



Audioscan Milano. Exploring Avant-Garde Sound Practices via Digital Humanities

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Abstract

[Audioscan Milano](#) explores the strategies and experiments in the field of sound and noise of Milan's legendary Studio di Fonologia Musicale. A multimedia installation composed of hundreds of field recordings of the city of Milan, Audioscan Milano provides its audience with a multisensory experience of the urban soundscape and the opportunity to interact with it digitally. The manipulation of noise and its transformation into musical sound via sophisticated electronic equipment emulates the Studio's audio techniques but also exposes the reasons behind its failure to attract a wider audience. Visitors to Audioscan Milano expect to hear urban noise rather than musical sounds and, despite some enthusiasm around being able to mix sound objects on the map and move them around the room, they fail to appreciate the technical subtleties of the procedures behind the music. Ultimately, Audioscan Milano constitutes an important link to Italy's musical heritage of the 1950s and 1960s and can learn from its limitations, particularly when it comes to engaging the audience to play a more active role in the auditory experience of the city.

Introduction

[Audioscan Milano](#) is a multimedia interactive installation based on a large collection of sounds recorded in Milan, Italy. A sound mapping project, Audioscan Milano utilizes [MaxMSP](#) to manipulate street recordings into music and arrange them on a digital map. Milan, Italy's largest metropolis, is the birthplace of the Studio di Fonologia Musicale (1954-1983), which quickly became one of the centers of the electronic music scene. Its main representatives, neo-avant-gardists Luciano Berio (1925-2003), Bruno Maderna (1920-1973), and Luigi Nono (1924-1990), produced astounding compositions and sound experiments that contributed to the reshaping of the musical landscape of the twentieth century both in Europe and the United States. Alongside Pierre Schaeffer's Groupe de Recherche de Musique Concrète (1951-1958) in Paris and Karlheinz Stockhausen's Studio für elektronische Musik des Westdeutschen Rundfunks (1951-2000) in Cologne, the Studio provided these composers-musicians-technicians with the new technologies, which at the time were mostly available to radio stations, they needed to push the boundaries of traditional music in ways reminiscent of Luigi Russolo's noise experiments of the 1910s.¹ At the core of the Studio's activity was a porous concept of music, which reflected the intention of Berio, Maderna, and Nono to incorporate electronic and concrete music materials into their work in order to break down the ideological barriers between the French musique concrète and the German

¹ See Russolo's *The Art of Noises* (1913).

elektronische Musik.² In fact, this approach comprised the incorporation of the urban soundscape into their compositions with the goal to generate auditory experiences of life in the metropolis that engaged the listeners and provoked a participatory response from them. Also, fascinated by the soundscapes of their time, Berio and Maderna saw the potential offered by the electronic gear at their disposal to study the “extraordinary life of sound and its physical behavior” (Mila and Paccagnini 153). Noise, in particular, became central, as they continued Russolo’s mission to liberate and embrace it as the phonic aspect of modern life (114). Electronic music therefore became their main avenue to investigate every aspect of the soundscape, including “the mechanical breathing of the big factories” and other urban noise (152, 169).

Audioscan Milano is a homage to and a continuation of the Studio’s work. It explores, analyzes, and manipulates the city’s sonic signature with the intent to elicit a participatory response from the public. Audioscan Milano also provides a digital approach to the Studio’s modernist musical practices that can aid our understanding of its sound experiments and the theory that governed them. In fact, by adopting and developing advanced digital tools for the manipulation of sound inspired by the Studio’s groundbreaking research and practice, Audioscan Milano can help shed light on the thought process behind each creation, enabling us to understand the mechanisms governing each piece and explore the complex relationship between the composers and their audience in order to study the reception of the Studio’s work and its impact on today’s music practices.

Technology and the Urban Soundscape

Like Russolo’s *Risveglio di una città* (1913) and Berio’s and Maderna’s *Ritratto di città* (1954), Audioscan Milano places the metropolis at its center and captures Milan’s many different sonic layers processed by the human ear, drawing attention to the sounds and noises that we often selectively ignore. Upon inviting us to embrace the “infinitely richer world of machine noises” which are enharmonic by nature so that we could “rejuvenate and enlarge the music system,” Russolo created the noiseintoners to harness noise and manipulate it (Russolo 62-63). With an intent that some consider not just imitative but also creative, Russolo “looked forward to the time when composers would exercise absolute choice and control over the sounds that their music employed”³ (19). A true precursor of electro-acoustic music before electronics had come of age, he proclaimed, “We want to give pitches to these diverse noises, regulating them” (27). This was, at least partly, also the mission at the Studio, which overcame the distinction between concrete music and electronic music in order to produce works that penetrated deeply into the city’s soundscape and brought its essence to the forefront. Audioscan Milano places itself at this junction of concrete and electronic music by utilizing heavily manipulated field recordings to create a sonic experience that plunges the

² We define noise as a way of “thinking,” or a “concept” rather than a specific physical phenomenon.

³ This was not Edgard Varèse’s opinion: “Our musical alphabet is poor and illogical ... Why, Italian Futurists, have you slavishly reproduced only what is commonplace and boring in the bustle of our daily lives? ... Music, which should pulsate with life, needs new means of expression, and science alone can infuse it with youthful vigor” (11).

listeners into the urban fabric of the city. Nono celebrated “our intimate, inner, outer, environmental life [that] vibrates pulses listens variedly to the acoustic variety” and wrote about “being in the sound,” particularly the non-static sound that accompanies the “constant mobility, mutation, and transformation” of time and place that is the staple of human existence (Nono 14). He also drew attention to “the very rich acoustic life inside and outside of us, selectable by limiting it, and limiting it in order to be intensely a part of it, but being able to discover, to wonder at the unknown, barely perceived,” and marveled at how “technology today can bring amazed wonder to our ears, our feelings, our knowledge” (16). Digital technology today can pave the way to “knowing how to listen,” not only to traditional music, but to other sonorities as well, particularly those of the space surrounding the individual, that were central to Nono (16). The disparity between composition and listeners, where the latter were often unfortunately ill-equipped to grasp its layered complexity that mirrored and interpreted that of the urban soundscape, resulted in the popular audience’s limited interest in the Studio’s work. In a way, Audioscan Milano replicated this dynamic, which in turn highlighted the need to provide guidance to the audience as a point of entry from which to approach and recognize the value of this genre of electronic music.

As for technology, the Studio allowed a level of sound manipulation that was greatly inferior to that available to Audioscan Milano today. Luigi Nono’s concept of “spaces to listen to” developed with the new gear at his disposal (11). He began with simple tape manipulation whereby he controlled the speed and frequency of recorded sound, and then – as they became available on the market – he moved on to harmonizers, the halophone, the digital delay, band-pass filters, vocoders, and the sonoscope, a tool that helped him analyze sound scientifically. The manipulation of sound in real time by way of the latest technology allowed Nono to achieve a so-called “mobile sound,” or a non-static sound that was not based on specific scales and that would capture the experience of the movement of sound in time and space (16). An example of this concept is Nono’s *La fabbrica illuminata* (1964), which overlays recorded and heavily manipulated machine sounds and workers’ voices in a steel factory with a soprano singing.

Nono and his fellow neo-avant-garde composers working at the Studio aimed at capturing the *intattezza* or wholeness of urban reality (Guglielmi 48). They worked within a poetics of chaos, completely free of patterns: no communication was real or possible, and language and music could only represent disorder without offering an interpretation of it (49). Since everything was fluid, nothing was permanent, the categories of sound, noise, and music were blurred and spilled into one another just as everything and everyone converged, overlapped, crashed, and existed within the aural fabric of the metropolis, the composers had no compelling reason to provide a conceptual framework or listening instructions to the audience. The principle governing the fruition of their music was therefore the unmediated absorption of the sounds along with the capacity to discern its multilayers. For this reason, theoretical writings by the authors of the Studio’s electronic music experiments are scarce, and a curatorial figure is entirely missing. The question Audioscan Milano can answer about the Studio’s sound experiments is whether technology can help us uncover the complexity behind the music and serve as that needed curatorial figure. Technological music requires a technological study, and Audioscan Milano’s digital tools, which are a logical continuation of those utilized by the Studio, can help us understand the intentions and the concepts behind its compositions and sound experiments.

Audioscan Milano

Audioscan Milano was conceived and realized in 2009 by Giorgio Sancristoforo and Giuseppe Cordaro as an interactive audiovisual installation and live performance centered around the noise of Milan and its unique soundprint. Commissioned by AGON Acustica Informatica Musica (a center for music experimentation, production, and research founded in 1990 by Luca Francesconi with Azio Corghi, Mimma Guastoni, Mauro Bonifacio, Mario Pascucci, Pietro Pirelli and Hubert Westkemper), the project was co-funded by Fondazione Cariplo, Regione Lombardia and the City of Milan, and exhibited at Palazzo Reale in Milan and at the Italian Pavilion at the Shanghai World Expo in 2010. This project fits in the tradition and legacy of the Milanese avant-garde and its long-standing relationship with urban noise, and it also takes inspiration from Canadian musicologist Murray R. Schafer's seminal work⁴ on soundscapes: "What always strikes me is how little attention people pay to the sound of the environment in which they live, when it should be obvious to anyone how relevant it is in terms of their quality of life," says Sancristoforo (Mosca). Audioscan Milano is also a homage to RAI's (Radiotelevisione Italiana, Italy's public national broadcaster) Studio di Fonologia Musicale. The Studio, located in a building designed by Italian architect Giò Ponti in the noisy and traffic-jammed Corso Sempione in Milan, was one of the best equipped electronic music studios of the 1950s and 1960s. There, physicist Alfredo Lietti and sound technician Marino Zuccheri collaborated with and assisted Maderna and Berio at the Studio, which also hosted a great number of late avant-garde composers such as Angelo Paccagnini, John Cage, Henry Pousseur, Niccolò Castiglioni, Aldo Clementi, Franco Donatoni, Giacomo Manzoni, and Armando Gentilucci. Audioscan Milano also aimed to utilize the soundscape method theorized by Schafer, and fuse the tradition of the Italian avant-garde with the scientific and musicological approach of Schafer's soundscape analysis and preservation.

Objectives

Both *Risveglio di una città* and *Ritratto di città* create music out of urban noises. While Russolo adopted a similar approach to the symphonic poem's technique in which acoustic instruments imitate common noise, and Berio and Maderna used found sounds and electronic tonalities as a substrate for their radio-poems, Audioscan Milano applied a scientific and ecological approach to collecting and manipulating sound materials. The project had two main goals that entailed elevating noise to art and controlling it. The first goal was to build a database of the city's sounds that would be accessible to the public. The second was to transform those sounds (which consisted mostly of sound pollution generated by today's technological society) and "distillate" them until they were purified into musical tones (as per Hermann von Helmholtz's interpretation in *Die Lehre von den Tonempfindungen als physiologische Grundlage für die Theorie der Musik* (1863)). These tones would then be employed to compose a type of music that was not experimental, but popular, and enjoyable by the younger generations. It was, in a way, a recycling operation by which a waste product was converted into something else, not different from the recycling of plastic bottles and other disposable materials

⁴ Murray R. Schafer. *The soundscape: Our Sonic Environment and the Tuning of the World* (1977). All translations are by Ferrando.

that contaminate the planet (Sasso). In Sancristoforo's words, "We created music from the scraps of our society" (Sancristoforo 39).

Work Structure and Phases

The work involved in Audioscan Milano was divided into two different phases that relied on digital technologies for recording, processing, and manipulating sound. The first three months were spent capturing and measuring the sound of 1,580 streets of Milan (namely, all of the streets and squares comprised within the outer ring road). With the aid of seven students from Laboratorio di Informatica Musicale dell'Università Statale di Milano, Sancristoforo recorded and measured 2 minutes of sound at each location every day during rush hour between 8 and 10AM from Monday through Friday. In order to achieve perfect coherence in data and sound, Sancristoforo used handheld phonometers and digital recorders of the last generation. The 50 hours of recording of downtown Milan they obtained provide a precise sample of the city's soundscape through the workday. The following four months of work required the intense labor and technical prowess of early electronic music composers, and yielded two different outcomes (Sasso). Using MaxMSP and Flash, Sancristoforo and his collaborators programmed an interactive map of the city that was made available to the public on a 40-inch touchscreen located in the prestigious Palazzo Reale in Milan in the summer of 2010. The installation was set in a completely dark room of the Palazzo and included, besides the touchscreen, a four-channel d&b PA system, and two laptops, which drove the map and sounds, and projected onto the screen real time sonograms with street names and relative dBA measurements. The multimedia and multisensory interface of the installation allowed for a spatial (thus enhanced) perception of sound and provided an augmented experience of the sound matter (Sancristoforo 28-29). The second outcome consisted of a one-hour musical performance of ambient music (kindly labelled by a fellow composer as "a musical lexicon very close to the taste of today's audience") that was held in 2010 at Palazzo del Ghiaccio in Milan as the opening show for Ben Frost's live act.⁵

The "distillation," or sound design, was a challenging and time-consuming process. The main goal was to perform "the alchemy of noise transmuted into music" by which literally "everything is transformed. Nothing is like it was before. Airplanes become microscopic percussions, passing cars turn into tin pianos and rubbery basses, light hums, and aquatic delusions. Brakes and exhaust pipes sound like tidal waves of ever so light strings" (Sancristoforo 39). By this process, ambient sound was manipulated in such a way that "it [was] no longer possible to recognize the matrix, the starting sound" (Mosca). To accomplish this, Sancristoforo and Cordaro built and operated a tool called Translator within MaxMSP that consisted of a bank of 46 harmonically-related resonating band-pass filters with a high Q factor.⁶ Each filter had an output with an adjustable gain, so that by adjusting each filter's gain it was possible to sculpt a sound using a technique very close to additive synthesis. The process of creating a single note and timbre was repeated 24 times in order to

⁵ Visit <http://ethermachines.com/> for more information about Ben Frost's experimental electronic music.

⁶ The Q factor is the ratio of the resonant frequency and the bandwidth of the filter.

produce a two-octave sample bank, which was then imported into an [Ableton Live](#) sampler and further processed with filters, reverbs, delays, and amplitude envelopes before it was sequenced for the performance.⁷ This technique allowed Sancrisforo and Cordaro to build approximately 50 different instruments ranging from kick drums to pianos, basses, strings, and synthesizers. The filtering process allowed them to use the aleatory components of the sound sources as a creative tool. The sound of a piano, for instance, did not remain static. The random amplitude fluctuations of the spectrum in the original sounds, once filtered, returned ever-changing timbres that presented peculiar aural characteristics that are impossible to replicate via conventional synthesizers or find in sound libraries. [Gleetchlab](#), a modular sound workstation with real-time processing capabilities, was also used to produce ambient sounds (Sasso). The sounds thus obtained through these various techniques and types of software were ultimately looped and orchestrated in a musical piece that encompasses and features the wide spectrum of Milan's sounds (Sasso).

Unexpected Results and Considerations

While the sound design process was exhilarating, it was extremely difficult to convey to the audience the reasons and the techniques behind the transfiguration of city noise into musical sounds during the communication phase of Audioscan Milano.⁸ The majority of the journalists and the people in attendance expected to hear urban noises rather than musical sounds. Given the complexity of the sound design involved, the methods that were used and the meaning of this form of sound ecology by means of recycling remained rather obscure to the general audience. The successful part of the project, instead, came from the interactive installation, which included a portion of the music performance that was held at Palazzo del Ghiaccio. On a simple XY mixer, visitors could mix the sound objects and move them around the room. They loved to explore all the city sounds, usually starting with the sounds from their street, and then lingering on either the most natural or the most peculiar sounds, which ranged from frogs croaking, to water dripping, the voices of street market crowds, birds singing, and the performances of street musicians.

The partial failure of Audioscan Milano of drawing the audience in revealed one of the reasons why the Studio di Fonologia di Milano failed to gain support among non-experts, and reflects an issue many artists involved in the so-called “contemporary music scene” often face. First, the audience is generally not concerned with how complex the mental processes behind a sound are, especially when those sounds are very familiar. For example, it is unimportant to them whether the sound of a piano is obtained from a real piano or is a simulation of the instrument via a complex method of sound synthesis. An untrained ear cannot distinguish between the two, which means that, in other words, the medium cannot be the message. Second, the twenty-first-century audience looks for interaction and personal engagement. Concerts are no longer “contemporary.” We must always take into consideration that we live in the age of portable digital devices. Today's listeners are looking for a different form of musical entertainment in part because of what we sometimes cynically call the “game effect.” Participation, involvement surround sound, and even virtual reality are a game changing factor. Electronic music, especially when it is made without the aid of physical

⁷ It is interesting to note that, as Sasso points out, complex DAWs such as Ableton Live and Propellerhead's [Reason](#) have evolved from the science of modular synthesizers.

⁸ The process ultimately consisted of “extracting data from noise” in order to capture the “sound of contemporaneity” (Sancristoforo 28, 38).

human gestures – which is typical of the traditional acoustic and electric instrumental practice – suffers from a lack of theatrical effect, which is the reason why popular electronic music acts require over-the-top spectacles of light shows. The audience expects an “experience,” and composers and performers need to focus as much on the experience factor as they do on sounds and musical form. Third, while a scientific approach to the soundscape can exhilarate a musicologist, the audience has different needs. In many cases, a scientific mapping technique does not yield a great number of interesting aural results. The soundscape author must then be very selective and willing to sacrifice a bit of coherence. Mapping an entire city is not only time consuming, but probably also pointless. Audioscan Milano would have discovered more interesting sounds by going into private homes, working places, and public structures during different hours of the day.

Audioscan Milano both succeeded and failed to answer several questions about noise: what is noise? How does our society generate noise? How does noise affect us, and where and when are we most exposed to it? What is the quality of life in the urban environment? While a cultural definition of noise can arise again, we also face the striking reality of noise as a concrete and very tangible form of pollution. Each of the acousticians, sociologists, art curators, and software experts that were consulted for Sancristoforo's book version of Audioscan Milano had a different and interesting point of view that had not been taken into consideration. Audioscan Milano also served as a precious link to our musical heritage, a lesser-known period of our history. Our modern tools and techniques can help us understand better Italy's avant-garde music and its practices, and today, much more than in the past, the audience is able to understand it as well. People are no longer scandalized by noise in music. They are more open-minded and curious, but we should not forget the most important factor: how we formalize a musical experience. The battle between musical sound and noise is a relic of the nineteenth century, and what matters now is how we involve people and how we make them participate. The listener is no longer a passive entity.

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