



RETHINKING MUSIC THROUGH SCIENCE AND TECHNOLOGY STUDIES

Edited by
Antoine Hennion and Christophe Levau



Rethinking Music through Science and Technology Studies

This volume seeks to offer a new approach to the study of music through the lens of recent works in science and technology studies (STS), which propose that facts are neither absolute truths, nor completely relative, but emerge from an intensely collective process of construction. Applied to the study of music, this approach enables us to reconcile the human, social, factual, and technological aspects of the musical world, and opens the prospect of new areas of inquiry in musicology and sound studies.

Rethinking Music through Science and Technology Studies draws together a wide range of both leading and emerging scholars to offer a critical survey of STS applications to music studies, considering topics ranging from classical music instrument-making to the ethos of DIY in punk music. The book's four sections focus on key areas of music study that are impacted by STS: organology, sound studies, music history, and epistemology. Raising crucial methodological and epistemological questions about the study of music, this book will be relevant to scholars studying the interactions between music, culture, and technology from many disciplinary perspectives.

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Rethinking Music through Science and Technology Studies

**Edited by Antoine Hennion and
Christophe Levaux**

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Foreword

Sociology and the arts: A few remarks

Howard S. Becker

The book you are holding in your hands is a tribute to the life and good health of the hybrid field that contains both sociology and the arts. Art, like science, had long been shielded from impartial inspection by sociology, which did not accept conventional aesthetic judgments as the criterion by which we could identify the specific topics a sociological approach to the arts (any and all of them) should cover. The result had been a sociology of music which took as given the canon of Beethoven, Brahms, and Mozart as the core of what a sociology of art had to explain. The sociologists (almost all European, and mostly German or Austrian) who produced this body of work accepted this as too obvious to need argument, let alone proof. In other words, they explained *why* the composers in that very specific European tradition were as “great” as they were taken to be at the time. These writers did not take other kinds of music—even other components of the standard European orchestral repertoire, like the music of Debussy and Ravel—into account. And they ferociously condemned jazz (which happened to be *my* kind of music—one of the contributors to this branch of the literature actually referred in print to jazz as “jungle music”).

The deepest flaw in these scholars’ approach was to take sociology as an adjunct to this imperialistic enterprise rather than the independent science it in fact was and is, the science that seeks to explain the workings of the social organizations that produce what a society calls, and treats as, the world of musical activity. I learned this way of studying *any social activity* from Everett Hughes. His core idea was that we could best study the people for whom the thing we wanted to study was their daily work. This was a lesson embodied in the sociology of science that Bruno Latour and others later developed at about the same time as others of us were working on a sociology of the arts (or, better put, “artistic activity”). Among other implications of this simple but fruitful idea was the idea that Latour put nicely by saying that the fate of any scientific idea lay in the hands of the people who took it up, took it out of the hands of its inventors. The same thing could be said of any artistic object or event.

Some fateful consequences flow from that. The work of the earlier sociologists of music took for granted something that was part of what a serious sociology of music would investigate, which is the *evaluation* of the activity the actors in this world engaged in, and its consequences for them and for their subsequent actions,

for what they did to the work itself. The critics were not separate entities from the music; they were part of the world that *made* it, an integral part of the process of music making.

But the people who do this critical work are no more important or necessary than the others who do what might seem like mundane ordinary tasks. I can never forget the image of a reed player (I think it was an oboist) watched as he carefully and somewhat despondently picked through a box of 50 reeds in search of one he could use. Which impressed on me the importance of this person who wasn't there in person, just represented by the products, the reeds, he had produced in the hopes of satisfying some forlorn reed player like the one I was watching.

What sociology can add to the "appreciation" of music is an understanding of the contributions of all the people who make the final product possible. And, indeed, what the final product actually is. John Cage taught me this lesson, in his wonderful composition "4'33'"—in which a pianist sits in front of a piano keyboard for that length of time, but doesn't touch the keyboard. Cage meant this exercise to teach listeners that *every* sound that took place in the recital hall during that "silence" was *part* of the musical experience of the audience. It surely taught me that, and I can't have been the only one.

The contributors to this book have taken that lesson to heart. More specifically, in line with recent works in science and technology studies, they have tried to fully enter into the musical objects, devices, techniques, and theories themselves. The essays contained here show the benefits to our understanding of doing so. Each in its own way, they contribute to our understanding of the larger enterprise that constitutes the world of music. Let them do that for you!

Introduction

Antoine Hennion and Christophe Levaux

Since its inception as a scholarly discipline in the second half of the 19th century, and for many decades to come, musicology aimed at the scientific study of music, seeking to adopt the same rational standards as the natural sciences. As stated by Friedrich Chrysander introducing the first issue of the seminal *Jahrbücher für musikalische Wissenschaft* in 1863, musicology was to be treated on the same level as other scientific disciplines. No less than the natural sciences, musicology would reveal facts hidden or inaccessible to the many. Musicology would disclose and state how music history unfolded, identify its great or influential figures, define how their particular influence spread and under what form, and carefully uncover and analyze this form. On the other hand, in the wake of the work of Max Weber (1921) and later Theodor Adorno (1976), sociomusicologists would expose the social and cultural environment where music was produced, how this environment stamped its mark on music creation, and how music impacted society in return.

In other words, music scholars were not to produce or invent content, but to observe and depict a content *already there*, presumably disregarding their own judgment. This divide between values and facts—the condition of scientificity *par excellence*—and ultimately between the “human” and the “nonhuman” would find a resonance in another musical field: technology. Musical instruments, and more recently mechanical, electronic, and digital music technologies, were indeed looked at as incredibly sophisticated and elaborate devices, meeting rational and finely measured standards. And this is the way those objects were, until recently, commonly approached in the field of organology: as precisely engineered ones where contingencies and the “human” barely seemed to act.

This divide between science and engineering on the one side and society on the other, which long ran the study of music as in other disciplines, did not prevent cracks or loopholes from appearing here and there, or disputes from erupting between experts, even if these latter were all supposedly to uncover the same truth. Should we remember the debates and controversies concerning—among many other issues—the accompaniment of medieval polyphony (Leech-Wilkinson 2002), Shostakovich’s biography (Fay 2004), the esthetic legitimacy of John Cage (Nyman 2013), and the debates on the academic recognition of popular music (Frith 1978, Tagg 1982, Middleton 1990, Hennion and Mignon 1991)? And that

is not to mention, regarding music technology and quoting Robert Moog himself, that “testing and adjustment are largely a matter of human judgment, rather than the application of rulers and gauges” (cited in Pinch and Trocco 2004: v).

In the study of music, these controversies between incompatible truths would be among the causes of the famous “postmodern turn.” In the 1980s, New Musicologists—as they would later be called—stood up against the set of values that permeated traditional musicology, to replace them with other, more inclusive and interdisciplinary ones. Simultaneously, the New Musicology exposed biased positivism by recognizing and even valuing scholarship’s inherent subjectivity, at the risk of setting aside the project of a universal knowledge.

Controversies are indeed as old as science. In the 17th century, Newton opposed Descartes on celestial mechanics after Boyle and Hobbes clashed over the existence of vacuums; Lavoisier overturned Stahl’s phlogiston theory by founding chemistry a century later; in the 19th century, Pasteur and Pouchet fought over the existence of spontaneous generation, Forbes opposed his colleagues on the abyss, and Darwin refuted everyone on the evolution of species. More recently cold fusion and global warming were objects of heated debates, and at the time this book was being finalized, a jumble of small, bigger, and still open controversies were erupting around the coronavirus pandemic, its nature, severity, medical treatment, and prospects for a vaccine.

The study of scientific controversies, however, is not such a long-established phenomenon. One had to wait until the 1970s to see a “sociology of scientific knowledge” (SSK) moving away from approaches considering scientific content based on a positivist philosophy of science. This approach aimed to open the “black boxes” of science, explore its contents, and provide—beyond a mere sociology of scientists—sociological accounts of scientific ideas themselves. David Bloor and Barry Barnes’s Strong Programme thus urged the study of successful and unsuccessful knowledge claims on the same plan, without privileging the analysis of the one at the expense of the other or invoking social causes for the former and natural ones for the latter (Bloor 1976). For its part, Harry Collins’s Empirical Program of Relativism (EPOR) would argue that, as no experiment allows for closing a controversy, it is social mechanisms that impose a single interpretation of facts (Collins 1981). Actor-network theory (ANT) went on to criticize this sociological reductionism: the sociology of scientific knowledge would too heavily rely on social rules and conventions settling scientific controversies. Michel Callon, Bruno Latour, John Law, Arie Rip, Madeleine Akrich, and others would advocate reconsideration of scientific fact and the human, according to the multiplicity of the relations which constitute it (see Latour 1987). This conception led to a rejection of approaches which separate the “human” from the “nonhuman” and, consequently, those which separate politics from science (and technology) or, more broadly, nature from society.

In the late 1980s, Antoine Hennion—closely associated with the development of the actor-network theory articulated by Latour and Callon—was the first to call for a resolution to a dilemma in music studies between considering the musical fact as a reality, neither altered nor determined by experts, and, in a more

relativistic vein, postulating that the musical fact was above all the fruit of the experts' intimate view (Hennion 1989, 1997, [1993] 2015). Moreover, the reintegration of “nonhuman elements”—scores and texts, sound, instruments, repertoires, staging, concert venues, and media—would allow music to be envisioned “not directly in terms of aesthetic content or social authenticity, but in terms of the way in which, by rejecting certain mediators and promoting others, both are collectively constructed” (Hennion 1997: 432).

Hennion was soon to be followed: in *Rationalizing Culture* (1995), on the institutionalization of the Parisian musical avant-garde, Georgina Born postulated that meaning was inherent in the social, theoretical, and technological aspects of music and its visual mediations just as in its sound. In *Music in Everyday Life* (2000), Tia DeNora likewise attempted to illuminate the way in which heterogeneous unions of people and objects are formed, interact, and structure each other. At the same time, Trevor Pinch was adapting the social construction of technology (SCOT) to the study of music and sound. SCOT empirical methods—inherited from the Empirical Programme of Relativism—strove to represent the full complexity of interactions between the different social groups that took part in technological innovation. In 2002, in this same vein, Pinch published *Analog Days: The Invention and Impact of the Moog Synthesizer*. Pinch opened the way; Karin Bijsterveld and Marten Schulp (2004) would follow its path and delineate new perspectives for organology and sound studies focused on music's scientific and technological mediations.

Since the mid-2000s, this multifaceted field has known a large but scattered number of developments. Whether they address questions of music history, technology, organology, or practices, whether they take their inspiration from SCOT, EPOR, or ANT, they all share the same aim: breaking from the opposition of objectivity versus subjectivity, facts or machines versus humanity, and moving towards a music study where humans, facts, artifacts, techniques, sounds, repertoires, and discourses all interact together. The present book aims for the first time at presenting this approach inspired by science and technology studies, which helps to rethink music. With this particular sociotechnical approach, it is divided into four parts. The first one delves into histories of music, the second scrutinizes instruments, the third approaches technologies, and the last one examines practices.

Histories

Through different case studies, the first four chapters aim to reveal how musical truths endure controversies, trials, and contingencies before they are reified. Antoine Hennion's 1987 essay “Rameau and Harmony: Can Theory Make Reason of Music?”—revised and translated for the first time in English—acts as a testimony of this pioneering approach in music studies. Here, Hennion delves into Rameau's theory, and in particular the presumed “dissonance” of the seventh. The author shows how theory constitutes an act of production, an operation, and in no way the humble servant of nature. Truth is not a discovery, Hennion states, but

a construction, which results from a laborious assembly of compromises, which finally produces music. In this same way, in “Sounding Standards: A History Concert Pitch, between Musicology and STS,” Fanny Gribenski approaches the note A tuned to 440 hertz, which is now regarded as “natural” and used as the norm for musical performance. For most of music history, Gribenski argues, pitches were fluctuating concepts: countries, cities, and individual musical institutions performed music according to their own tones. But a 1939 treaty marked a crucial turning point in the history of musical practices, putting an end to centuries of instability and dispute in the realm of pitch. Drawing from extensive archival work, Gribenski tracks the creation of concert pitch throughout the second half of the 19th and the first decades of the 20th century, revealing the political and social issues entwined with the creation of a common sonic point of reference.

In the third chapter of this first part, “Is DIY a Punk Invention?: Learning Processes, Recording Devices, and Social Knowledge,” François Ribac dissects another fact: it is indeed generally accepted that the “punk revolution” has allowed young people to play music without formal training and make journalism without prior knowledge. Ribac discusses some of the assumptions of this history, and especially the common idea that punk was something completely new which broke all the rules. Going back to a long-range history of DIY practices, he shows that punk is more a visible expression of the place of amateurs in popular culture than a “revolution.” He also argues that the circulation of music should be followed not only through bodies, instruments, records, films, hardware, and the web, but also from one area to another, for instance from cinema to music production. In “Secure and Insecure Bases in the Performance of Western Classical Music,” Daniel Leech-Wilkinson analyzes another common fact—and practice—here in Western art-music ideology: that performers must be faithful reproducers of composers’ intentions. The author asks why practice is so much less varied and more strictly policed in music, to the extent that it behaves more as a historical or worship practice than an artistic one. The training and the policing of professional performance provides musicians with ready-made models, he claims. Moreover, classical performance ideology rests on a collection of delusions, including that the long-dead composer’s intentions can be known, and that realizing them will necessarily produce a better result. The author also shows how the exceptionally long and difficult training it requires becomes a mechanism of costly signaling, so expensive that performers cannot afford, nor can they afford for their students, to innovate.

We close this exploration into musical facts and histories with a more epistemological turn in Patrick Valiquet’s “Deep Structure: The Generative Subject in Actor-Network Theory and Musicology.” Here, the author compares two related attempts to achieve a Chomskian “universal grammar” for music: the “compositional theory” developed by Otto Laske and the “generative theory” developed by Fred Lehrdal and Ray Jackendoff. The author argues that efforts to portray musical behavior as constrained by inborn codes of syntactical competence were not simply borrowings from more powerful disciplines; they enlisted existing musicological concerns, techniques, and technologies in a far broader political

and epistemological imperative: the drive to establish a scientific basis for liberal discourses of human equality and human rights. In addition to offering new ways of studying musical objects and subjects, STS can help us establish a more rigorous and reflexive understanding of the political and cultural construction of musicological knowledge.

Instruments

After an exploration into facts, theories, ideas, histories, and concepts, we delve here into the precise mechanics of musical instruments to reveal their human roots. In “Sonic Imaginaries: How Hugh Davies and David Van Koevering Performed Electronic Music’s Future,” James Mooney and Trevor Pinch develop, through an extensive cross-study, the concept of imaginaries and study its usefulness for a new sociomaterial understanding of musical practices, those of the English experimental musician Hugh Davies and the US synthesizer designer Robert Moog, in particular. Although the basic notion of the imaginary has been occasionally deployed in electronic music histories, the authors suggest, this served a primarily rhetorical function that has tended to boost reductive “pioneer narratives.” It also failed to take full account of the socio-materiality within which music-making practices are embedded. Mooney and Pinch develop and extend the concept of the “sonic imaginary,” describing and delineating the role of the imaginary in the co-construction of new electronic sound instruments, musical ideologies, and social formations. In “Following the Instruments: The Designers and Users of the Fairlight CMI,” Paul Harkins approaches music sellers as “boundary shifters” and “missing masses of technology studies.” At the end of the 1970s, Peter Vogel of Fairlight Instruments in Sydney demonstrated a digital synthesizer to Peter Gabriel during the recording of his third studio album. Along with his cousin, Stephen Paine, Gabriel started a distribution company called Syco Systems, which became the sole agent of the Fairlight CMI in the UK. Using interviews with the distributors at Syco Systems, this chapter shows how they connected the engineering worlds of its designers with the musical worlds of its users. It tells a story about how the use of the Fairlight CMI as a sampler rather than a synthesizer was shaped by the marketing strategies of its distributors and conflicted with the original objectives of its designers.

Finally, in “The Interface and Instrumentality of Eurorack Modular Synthesis,” Eliot Bates explores the interplay between interface (as the point or surface of contact between the human and the technical) and instrumentality (as a performative property of musical-technical assemblages). His research draws on three years of participant observation within modular synthesis communities, interviews with Eurorack module designers, online discussion of interface aesthetics on popular message forums, and archival research into the longer history of more general forms of technological interface design. Technological aesthetics, the author argues, are not an autonomous property that exists in the world, but rather arise from human sensory and kinesthetic engagement with technological

objects. In order to frame the affective aspects of these human-technical encounters, Bates utilizes work from sensory anthropology that provides ethnographic accounts of the relation between the material world and human sensory perception and kinesthetics.

Technologies

From instruments, we scrutinize technology. In “Human Sounds and the Obscenity of Information,” David Trippett studies digital voices used by Alexa, Siri, and Cortana. Human conversation, the author shows, is not exclusively driven by data. He explains how the challenge of creating an empathetic AI using not only suitable vocal intonation and speech timing but also modes of vernacular humor and learning has ignited the race to generate mutual empathy between humans on the one hand and the emergent persona of digital assistants on the other. This chapter examines the carefully choreographed sound of digital voices and their relation to human listeners and human interactivity. In the same vein, in “STS Confronts the Vocaloid: Assemblage Thinking with Hatsune Miku,” Nick Prior studies the particular case of a singer, Hatsune Miku, who has no vocal chords, always sings in tune, and refers to no one and nothing. Voices, including singing voices, states Prior, are double-coded: they can connect and disconnect, comfort and haunt, unveil and conceal. And they still contain the feint promise of a transhistorical interiority: the “I” as the locus of ultimate meaning and signification. How can STS add to our understandings of vocal mediations when the object under scrutiny then refers to no flesh-and-blood singer? This is what the author tries to answer.

To conclude this part on technology, Basile Zimmermann, in “Similarity and Difference in Sound Studies (and elsewhere),” argues that the subfield of sound studies has focused mainly on devices and infrastructures but paid less attention to sound itself, sometimes even describing it as intangible. A sound engineering perspective on sound waves (i.e., audible variations of pressure that air particles take) is then presented by the author and compared with the understandings and uses of the notion of materiality in STS frameworks such as ANT or SCOT. Finally, the framework of waves and forms is introduced as an ontological argument for music studies in the age of the digital.

Practices

If the humanity of technologies needs to be brought to light, in this last part, we study the materiality of human practices. In “Smartphones, Streaming Platforms, and the Infrastructuring of Digital Music Practices,” Paolo Magaudo analyzes the changes that have taken place in music listening practices today as a result of the widespread adoption of smartphones and music streaming services such as Spotify. Based on qualitative data from a study on smartphone use among youth and drawing on an STS theoretical framework on infrastructures, the chapter interprets music listening practices on smartphones as the outcome of

an ongoing process of “infrastructuring,” in which material devices, online platforms, digital data, and shared social music practices have coevolved, embedding today’s listeners into a new set of opportunities and constraints. For its part, in “Tracking the Musical Actor-Network: Losing the Meaning of Musical Experience?” François Debruyne investigates the transformations of online music exchange and its consequences for listening ecology and music experience, from a long-term ethnography of a record shop, which became a site of online sale, to the study of the various generations of recommender systems, linked to the rise of streaming music industry. He shows the ease with which the perspectives of science and technology studies allow us to explore the internet’s “black boxes” and to trace music’s “actor-network”. At the same time, he shows the limits of this kind of cognitive routines in helping us understand the meaning of musical practices today. Sometimes, the more we focus on the network of relations and digital black boxes, the less we keep close to social and musical phenomenality, he explains.

Finally, in “Musicalized Images Composing, Playing, Remixing, and Performing Net Art,” Jean-Paul Fourmentraux investigates the term *net art*, which has been used to designate interactive creation designed by, for, and with the internet, as opposed to those more traditional forms of art transferred onto the network. He proposes to distinguish three main types of net art: works of media contamination, of algorithmic generation, and of interactive communication. Here the relationship with technical objects no longer has to do with exploitation or alienation; on the contrary, it functions in the mode of acquaintanceship and contact, and even of play. The observation of this “artistic experience” is based on anthropological or pragmatic excursions into what objects “do” or “cause to be done” to those who create and experience them.

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