand, and of the involvement of large numbers of players in the production of scientific knowledge on the other. Likewise, the fields involved are not just limited to the production and history of science (physics, astronomy, chemistry etc.) and technology, but also include other worlds such as medicine, the environment and the media, examined from the perspective of the knowledge they produce, communicate and use. Many thinkers working in other fields (museums, music, the media etc.) also draw on STS works to

carry out their research, dissect their archives, sort through and analyse their “results” etc. Finally, and perhaps above all, these different approaches are not homogenous: they often diverge, sometimes even very strongly, in their ways of engaging with and understanding their objects of study.

Despite the variety of components of this universe, it still seems to us that we can identify some common features. We would say first of all that most science studies combine the production and sharing of knowledge (be it scientific, technical or not) as *practices*, *controversies* and *collective*, i.e. *social forms*. Then, they are particularly focussed on examining systems and technical structures (the launch pad on a military ship, a birthing room, Boyle’s laboratory, a bicycle, a synthesizer) by viewing what happens there (our aforementioned black box) as a concretion of social organisation. Concretion means, on the one hand, that the laboratory or the bicycle are one of the material expressions of the social world and, on the other hand, that this materiality is a constraint. Thirdly, STS simultaneously invite us to consider the *plasticity* of these technical worlds (incidentally, where is the world that does not involve some kind of technology?) and their uses: the bicycle was not always put to its current use, and could very probably be repurposed again. Fourthly, it seems to us that STS are interested in examining (and believe) less in the possibility of a perfect epistemology, the aim of which would be to lock down the objectivity of the scientific method, than in the necessity of a reflexive approach to located scientific practices and their protagonists. To summarise, in STS, the sciences and technologies, and the people and objects they involve, are *moments* of society.

These resonances between (knowledge about) music and (the study of) science are at the heart of this special issue. Its contributors may thus either document dialogues between music(s) and science(s), between knowledge specific to music or STS, or again use one of the two terms as a tool to analyse the other. Our aim here is thus to create a back-and-forth bringing together various academic fields, sciences and STS and other social spheres connected to music (in the sense of a wide set of practices).

EXISTING RESONANCES

These relationships between (knowledge about) music and (the study of) science of course predate this issue of the journal! If we limit ourselves to the history of science in Europe, music – both as a material reality and as a metaphor – was regularly drawn on by the sciences to understand and describe the universe, both before and since the Scientific Revolution. The harmony of the spheres was thus an essential concept for astronomers in the Middle Ages (Hicks, 2017), while harmony and music were also vital for figures such as Kepler and Leibnitz (Serres, 1968: 2011) and, according to Pesic (2014), for the formation of all of modern science. This attention to sound and music is for example

displayed in *New Atlantis* (1627), a genuine political programme for the Scientific Revolution in its British version, in which Francis Bacon describes “sound-houses” in which the pitch and form of sounds are manipulated and they are conveyed through pipes (Gouk, 1999; Ribac, 2009). Veit Erlman (2014) recently showed that even authors like Descartes, who has commonly been viewed as a promoter of the primacy of the visual, also attached great importance to music and sound. This osmosis between science and (knowledge about) music since the Renaissance has in particular been documented by Gozza (2000). We could mention countless other examples and works on the place of music and sound in the elaboration, discourses and fields of science throughout the 18th, 19th and 20th centuries.

Conversely, since at least the 17th century, music theorists (and in particular composers) have often drawn on arguments, metaphors and methods taken from the sciences to describe music and show the connection between their practices and their theories using the various paradigms of nature that the sciences have put forward over their history. As some of these became dominant (the natural order, organicity etc.), they have been used to describe, analyse, assess and organise by music theorists (Clark and Redhing, 2001; Small, 2011) in the same way as they have been in other areas (through the example of primates that Haraway documented, 1989). In order to illustrate this point, let us mention Arnold Schoenberg, who in his *Theory of Harmony* (1922: 390-416), justified his use of notes and chords that had not appeared much before in works on and theories of harmony, by the fact that each one of these sounds was supposedly present in a note’s “natural” resonances. Thus, atonality and then twelve-tone composition (which includes both the adoption of a scale of twelve half-tones and its codified uses in composition) become manifestations of the Great Book of Nature, and the composer a scholar who is giving resonance to something that is already there. Schoenberg’s *tabula rasa* thus uses nature like a magistrate – what Lorraine Daston and Fernando Vidal call the moral authority of nature (2004). Similarly, many contemporary composers and contemporary music theorists have drawn parallels between music and mathematics (the equivalence Iannis Xenakis sees between the Pythagorean theorem and the “rules” of the tonal system), or have tried to reproduce natural phenomena in their music (Messiaen’s transcription of birdsong or the exploration of the resonance of sonic bodies in so-called spectral composers). At the intersection between cognitive science, the psychology of music and musicology, we might also note the tendency to study the perception of music in laboratories by music psychologists (Sloboda, 1985) or the widespread idea that it may be possible to explain the “effects of music” by focussing mainly on the brain (Sacks, 2009; Bigand, 2013). Here again, experimental methods and causal explanations are imported from the sciences. Likewise, musicology – which really came into its own in the 19th century – has developed as the only science able to analyse “music” using specific tools (Redhing, 2003) and furthermore by focussing its gaze on... art music. As Nicolas Cook (1990), one of the

artisans of musicology's cultural turn, has shown, the problem with this analytic musicology is that it bears barely any (or very little) relationship to the experience of listeners, be they ordinary or not. Musicology, as the empowerment of music and the science related to it, is reminiscent of the social processes and arguments that allowed the "hard" sciences to establish themselves as autonomous practices, separate from other scientific disciplines and owing no or very little explanation to the social world (Pestre, 2015). Similarly, we might also note that the modern narrative and its notorious time's arrow, which is an essential component of modern science (Latour 1991), very largely pervades the history of music – a history which is also full of genius-inventors, radical ruptures and progress.

Furthermore, if we take an interest in the techniques connected to music, many spaces, objects and instruments can be considered as particular embodiments of knowledge and practices drawn from the sciences and medicine. From this perspective, an audio headset can thus be understood as a stethoscope (Sterne, 2003), a piano as a mechanical instrument (Carew, 2007; Loesser, 2012), the metronome as one aspect of the generalised measure of the world (Barbuscia, 2012), a recording studio can be analysed as a laboratory (Ribac, 2007; Jackson, 2008; Hui, Kursell & Jackson, 2013) etc. Indeed, the relationships between the practices and theories of music on the one hand and scientific practices and theories on the other are vast and still beg to be documented (on this relationship in England in the 19th century, see for example Davies & Lockhart, 2016).

If we now turn our attention to the ways in which STS have been used by academics working on music, the link had already been made several decades ago. We know, for example, that Hennion's sociology of mediation (1993), which was developed in particular on the basis of studies into musical practice and controversies, was born in the Centre de Sociologie de l'Innovation in Paris, and that it played an important role in the development of the sociology of networks (Latour, 1991: 106; Hennion and Ribac, 2003). Likewise, some founders of *Sound Studies* came directly from various branches of STS, such as Pinch and Bijsterveld (Pinch & Trocco, 2002; Bijsterveld, 2008; Pinch & Bijsterveld, 2013), figures of the social construction of technology (SCOT). Other academics, in particular sociologists of music, refer more or less explicitly in their objects and methods of study to STS, and some were even trained in this field (DeNora, 1995 and 2000; Maisonneuve, 2001 and 2009; Ribac, 2004 and 2007; Magaouda, 2014; Zimmermann, 2015; Prior, 2018; Harkins, 2019). All of these authors rightly pay very particular attention to the objects, technologies, corporations, broadcast networks, users and their interactions, and take into consideration ordinary practices just as much as those of the professional world. Alongside these direct and/or often explicit connections, the vast field of popular studies also regularly investigates objects and spaces connected to technology and science: the reproduction of sound (from the Walkman to the recording studio, via software), the Internet, the archaeology of media/the media etc.

To conclude this panorama of resonances, which is bound to remain incomplete, we must also mention sound studies. Murray Schafer's pioneering study of soundscapes (1977), investigations into the sound of the industrial world (Bijsterveld, 2013) or of nature (Krause, 2002; Rothenberg & Ulvaeus, 2009; Feld, 2012; Rothenberg, 2013), the *Art of Record Production* network and of course the vast world of sound studies encourage us to take seriously the sonic dimension of societies. While we might argue that a certain number of these works take on postures that are a little too normative, in particular when they make claims to tell us what is the "right sound" or how and what to listen to, these approaches are nevertheless extremely valuable: where musicology essentially examined works and musical scores (woe betide any music that did not have any), sound studies have taken a great interest in the *ordinary experience* of music and in all its forms of circulation (for example the pioneering work on listening by Bull and Back, 2003). While the media and the Internet have often been considered as worlds of images, works located at the intersection of cultural history and sound studies have for example documented the essential place of (listening to) the radio in daily life and its contribution to common cultures (Douglas, 2004; McCracken, 2015). Where social sciences discussed perspective, gaze, representations, unveiling (the list goes on!), sound studies reminded us that, just like sensory experience, the world is protean, and can also be listened to. The act of listening, and practices of attention, can be connected in science studies as in sound studies to a critical interrogation of the way in which academics deal with (or not) with the phenomenon of the audience, with the ways in which it is analysed. The audience is often thought of on the basis of implicit models which, in the very way in which studies are structured, naturalise political or economic relationships, with a strongly hierarchized split between an interest in the conditions of production of something (science, music) and an interest in a poorly-conceptualised "reception", which is too often dressed up as the production of something else. This critical thinking is a major issue in terms of research into the sciences and music, with the development of serious attention being paid to social practices and postures that do not make claims to produce anything, without however being reduced to "reception": practices of listening, practices of attention, postures of voluntary erasure and of reserve, for example (Le Marec, 2013) but also types of sociability and attachments (Hennion, 2013; Debruyne, 2015).

THE AUTHORS' DECISIONS

Fields

This special issue does not of course include all the questions that might be posed regarding the connections between music knowledge and science studies. These numerous connections, which appear in all the articles, do not in fact generally constitute well-defined methodologies: STS and music knowledge are not academic disciplines in themselves, but rather areas that are *natively* open and hybrid. There is thus no reason to close them down again, if we want to use what they make available when we draw upon them simultaneously. The reflexive turn that characterises them was created in the acknowledgement of knowledge arising out of contact and thanks to the deliberate relinquishing of a position of strict exteriority. The production of knowledge supports an irreducible heterogeneity in this field, not just in terms of the forms of enquiry and formalisation of knowledge, but also of the choice of objects to which one pays attention. There is thus something salutary in the authors' decision to deal above all with specific phenomena concerning music, by drawing on references or works that are connected to STS or to music knowledge, but without commenting too much on the ways in which they are drawing theoretical connections, focussing instead on their objects of study and the studies themselves. To put it differently, most of the articles rely on fieldwork and/or the exploration of archives, and focus on specific objects.

We can however observe a general trend: the contributors to this issue start from musical phenomena *through the mediations that constitute them* (range, types of broadcast, coding and monetisation of music), of the broadening of the meaning of certain specific practices viewed from a musical perspective (improvisation, the silence connected to the respect given to drums), of the institutions devoted to music and to their audience and affected by the life of knowledge and of the relations of legitimacy on which they depend (museums, music publishers). As such, scientificity appears at once as a desire which the authors wear on their sleeves (in that they methodically study fragments of reality), and as a carefully located phenomenon or even mediation: a set of institutional and cognitive standards at a particular moment, an imaginary realm that is used in order to force or open up certain perspectives, a reservoir of markers of rationality used to create institutional or commercial value.

From One Text to Another: Mediations, Standards, Mutations

We can identify three sets of articles, bearing in mind that some fit into all three categories.

In the first set, methods drawn from STS are used in order to describe, deconstruct or decentre. Some authors use these works as such (fields, authors, theories, histories of science and technology etc.) in order to explore musical practices, while others tend to use them as *tools* of investigation. The attention paid to the mediations used by music appears to be adjacent, in terms of its methods, to the study of the mediations underlying the sciences, with, in certain cases, movements between cultural forms and scientific agents. Thus, in Angelica Rigaudière's contribution, forms of scientific authority are cultural mediations that are drawn on in the process of legitimising nascent music publishing. Likewise, Judith Dehail shows that the choice of taking away numerous cultural dimensions from instruments in order to create the museum collection as a new cultural entity leads to naturalising the development of musical instruments, meaning that we then read into instruments a movement towards rationality (that is supposedly) typical of the Western world – a question that is insistently put forward in Max Weber's writings about music (1998). For her part, Fanny Gribenski replaces the history (of the normalisation) of the tuning fork in a history of international measurements and standards. Going against a strictly "musical", internalist approach, we then hear the rumour of controversies, the tumult of international conferences and the shock of empires, we understand the strategies for recognition employed by various players and which countries ended up triumphant. Conversely, sound and music are given (back) their place in the history of measurements and standards, and inform it.

A second set includes the texts in which music knowledge (in the protean sense we have outlined above) is drawn on in order to interrogate practices that are founded – more or less explicitly – on scientific standards. Carole Delamour makes her own the relationship to lost drums, the respect and knowledge that have disappeared, but also the practices of validation of her study among the members of the Inuit community in Mashteuiatsh: she makes these into categories that are relevant to her own enquiry and develops a collaborative approach that also gives silence its due. Lisa Lévy, Sébastien De Pertat and Olivier Soubeyran draw on improvisation in jazz to criticize the type of thinking usually applied to urban planning, which tends to be heavily influenced by techno-scientific promises of control; instead, they recommend that the jam session become a common practice in urban planning, opening up a whole range of new possibilities and leaving room for uncertainty.

A third and last group explores new worlds, and in particular the circulation of music and its commodification on digital networks (regarding digital transformations, see for example Lévy, 1994; Serres, 2012; Doueïhi, 2011; Flippo, Dobré and Michot, 2013; regarding the digitalisation of music see for example Sterne, 2012; Morris, 2015; Eriksson *et al.*, 2019; Maisonneuve, 2019; Camus and Vinck, 2019). Paolo Magaudda examines the multiple discourses surrounding blockchain technology, and the redemptive promises that go with them, and assesses their (in)efficiency online. For his part, Guillaume Heuguet takes us straight to the heart of Youtube's algorithms and of the ideas of the people

who programme them. He then shows the ideas and dreams of control that underpin these programmes and the automation of recommendation. Here, the issue for both these authors is to think not only about the significance of social practices and structures, but also about the methods we would need to (re)create to observe the transformations that are currently taking place online and on our smartphones: for example, how to choose what we should watch, listen to, identifying in order to understand them both the processes through which (cultural, scientific) value is captured, and the constant masking of these processes.

A Range of Attachments and Situations, from Criticism to Cultural Responsibility

Looking beyond this breakdown, the texts in this special issue allow us to present a nuanced range of positions. Music does indeed lend itself to a relative symmetrisation of the ways of thinking and acting of numerous people involved – academics of course, but also industrial operators, publishers, experts, members of indigenous populations. This plurality ends up being condensed in the same person when they take on several roles: some narratives outline the cases of those who have been at once musicologists, curators, editors, physicists, etc. Scientists (be they characters in the narratives or the authors themselves) are placed in positions adjacent or parallel to those of other agents involved in the production of knowledge or objects that are scientifically validated on the subject of music. Fanny Gribenski thus describes the attachment of physicists to musical practice in an environment that has been made favourable to action aimed at the creation of standards arising out of a metrics of sound. Carole Delamour reports the transformations she went through as a result of coming into contact with members of the Inuit community. The texts offered here reveal a gradient of the roles and places of academics, between the desire to enrich historicising approaches and the voluntaristic promotion of those transformations that are desired by the authors. The text jointly written by Lisa Lévy, Sébastien De Pertat and Olivier Soubeyran, for example, argues in favour of a “revolution” in postures of expertise, from the perspective of the authors’ present lives as (jazz) musicians and academics. They call for a return to generality of the tacit knowledge involved in improvisation, which they suggest should be connected to the “polygon” of small causes, arrangements and local contacts identified in all the studies, without however being able to claim to completely fit within current standards of scientificity. And in fact, all the authors pay a great amount of attention to the heterogeneity of regimes of legitimisation and to the plurality of roles to describe developments or historicise phenomena, but without doing so from the position of a contestation of the domination of science over other types of knowledge.

We can also observe how, across these different contributions, common institutions emerge as places of exchange and conversion between scientific, cultural and commercial qualifications of practices: museums or magazines (Judith Dehail, Angelica Rigaudière). The museum is at once a place for material inscription in series of objects, evolutionist scientist classifications that are indifferent to the cultural dimensions of relationships to instruments and the place where the contingent character of choices and knowledge is made apparent: in Carole Delamour's study, the museum asked to return objects keeps the trace of the gaps and absences that have followed colonial upheavals. One same institution has contributed to domination by this discipline, and, centuries later, becomes the space where loss is felt, as well as the possibility of a reopening of knowledge. The magazine is likewise, in both cases, a site of negotiation, by audiences, of the connections between scientificity, culture and the market.

In the articles as a whole, the crossovers between science (studies) and (knowledge about) music open up, each in their own way, the question of responsibility as a contemporary scientific question, worked on by everybody but in a manner that is different each time. Responsibility is not limited to the *naturally* critical dimension of minute attention being paid to mediations, standards and transformations, which are always connected in one way or another to relationships of legitimacy or power and to economic issues. It also looks for its own limits and challenges, in situations where the authors draw not only on their skills as academics but also on their attachments and involvement in multiple cultural and professional communities, institutions, and networks. In this context, music is the powerful marker of opening up to forms of responsibility other than the strictly critical perspective. Thus, in the case of monitoring the operations of conversion and transformation that affect quality and cultural and commercial value, responsibility stumbles and searches for its mirror image in the record, within what has been observed, of what the sciences have engaged in and what they have made possible (for example the production of units and objects that count, the authority of the expert and of the engineer, models of legitimisation, the colonial backgrounds of the management of objects). Responsibility can be looked for and exercised in types of questions and forms of work that are amenable to a sharing of their cultural and scientific challenges. From this perspective, some types of music knowledge reactivate what science studies had started from: an interprofessional reflection, located at the limits, which immediately recognised the pertinence of experiences and of the questions of those who experienced science not as tenured academics but as individuals involved in the life of sciences and how they work.

Silence as a Social Operation

In this issue, these studies are carried out in the zone of strong proximity between scientific knowledge and music knowledge, which puts them to the

test, but without the benefit of taking this as an issue of struggling against a hegemonic position of science – a position that underlies a great number of texts that fall under the umbrella of studies (cultural studies, gender studies...).

We might put forward the hypothesis that the issue in creating these openings in science studies and in works on music, which mutually amplify each other, involves dissociating the issue of knowledge from that of science, prudently and carefully, not starting from a position that is as far removed from science as possible, but rather starting from studies that include the sciences and desingularise them. Thus, science can be taken seriously in a *cultural* sense. This original dissociation between knowledge and science, stimulated not by a critical position taken in relation to hegemonic scientificity (in the case of numerous pieces of work in the field of popular studies²) but more by the grey areas and direct proximity between scientific value, cultural value and monetary value, reveals a weak but insistent signal in the boundary shared by science studies and music knowledge. This signal, which can be seen in most of the articles included in this special issue, is related to *silence*, or more precisely, to the variety of values and uses of silence – what we would refer to in English as *silencing*³.

Being, like most social activities and types of knowledge, caught up in the flow of the Scientific Revolution, some types of music have indeed been represented in the form of musical scores, a Cartesian diagram in which notes represent the duration and pitch of sounds (Ribac, 2007b). While this process does not imply that music is being silenced or limited, this type of coding does nevertheless signify social processes and considerable transformations, in particular once this movement is supported by music publishing. Firstly, musical scores allow publishers to commodify their lists of works – the term score in fact perfectly expresses this convergence between Cartesian arithmetic and the emergence of a new market. A composer's printed score can in fact be performed in several different places, even simultaneously, without the publisher or the composer needing to play it (Frith, 1996). Then, and as a result of this, if the work and the score are identified as one and the same thing, then all those who know how to read the score *in silence* and use solmization (meaning translating it into sound, with or without the support of an instrument), are endowed with a certain privilege. Some of them – and in particular musicologists – will then claim to be able to analyse, understand and classify according to a measure of greatness these works and “Music” in general. As we have mentioned above, the score does not make music silent, be it in terms of how it is learned or of course in terms of how it is executed, but it makes music silent for those who do not know how to read scores (which will now be referred to as “music”). It seems to us that it is precisely this social production of a particular type of

2 See the special issue entitled “Studies à l'œuvre”, of the *Revue d'Anthropologie des Connaissances*. 11 (3), 2017

3 We would like to thank Céline Granjou for drawing our attention to silencing.

silence, by those who publish and analyse scores “as experts”, that is fascinatingly described in Angelica Rigaudière’s article.

Along similar lines, it seems to us that the other great dumbshow is the museumization (Davallon, 1999, Baker, 2015; Cohen *et al.*, 2015; Le Guern, 2015:) of musical instruments as described with great precision by Judith Dehail. The act of collecting is part of the phenomenon of the building up of massive collections that forms the basis on which the discipline was created (Weingart, 2010). In an exhibition space, as has already been mentioned above, the objects that produce music are not just classified as things equipped with material characteristics, inscribed within histories that often have a whiff of colonialism to them, designated as objects that are exceptional (Bach’s harpsichord, Berlioz’ octobass, John Lennon’s guitar) or functional (the organ used in the liturgy or the flute of a particular “tribe”) – they are also exhibited *in silence*. While a musical score does indeed require musicians, the museum, for its part, most often forgets about them, both in their quality as essential users of these instruments and in that of stakeholders in the very forms of sociability made possible by music. While we are of course not claiming that music museums are sad and disembodied (we like looking at John Lennon’s guitar or imagining Bach sitting at his harpsichord), it is nevertheless patent that, here again, the expert treatment of “music” involves favouring its visualisation and laying to rest.

Rather than presenting these recourses to silence as authoritarian and disembodied forms of disciplining, a trend that we find in certain approaches that claim (we believe wrongly) to be pragmatic (e.g. Schusterman, 1992), they encourage us to explore in more depth the historicity and sparkle of the social significance of mediations, and to explore silence not as an effect of the power of silencing or immobilising, but rather from a semiotic perspective: the cross-overs between what can be heard, what can be seen, what can be read, what can be calculated to produce meanings, and the power to control these cross-overs and master actions, are connected both to mediations and to the life of (index-based, iconic, symbolic) signs and to an economy of transformations (Jeanneret, 2008, 2014). While it is indeed these mediations that support and give body to music and its sociability (Hennion, 1993), they deserve for their black box to be opened up a bit more and for us to understand not just what types of social processes they support and what uses are made of them, but also the implicit and explicit projects they involve. To put it differently, we should probably pay more attention to the processes of coding and translating of these structures and the ways in which (silent) signs are converted into sounds and into music and into value(s), and the reverse. It is precisely this operation of the conversion of signs and calculations and controversies that are explored in an original way by the algorithms of Guillaume Heuguet, Paolo Magaudda’s blockchain and Fanny Gribenski’s exploration of the standardisation of pitches through tuning forks.

Finally, we would like to round off this presentation with a kind of silence that in itself constitutes a form of knowledge, and which is discussed by Carole

Delamour. She refers to how the members of a community who, out of respect for their drums and those who once knew how to make them resonate, prefer not to tell ethnologists too much about how to play them and refrain themselves – for the moment at least – from playing them. Rather than being a form of retention, silence here is modest and instructive – not just in terms of the world that is explored by the ethnologist, but also as a lesson about academic research and how to carry out a study in general: that which is silent is no less significant. As Eduardo Kohn's "ecology of the selves" (2013) mentions, an academic interacts with beings and things without necessarily *producing* symbolic objects. The silence of the drums, while they wait to be played again one day, makes present forms of knowledge that usefully remind us of the plurality of ontologies. Music – understood as a social practice – thus does indeed talk to us about study/ies. And for those who believe that the moderns are nevertheless different to the "others", we would like to recall that in his *Compendium musicæ* (1618), Descartes claimed that a sheepskin drum would not make a sound if faced with a wolfskin drum (quoted by Clark & Rehding, 2001: 1): the natural order was thus expressed even after the death of animals and their transformation into drum skins. Likewise, musical scores and instrument museums also, and each in their own way, show us how silence, even it is being used to keep sensory experience at bay in favour of a formalisation of our relationship to the real in forms of writing, can in no way be an *irrelevance* when we are talking about music. We may then be tempted to reflect based on this irreducibly dense, heterogeneous, perceptible and significant character of silence, including as a form of knowledge, by coming back to the sciences. Going beyond a revival of an attention to the sensory dimension that has up until now been neglected in most scientific discourse, we can indeed pay attention to semiotic continuities and ruptures, based on a critical study of transformations (the shift from a sensory experience to arithmetic, for example).

The relationship between sound and silence is not just at the heart of musical language and expressiveness, it begs to be explored as a social fact that is variable and filled with multiple meanings; it reminds us of the ways in which the sciences and STS allow us to listen to music and how music knowledge makes us reread practices connected to science and technology. A sonic turn?

To complete this special issue and as an echo to numerous questions brought up in this introduction and the contributions themselves, this issue also includes an interview with Viktoria Tkaczyk, who leads the *Epistemes of Modern Acoustics* team at the Max Plank Institut in Berlin, and who is a pioneer of what we might precisely call the sonic turn in the history of science. Viktoria Tkaczyk presents her work group and their research topics, and a series of works, often little-known in France, on the place of sound and music in science since the Scientific Revolution. She also describes the way in which another way of thinking about and telling the history of science has emerged, by giving certain agents a place that they were not previously granted and by showing how sound has been used, for example by Ernst Mach, as an investigative tool

to explore non-sound-based fields, set up laboratories, produce objects, etc. Music and sound are examined from the perspective of the history of science, of measurement and standardisation; and at the same time, the history of science is, after a fashion, “reset to music”.

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