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Electronic Music

This chapter provides a definition of electronic music and presents some of the musical techniques that contributed to its ever-accelerating transformation over the past few decades.

1.1. *Musique concrète*

It would be tempting to claim that *musique concrète* (which translates literally to "concrete music") was the foundation of today's electronic music. Unfortunately, things are never quite that simple. The arrival of new technologies introduced various other new concepts, some even richer and more complex, which punctuated the evolution of music from the post-war era until the present day.

Who invented *musique concrète*? Even this question is not entirely straightforward to answer. Some might suggest that Pierre Schaeffer[1] invented this style of music in 1948 from the studios of the RTF (*Radiodiffusion télévision française*, the French national broadcasting organization from 1949 to 1964). But digging a little deeper quickly reveals that musicians such as Hector Berlioz, Claude Debussy, John Cage, Herbert Eimert, Jorg Mager, and many others were also experimenting with similar concepts, styles, and approaches.

1 Pierre Schaeffer, August 14, 1910–August 19, 1995. French engineer, researcher, composer, and writer who founded the *RTF Studio d'essai* in 1942, together with Jacques Copeau.

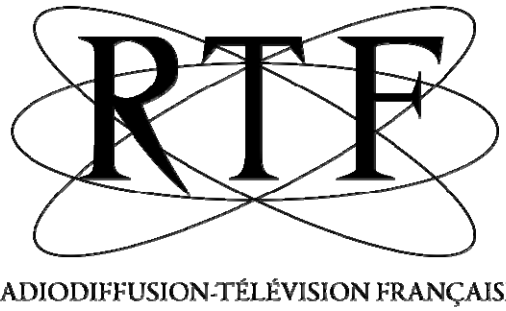

Figure 1.1. *One of the logos of the RTF (used between 1959 and 1964)*

Musique concrète was gradually conceived among a constellation of factors that contributed to shaping its ideas: technological advancements (tape recorders, sound generators, records, etc.), new art forms (cinema, television, radio, etc.), a period of musical renewal driven by new types of instrument (mechanical instruments, electromechanical instruments, electronic instruments, etc.), evolving environmental conditions for musicians (concert halls, studios, acoustic playback and reproduction equipment, etc.), and much more. This list is far from exhaustive.

Pierre Schaeffer can arguably be credited with popularizing *musique concrète* – if "popularize" is indeed the right word for such a niche style of music.

Before we go any further, let us take a moment to define and characterize exactly what the concept of *musique concrète* means. This is also the perfect opportunity to present some of the many musical styles that it has inspired.

Musique concrète has already been defined many times. However, it is often presented by invoking freshly minted terminology, the *raison d'être* of which seems to be to confuse or disorient amateurs and occasionally trip up even the most careful of experts.

Who better to define *musique concrète* than the man who originally introduced the term himself in 1948, Pierre Schaeffer?

The expression *musique concrète* was first immortalized on a paper in the article "Polyphonies", published in December 1949. In this chapter, Schaeffer offers a clear and precise explanation of the term: "We have called our music by the name of 'concrete' because it is made from preexisting elements, borrowed from various sound materials, including both noises and musical sounds, then arranged experimentally by a direct construction that realizes the composer's artistic

intentions without the help of ordinary musical notation, even if such help were not impossible".

1.2. The beginnings of electronic music

Armed with this definition of *musique concrète*, we are now ready to talk about *electronic music*, a much more nebulous concept – especially given how ubiquitous it has become today. We shall return to the modern view of electronic music later in this chapter. In its original context in the 1950s, Herbert Eimert[2], one of the inventors of the style, gave the following definition: "Unlike *musique concrète*, which uses microphone recordings, electronic music only uses electro-acoustically generated sounds. These sounds are produced by a sound generator and engraved on tape. They can then be processed by performing complicated and dynamic frequency band manipulations".

1.3. Electroacoustic music

The marriage of *musique concrète* and electronic music was preordained and inevitable, even if, on some level, they are opposing concepts. *Electroacoustic music* emerged as the fruit of their union in the late 1950s. Karlheinz Stockhausen[3] was one of the pioneers of this type of music.

Electroacoustic music mixes concrete sounds recorded by one or several microphones with purely electronic sounds. One of the most important early pieces in this style was "Song of the Youths" (*Gesang der Jünglinge*), composed by Karlheinz Stockhausen in 1956. Some even earlier pieces, such as *Orphée 51* by Pierre Schaeffer and Pierre Henry, *Déserts* by Edgard Varèse[4], and *Musica su due dimensioni* by Bruno Maderna[5], experimented with similar ideas.

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2 Herbert Eimert, April 8, 1897–December 15, 1972. German musician, pioneer of electronic music, founder of the *Studio für elektronische Musik* for the Cologne-based radio station WDR in 1951.

3 Karlheinz Stockhausen, August 22, 1928–December 5, 2007. German composer, pioneer of electroacoustic music and the spatialization of sound.

4 Edgard Varèse (Edgar Varèse), December 22, 1883–November 6, 1965. French composer who later gained American citizenship, widely acclaimed as a pioneer of 20th-Century music.

5 Bruno Maderna (Bruno Grossato), April 21, 1920–November 13, 1973. Italian composer and conductor.

In the 1960s, the term *electroacoustic* quickly became murkier, which was widely abused as a one-size-fits-all description for anything with elements of instrumental, concrete, and electronic music.

It is worth noting that any purely electroacoustic works from this period were almost entirely limited to recordings. Direct playback was extremely difficult to implement with the equipment that was available at the time, although this did not stop some artists from experimenting with it.

Figure 1.2. *The Cologne-based radio station WDR, one of the workplaces of Karl Stockhausen. This studio was one of the first-ever electronic music studios*

1.4. Acousmatic music

During the same period, in parallel with *musique concrète* and electronic music, the musical community embraced another new concept, *acousmatic music*. The objective of acousmatic music is to experiment with the listeners' sense of hearing and their mental perception of musical messages to leave room for the imagination. The word "acousmatic" refers to an auditory situation where the sound source is not visible, e.g. when listening to the radio or the off-screen voiceover of a documentary. Acousmatic music is intrinsically bound to its platform; it must be played on the same medium on which it was recorded. The sound materials carried by the medium are carefully crafted, sculpted, and shaped by the composer. They can feature any type of sounds (instruments, noises, voices, and synthetic sounds, which are deformed, chopped up, transcribed, inverted, looped, filtered, sped up, stretched, compressed, etc.). During playback, the acousmatic composition is

reproduced by a potentially elaborate array of equipment (inside an *acousmonium*[6]), often with an orchestra of speakers with different acoustic properties to play signals at specific volumes with specific acoustic colors, much like a traditional orchestra of instrumentalists.

Figure 1.3. *An acousmonium with an orchestra of speakers (source: https://inagrm.com)*

The word "acousmatic" was coined by the philosopher Pythagoras, who used it to describe his personal style of teaching. The Ancient Greek thinker spoke from behind a curtain so that his students would only perceive the sound of his voice and would not be distracted by facial expressions and gestures. The term was dusted off and revived by the novelist and poet Jérôme Peignot[7] in 1955.

6 Acousmonium, a playback room or auditorium, also known as a sound projection room, containing multiple speakers arranged and staged in various ways according to the specific requirements of a piece of acousmatic music. The sound message can be played monophonically, multiphonically, stereophonically, on three or more channels, etc.

7 Jérôme Peignot, June 10, 1926. French novelist, poet, and typographer.

1.5. And much, much more

Even after defining *musique concrète*, electronic music, electroacoustic music, and acousmatic music, we are still far from having exhaustively covered every form of music that emerged between the 1950s and today. We could, for example, continue by mentioning experimental music, mixed music, tape music, computer music, live electronic music, subaquatic music, minimalistic music, spectral music, and so on. This list is just a small taste of the sprawling diversity of music and broadcasting phenomena inspired by *musique concrète* and technological advancement. In parallel, the ebb and flow of various trends gave rise to creative movements that proceeded hand in hand with specific musical styles, both old and new: krautrock, ambient music, progressive rock, wave, no-wave, disco, funk, etc.

1.6. Maturity

It is impossible to remain fully objective and neutral when judging the maturity of music. The maturity of which style, exactly? Some musical styles are still being born, while others have disappeared. Combining everything under the single label of "electronic music" reflects the modern reality of the style, despite being something of a catch-all description.

Throughout this book, we shall view electronic music as sound content that combines traditional and/or electronic instruments with a wide range of acoustic processing equipment to enhance playback and listening, whether live or on a recorded medium.

In historical terms, I would personally suggest that the experimental period of electronic music ended with the arrival of the first synthesizers in around the 1960s; electronic music has arguably been mature as a style ever since.

We shall mention specific music styles wherever relevant throughout each chapter of this book, noting the corresponding periods and dates where necessary.

1.7. Different paths to music

A new movement known as *serial music* first emerged in the early 20th Century, initiated by Arnold Schönberg, Alban Berg, and a few others to replace *tonal music*, which had predominated since the 18th Century. Serial music adopts a new approach to writing and composing music by arranging its 12 chromatic sounds according to the enumerative and non-repetitive principle of *twelve-tone serialism*

(or *dodecaphony*)[8]. As such, serial music is in some sense a derivative or an extension of dodecaphony.

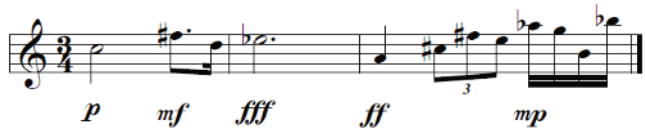

Figure 1.4. *Example of a twelve-tone series (notes, dynamics, and rhythms), the foundation of serial music or serialism*

Although it attracted a significant amount of attention, serialism had very limited influence on contemporary styles of music like rock, jazz, and popular songwriting, which continue to employ the tonal system, each style developing its own characteristic rules of construction.

Composers like Karl Stockhausen and Pierre Boulez combined together *musique concrète* and serial composition in pieces that remain important references to this day. For example, the piece *Deux études de musique concrète* ("Two Studies of *Musique concrète*") was composed by Boulez in 1951.

In the mid-1950s, serialism was gradually abandoned in favor of mixed sounds that combine recordings of concrete acoustic sounds and musical instruments.

In parallel with these more theoretical developments, technological progress was skyrocketing. In the early 1960s, new types of electronic equipment began permeating each and every style of music.

Ever since the tape recorder replaced turntables and engraving benches, musical compositions have been defined and shaped by the actions performed on them. Composers realize their artistic vision by molding sound materials like a sculptor, carving out its musical mass, and adding loops, collages, montages, experiments, and various other manipulations which, together, forge and enrich the musical continuum of the newly created piece. Composers are like musical smiths, hammering away at their sound messages with carefully measured strokes driven by patience, precision, energy, and drive within a brand-new musical environment.

8 Twelve-tone serialism is a technique of musical composition invented by Arnold Schönberg that gives equal weight to each of the 12 notes of the chromatic scale. Serial music is also called atonal music because of the lack of hierarchy between notes of different pitches.

Figure 1.5. *An AEG tape recorder from 1935 (source: https://www.filmsoundsweden.se)*

This new path to music is still trodden by the musicians of today, who continue to produce a stunning diversity of incredible compositions. Guided by personal artistic vision, musicians worked in various organizations, laboratories, and studios, such as the GRMC (*Groupe de recherche de musique concrète*, Research group for *musique concrète*), the GRM (*Groupe de recherche musicale*, Musical research group), and the GMEB (*Groupe de musique expérimentale de Bourges*, Bourges experimental music group) in France, the WDR (*WestDeutscher Rundfunk Köln*, West German broadcasting Cologne) in Germany, the *Studio di fonologia* (Studio of phonology) in Italy, and various other private studios, especially in the USA, to assemble their musical materials into musical styles that differed wildly, despite often being carried by the same underlying technology.

The alternative path to musical composition adopted by the practitioners of so-called popular music, such as rock and jazz, received relatively little attention at that time.

These paths to music share much in common. As well as a classification based on musical styles, it is striking how accurately each path can be characterized by the technologies used to design and reproduce its sounds.

Figure 1.6. *One of the earliest digital samplers, the Fairlight CM1 (1979 – source: https://motherboard.vice.com)*

Electronic equipment has been an integral part of music ever since the 1900s. Without attempting to give an exhaustive list, a few of the key milestones are as follows:

– Thaddeus Cahill's Telharmonium (1896);

– the first audio oscillator (1907) by Lee de Forest;

– the Audion piano (1915) by Lee de Forest;

– the Theremin (Etherphone[9] – 1920) invented by Lev Termen;

9 Etherphone was the original name of the instrument that would later be renamed as the RCA Theremin in 1929.

– the *Ondes Martenot* (“Martenot waves” – 1928) invented by Maurice Martenot;

– the Trautonium[10] (1930) by Friedrich Trautwein;

– the Hammond organ (1935) by Laurens Hammond;

– the tape recorder (1935) marketed by AEG;

– the first analog synthesizers (1970);

– musical computers (IBM 7040 – 1957 – Bell AT&T);

– microcomputers and musical software;

– vocoders;

– samplers;

– digital synthesizers;

– groove machines or grooveboxes.

1.8. Today and tomorrow

Since the early 1990s, a new generation of musicians has taken up traditional, electronic, and electroacoustic instruments. Much like their forefathers before them, every budding new musician needs a historical context to identify with and relate to. What could be more natural than choosing Pierre Schaeffer, the man who popularized *musique concrète* within the contemporary musical community, as foundation and reference? Schaeffer was a researcher, inventor, pioneer, and thinker whose literary and musical works formulated a philosophy and an entire school of thought for one of the most innovative modalities of his era, *musique concrète* and its derivatives: electroacoustic music, electronic music, acousmatic music, mixed music, and so on.

Schaeffer is far from the only possible source of inspiration. We could cite many other artists, such as Pierre Henry, Luc Ferrari, Bernard Parmegiani, François Bayle, etc. Their independence, esthetic vision, extravagance, talent (or occasionally ego), and musical productions introduced new ways of expressing sound, creating a platform for the trends and styles of a newly emerging musical art form whose history would be intertwined with counter-culturalism.

10 Two-hundred copies of the Trautonium were made by Telefunken between 1932 and 1935 under the name *Volkstrautonium*.

1.9. Electronic music and counter-culturalism

In the 1990s, two new genres known as house and techno music gained in popularity. This marked the beginning of the modern electronic scene and a new union of esthetics and culture. The ferocity of this new music was unlike anything that existing artists and producers had ever experienced; computers began to spread, the Internet became accessible to everyone, and the musical economy was shaken to its very foundations. A sophisticated and disciplined audience, who just a few years earlier seemed perfectly happy to purchase vinyl records, tapes, and CDs, suddenly transformed into an impulsive and inveterate consumer base with completely new music consumption habits. Online music, shared from peer to peer (P2P)[11], the first ever music downloading websites, the MP3 format, and portable music players drastically changed the way in which people listened to music – audiophiles wanted more and more music, no matter whether it was obtained legally; individuals were empowered to consume music in their own way, at their own speed.

The introduction of sampling and remixing and new forms of musical performance blurred the traditional lines between composers, performance artists, and DJs (disk jockeys). Electronic music functions as a creative melting pot, merging a vast array of different art forms and styles.

To compose a piece, artists no longer need to sit alone in front of an empty page of sheet music. New methods and equipment are available; writing music is now a collaborative enterprise that can draw from any repertoire: contemporary, classical, jazz – just to name a few.

Theoretical concepts, such as the tempo, the dynamics, and the key of a piece, have become more flexible, fluctuating around an equilibrium that often depends more on the audience than the artists themselves.

Raves[12] and DJ performances perfectly encapsulate the experience of the audience; nothing is fixed or set in stone, and everything is constantly in flux.

Music has thus become a malleable medium shaped by sociological, technological, and cultural events. New esthetic sensibilities have taken flight, often intangible, multidimensional, and cross-generational.

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11 P2P is a computer networking model where every participant acts as both client and server, unlike the more conventional client–server model.

12 The underground gatherings of the electronic music scene, often organized in disused locations (warehouses, old factories) or natural venues.

Musical styles can no longer be imposed on an audience. The audience are the mediators, judges, and executioners of the present moment and deliver their verdict in real time. Just a few years earlier, this might have been seen as scandalous and denounced as such – plagiarism, copyright violation, and theft. A few still fight to uphold traditional values in the name of musical and sociological ethics, but they are in the minority. The steamroller of popular electronic music irreparably crushes any voices that dare to rise against the crowd.

Even as the old guard, the producers and record companies, scream foul play, nobody hears them, or perhaps nobody wants to listen. Their efforts are in vain; they cannot fight against technology, the Internet, and the ability to download. The general public and their new artists have seized the helm. Who needs the music industry?

Albums can be promoted over Web 2.0[13], social networks, music and video sharing, and distribution platforms: Deezer, Spotify, YouTube, DailyMotion, etc. (see Figure 1.7).

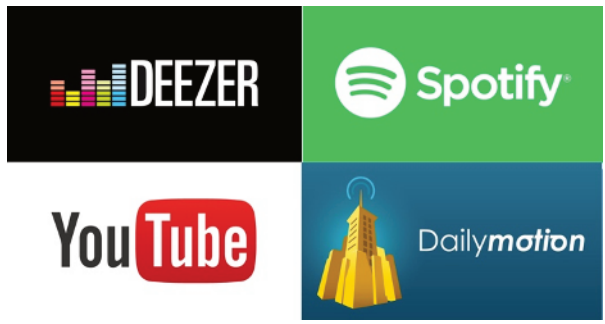

Figure 1.7. *Deezer, Spotify, YouTube, and DailyMotion – four of the most popular sharing platforms*

Some performers, rights-holders, and institutions continue to protest the concept of a piece of music that cannot be fixed, that is continuously evolving, which jeopardizes the legal principles of copyright and ownership. Perhaps they have a point?

But we could also argue that even traditional songs, melodies, and compositions have traveled over time, across different epochs and continents, with a thousand and one variants in almost as many different styles. Surely this is nothing new? The

13 Web 2.0 describes the Internet after 2003, once support for user interactivity had become widespread. On the web, users are both actors and content creators.

modern world invokes ethicality to justify rights and contracts, but we should not turn a blind eye to the economic and financial incentives at play.

The recognition enjoyed by artists and performers is granted and taken away according to the whims of the media and networks. The *dematerialization*[14] of music, whether at the level of distribution, interpretation, or composition, seems to be a recurring theme of modern times. It seems unlikely that anything can stand in its way.

Still, a few noteworthy initiatives such as the Creative Commons License[15] and the Free Art License[16] have attempted to adapt the idea of copyright to the new musical dimensions of cyberculture.

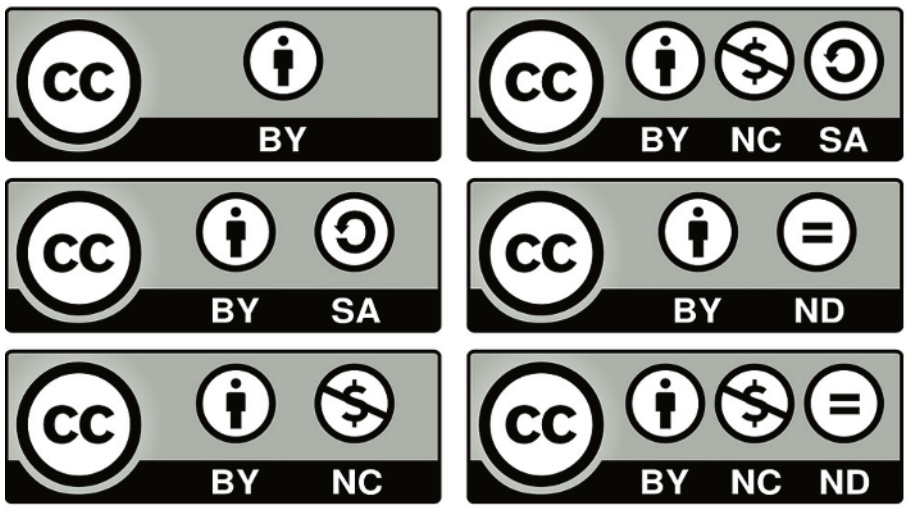

Figure 1.8. *The different types of Creative Commons License (BY: attribution to the author is required – SA: sharing is authorized under identical conditions – ND: no derivative works – NC: no commercial usage)*

14 Replacement of traditional information carriers and materials (papers, folders, disks, CDs, etc.) by computer files.

15 Creative Commons is a non-profit organization that offers an alternative legal solution for individuals of all countries who wish to relinquish their intellectual property rights.

16 The Free Art License is a legal contract that applies the principle of "copyleft" (where the author of a protected work grants the rights to this work) to artistic creations and much more. It can be used for any production that is covered by copyright.

1.10. Final remarks

No one can predict the future of the popular landscape of electronic music, which is the culmination of a technological, musical, and ethical convergence at the forefront of a revolution that might deserve to be denounced as politically incorrect. Nevertheless, the foundations have been laid for a transgressive utopia that perfectly suits its newly emerging musical sound smiths – a paraphrase, in case anyone should object to using the terms “musician” or “artist” in connection with electronic music.