

[1]

Digital Musicobricologie

Interface modalities in the digital music
creation process

Marin Scart

Abstract

“We Shape Our Tools, and Thereafter Our Tools Shape Us”

Marshall McLuhan, *Understanding Media* (1964)

Musicobricology? This neologism was coined in the context of this research and aims to synthesize the ideas that compose it. This term combines the notion of music with that of bricology, invented by Ely Bessis at the *Arts Décoratifs de Paris* in 2015, which designates: “the science of do-it-yourself (in an) approach guided by the observation of technical objects or industrial constructions resulting from engineering or craftsmanship.”

"What is the musical object on which the artist will be able to “tinker” with?"

Pierre Schaeffer defined the notion of sound object in 1952. All notes but also all audible sounds can be sound objects and they do not have to possess an aesthetic value.

By associating DIY, craftsmanship and industry to create and experiment with sound-producing objects, musicobricology can invite to an approach that does not sacralize music and is opposed to a virtuoso and elitist vision. It designates instruments thought and designed more from positions close to do-it-yourself culture/the DIY world than from positions demonstrating the expertise of craftsmen designing instruments. (Like most classical instruments, the *Stradivarius*, for example, is considered a masterpiece of lutherie).

The term musicobricology emphasizes a more experimental approach. It also aims to question the classical academic system of the orchestra or groups in order to question new forms of dialogue in musical creation.

Once this terminology has been clarified, it is appropriate to delve into the technical issues related to the musical interface. What are the crucial elements in the design of a successful interface and the criteria, parameters, modalities that allow its quality to be evaluated? The reflection will lead us to consider the context of use of the instrument and the balance between technical complexity and accessibility of the interface.

The first part of this dissertation deals with the experiments carried out in recent years in the field of digital creation and musical interfaces and attempts to define a horizon of possibilities by reflecting on the technical issues related to the musical interface. What are the essential elements for the design of an interface and how to define the criteria that allow to evaluate its musical qualities?

The second part raises the question of the necessity of the appropriation of tools by the artist but also by legitimizing their status as creator and musician. It also tries to explain how this appropriation is facilitated by different types of sensory feedback in the creative process.

In the third part, the way in which digital technology is changing the stakes of the public/artist relationship in musical creation is analysed.

The end of this research on the interface in musical creation leads to a conclusion synthesizing the discoveries and main ideas of the different parts.

The challenges of designing musical creation interfaces

Let's start with the main issues related to the development of digital technology, which are now appearing in the design of new interfaces for music creation. We will rely on research that questions the optimization of music creation interfaces for the user.

Kristina Andersen and Dan Gibson, researchers at MIT, have written an article entitled *The Instrument as the Source of New in New Music*. Their experiments focused on the modification of a cello, chosen for its wide range of sound possibilities and the possibility of integrating electronics in a non-intrusive way, in order to provide the instrument with a digital capacity to modulate the acoustic sound produced, directly from the instrument's surface. The cello was chosen as the base, as it offers a wide range of possible sounds thanks to the different materials that make it up. It allows the nuances of pitch to be played with high resolution, and the surface of the instrument allows the electronic components to be easily mounted without impinging too much on the use of other elements:

“The underlying issue is not only to improve an existing instrument or make it more suitable for electronic music, but to create structures that could better correspond to the personal mental images of the artist of the music that might be produced.”

This research thus raises the question of the appropriation of this instrument by the artist and how relative it is to call an instrument “good”. An instrument may have the capacity to produce a magnificent and harmonious sound, but be designed in such a way that the musician will never be able to fully appropriate it and exploit its sound potential. In spite of the sound qualities of the instrument, in the end it cannot be played the way the user wants.

The quality of an instrument will always depend on the context in which it is played as well as on the musician's expectations regarding the sound they wish to produce and the way they wish to play it. In the article quoted above, Kristina Andersen and Dan Gibson point out in particular that the construction of their *augmented cello* allows it to fulfil the role of an experimental instrument dedicated to a performative dimension of music. Their augmented cello will thus not be judged solely for the quality of its sound, but rather for the creative possibilities discovered through this technology as a mediator of reflection.

A first distinction must be made as regards on the dialogue between instruments and musicians: some instruments are designed to play sounds that are meant to be listened to or to transcribe previously composed music, and others fulfil a task of musical exploration, or even purely sonic exploration. The stakes of a musical creation interface are linked to the context in which it will be used (in concert, rehearsal or experimentation for example). It is therefore important not only to think about the object in terms of its technical possibilities, but also in terms of the dialogue it will maintain with its users and the context in which it will be used.

Dialogue between machines and artists

It appears that diversion and personalization are at the heart of the musicobricology approach. However, in this process, the question arises as to the nature of the dialogue that the artist seeks to develop with the tool of sound creation. It seems obvious that one will not be led to play an electric guitar designed for Norwegian death metal in the same way as an alphorn or a Bali gong. The way in which each instrument has been designed for a type of dialogue, a physical relationship with its user, influences its use and therefore the sound produced. The physical form, the context in which it was created, or even its place in the history of music influences the way an instrument is played.

But this same realization seems much less consensual when dealing with digital interfaces and instruments. Brian Eno explains that:

“The basis of computer music making is the misconception that only the brain makes the decisions and only the index finger does the work.”

Sidney Fels’s research paper, *Designing for Intimacy: Creating New Interfaces for Musical Expression*, asks how to create digital interfaces, while avoiding the coldness of playing virtual instruments, and creating a form of intimacy between player and instrument. Fels begins his article by explaining what he means by intimacy between instrument and musician:

“A high degree of intimacy is achieved when the control over the sound is clear to the user and reaches a level where the correspondence between each modulation parameter and their results on the sound is transparent to the player, when the player embodies the device.”

To explain this idea, we can refer to Robert Henke’s creation (known under the stage name *Monolake*): and his interface, the *Monodeck*. The particularity of this interface, is that Henke built it to measure to accompany his own artistic approach. He knew the way he wanted to play his music thanks to the software he was already using, but he didn’t want to lose the performative dimension of the music, despite the use of digital tools. More precisely, he wanted to avoid having to use a keyboard and mouse combo as interfaces, which would have frozen the interaction and prevented a more spontaneous relationship to his sound creation. Creating the Monodeck allows him to give a specific physicality to the virtual parameters with which he wishes to interact live. The challenge of this interface was not to offer new technical possibilities, but to entrust a tangible dimension to a computerized sound creation process.

In this work, we can see a will to allow the instrument to be as much as possible a form of extension of the body, a phantom interface in a way, which has to fade away to allow the most direct possible dialogue between the sound and the player. The instrument does not take a creative place and is only a tool. It is transparent in the creative process, so it does not “filter” or directly influence the musician’s creative choices. There are, however, instruments that seek to colour the artist’s playing/performance through their use. What happens when the trend is reversed and one no longer seeks to reinvent the instrument for the musician’s performance, but to think about the interface to question the modalities of the user’s playing?

The example of the *Mimu Glove* shows how the interface can lead the musician to reconsider the way they play: it proposes to the user to assign the parameters he wants to the different functionalities of the software thanks to the midi protocol. However, *Mimu Glove* differs from a conventional midi interface in its form. Indeed, it slips over the hand like a glove and analyzes the intensity of the user’s movements. During its use, the user undergoes an empirical learning process: he moves while trying to discover the influence of this movement on the sound he hears and produces. Thus the same virtual instrument, which the user may know how to use with a more conventional piano key interface, may appear as a completely new instrument using a gestural dialogue. This change of perspective on the playing modality will give very different sound results, but above all it will allow the user to rethink his relationship to the playing of the virtual instrument used, regardless of the interface.

Another special case is when the dialogue between instrument and artist has to be designed for a specific context. Artist Dmitry Morozov’s performance *Last breath* will use a custom-made wind instrument to be played with his last breath. The strength of this performance, apart from the power of the context in which it is played, lies in the dialogue between the instrument and the player. The instrument must be adapted to be played passively, as the artist imagines himself lying on his deathbed, too weak to operate an “active” instrument. The sound produced is then entirely predetermined by the shape of the object itself. On the other hand, the user has to channel his last forces to exhale enough air to activate the whistle mechanism that produces the sound. We find in this performance the idea of a body extension in the instrument, without the need for virtuosity. D.Morozov presents us here with a dialogue closer to the trust between the instrument and the artist. His trust in his instrument so great that he wishes to entrust it with his *last breath* which will be transformed into a note on the verge of death.

To synthesize the contributions of this development, it should be remembered that the technical mastery of an instrument is fundamental to establish a dialogue between player and instrument. However, we can take as a creative postulate to question the unilateral nature of this typology of use. Symbiosis, conflict, discovery, trust, to name a few, are different types of dialogues that question both the instrument and its user in the place it occupies in the creative process. It is interesting to reject the idea of a single dialogue between a musician and his instrument, in favour of a plurality of possible dialogues, specific to each creative process, each resulting in their own type of sound creation.

Appropriation and hijacking of interfaces in music creation

One constantly finds in the intentions carried by musicobricology, a will of appropriation and misappropriation. But what does this approach of experimental research bring in relation to a sound practice such as that observed in the world of conventional music?

A book by Caleb *Kelly Cracked Media The Sound of Malfunction* shows how, from the middle of the 20th century to the 21st century, artists and musicians have manipulated, broken and “cracked” audio media technologies to produce new sounds and performances. This book provides insight into why musicians such as John Cage, Nam June Paik, and Oval have modified phonographs and CD and vinyl record players to create a new sound palette.

It is difficult to talk about musicobricology without mentioning the work of Pierre Schaeffer. He was neither a musician nor a composer by training, but a radio engineer when in 1944 he began his first experiments in what will eventually be called “musique concrète”. Concrete music is defined as a musical genre allowed by electroacoustic techniques. It uses the recording of sounds, followed by arrangement and composition, as a process of musical creation.

Another pioneer of experimental music, as early as 1960, John Cage, demonstrated how everyday objects could be rethought for their sound properties, allowing sound pieces to be composed with musical intent. In *WaterWalk*, he performs a series of predefined manipulations of objects and liquids to create a form of sound narration that is then recorded on magnetic tape. In John Cage’s concrete music and performance, we find important ideas of musicobricology: technical experimentation to create a sound never before heard and the use of any objects to derive sound properties from them.

The book *Handmade Electronic Music: the Art of Hardware Hacking* by Nicolas Collins is a guide designed to enable novices to embark on this quest to construct sound objects from generic electronic components. Part of the beauty of this practice lies in the fact that although there are guides, using components from everyday life can create unique combinations for each creator. The approaches may be similar, but the sound that the circuit hijacking will produce is always uncertain, it is not even sure it will light up (or explode), before it has been tested!

A collective of musicians is highlighting this recycling dimension in their performances. *Electronico Fantastico* is a collective that wants to breathe life into household appliances thrown away by their former owners. They thus create a real orchestra of improbable instruments, as quirky as they are touching by their stories. Old cathode ray televisions are converted into percussive instruments thanks to the interference of static electricity from the user tapping rhythmically on the screen. An

old fan suddenly becomes the support for a real solo to make Jimi Hendrix fade away, and the old granny's TV probably never thought it would end up as a *Telelele* (a TV set living its best [second] life as an analog ukulele). *Electronico Fantastico* explains their approach as follows:

“Once consumer electronics is dismantled, we realize the wisdom of the first electronic devices and the interesting scientific/physical phenomena hidden inside their functioning. By transferring these physical principles into musical instruments, a sound like a moan of electronics begins to resonate. Old household appliances come to life as supernatural creatures, the yokai of Japanese folklore, sometimes appearing as the spirits of abandoned tools reviving through their new uses.”

Interestingly, they highlight the possibility of highlighting the electronic recycling dimension in performance. In their case, by naming their instruments and recalling their origins as everyday household appliances, they stress, without needing to make it explicit, that performance is only part of their approach as sound creators.

But what formal choices can be made regarding complex instruments (digital or not) to bring their users to this same form of intimacy and familiarity with the object? During the interview with the musician Hainbach, he said he particularly enjoys playing on the synthesizers of the creator *Ciat-Lonbarde*. These instruments, even if they produce their sounds from complex analog modular synthesis, are visually not much more than blank wooden panels. Beneath this seemingly anecdotal observation lies the desire to bring this instrument back to a tactile relationship that would be more closely associated with the touch of a craftsman's instrument, such as a guitar or a violin. Where the aesthetics and touch of many modular synthesizers are related to the technical, metallic and cold worlds, *Ciat Lonbarde* synthesizers are rounded and made of wood. This choice of material and shape leads us to see these instruments as the product of craftsmanship in which the feeling of the interface and the manipulation of the sound would have been thought of simultaneously. In an industry where the process of creating a synthesizer often boils down to making a list of desired technical features fit into a panel of buttons and generic sliders, without thinking about their interpretation by the user, *Ciat Lonbarde* instruments stand out by thinking about the tactile relationship that their instruments will maintain with their players.

By not specifying the technical dimension of its instruments, *Ciat Lombarde* sells a medium that invites a sensitive creative process, where many electronic instruments are only “technical tools” that do not bring through their forms a specific creative vision. The answer to the question of what allows an intimate dialogue with complex instruments is probably to be found in the simplification of their interface, and not in the explanation of their functionality. By creating a surface that removes the technical dimension and integrates that of aesthetic pleasure, *Ciat Lombarde’s* instruments invite us to experiment with their use and offer a specific playing sensoriality to each of them.

In conclusion, we understand the primordial issue of thinking about all forms of sensory feedback for the acoustic instrument as well as for the digital interface. It seems important that the shape of an instrument should invite the use that its creator intends for it. Even if the aim is to fade away in favour of the total appropriation of the instrument by its user, the formal choices concerning the instrument can encourage this. It is then these formal and tactile choices that will allow for a unique familiarity and dialogue between artist and instrument.

How the digital interface generates such new contexts for musical creation and pushes the limits of the stage

We have seen in the previous section the immersive possibilities that digital technology offers to the audience to project themselves more into the live performance of the music. In some of the projects presented, novice users are invited to take part in the creation. This raises the question of the capacity of digital technology to change the notion of participation and stage for the audience in performance.

The performance *Lullaby Experience* is a participatory project imagined by the composer Pascal Dusapin, giving children and adults alike the opportunity to participate personally in the performance. He proposes to each one, through an application, to come and give the memory of a melody or nursery rhyme that marked their childhood. The recordings collected then become the sound material used by the composer for the performance. The excerpts are transformed and assembled, and immerse the spectators in the sound portraits of each city where the work will be presented. The boundary between spectator and actor is thus blurred here. To further reinforce this, during the performance the spectator is also invited to come to the stage, to fully immerse themselves in the installation to which he has contributed.

Some projects take use of this desire to question the limits of the stage even further by giving the audience an active place in the performance. Arthur Carabott's project, *Today at Apple: Designing Sound* questions the possibility of "hacking" places and objects to transform them into stages and generate new performance contexts. In this project he seizes an Apple store, in which all the latest products are lined up for promotional purposes, to transform it into a connected orchestra. Each of the computers or telephones produces one of the instrument voices as would a traditional symphony orchestra, composed of iPhones instead of violins and iMac for double basses. Users are then invited through an application to change the timbre of these instruments. The interface has been designed to make it easier for novice users to get started. It allows to understand the fundamentals of sound synthesis. The application consists of seven widgets, designed to be "touch first" and to encourage experimentation; each widget controls one aspect of the sound: the envelope, the waveform, the harmonics, a filter, an LFO amplitude modulation, a chorus, or a reverb and an echo. After giving users a time to discover sound design, Arthur Carabott takes on the role of conductor by playing all the voices created by the users on a midi keyboard.

This is a form of collaboration between audience and musician, finding the balance between mastery and external parameters for the “conductor” who controls the melody while fully integrating the audience into the creative process. For the conductor, the audience in this performance remains an “unknown variable” which he must harmonize without limiting the creative tools he makes available to users. By asking the audience to specifically take charge of the timbre of the instruments, Arthur Carabott offers a task that requires more personal sound aesthetic choices than purely musical ones. By managing only the timbre of the instrument, the instrument may sound bad, but will always played in tune with the rest of the orchestra. This gives users the free choice of their place in this orchestra of digital voices and allows them to experiment during the performance itself to find a sound balance with the other users. In this performance, there is a willingness to push the usual limits of the stage, by “musicker” a place that was not intended to host a participatory electronic music performance.

But to what extent does bringing digital sound creation into everyday life allow us to reinvent the limits of the stage and of participatory performance? Dailytouslesjour's project **21 Balançoires** questions the integration of a participatory musical dimension into an urban context. In their project, 21 "sound swings" are installed in front of bus shelters and passers-by are invited to participate in a collective musical creation. Each of the swings generates part of the musical composition, changing rhythm according to the intensity with which the user swings. By trying to coordinate with their neighbour or, on the contrary, by deliberately taking the counter-time, the users make the music evolve in real time. The will is to make emerge from a cooperation between individuals, a unique sound creation. As a user, you have to adjust your actions to those of the other users.

Conclusion

Over the course of this dissertation several major ideas have emerged and some intuitions have been confirmed. Over the course of history, the very notion of a musical instrument has evolved. Today, it agrees to include the digital interface within this category originally reserved for acoustic instruments. Just as the advent of photography has not made painting obsolete but has allowed us to rethink its stakes, this dissertation postulates that the same applies for the emergence of digital technology in the world of musical instruments. Our reflection around the musical interface is thus situated in the field of musicobricology, a term invented to embody the spirit of this work in order to introduce the aspect of interface creation and deep reflection on the very notion of instrument in the musical field.

By questioning the concept of the sound object, we were able to determine that the transformation of a sound tool into a musical instrument is made possible by the dialogue it maintains with its user. It is therefore not only defined by technical elements, but rather by its use. It is possible to create acoustic or digital instruments to play music for which the codes are already established. In the world of sound creation, digital technology has made it possible to lower the barrier of technicality necessary for musical creation. In the case of musical creation, the interest of digital technology has been to allow us to no longer focus solely on the virtuosity of the artist's performance but rather on his universe and the singularity of his creative process.

However, digital technology underlines the possibility of thinking first of all about the technical dimension of the sound tool and then allowing it to find a creative use "of its own accord" and develop a new way of dialoguing with its users. The interface must be the vector designed to allow the evolution of the dialogue between user and sound tool towards that of musician and instrument. The emergence of the current trend whereby musicians are diverting their instruments underlines their desire to create their own forms of dialogue. The creativity of the artist is no longer only in the playing but can also be found in the conception of the instrument and its specific use for a singular artistic vision.

Through the finesse of the approach put in place by these digital luthiers, we witness a truly two-way exchange between artist and instrument. The instrument is adjusted, in its interface or on its functionalities, according to the artist's choices. The artist, in turn, is led to question and refine his practice in response to the choice he makes on the design of his instrument. Digital technology has thus enabled the emergence of a new type of dialogue between instruments and musicians.

While opening the doors to new dialogues between musicians and instruments, digital technology raises the question of the part of sensoriality present in music. The physical dimension of the instrument as well as the senses (other than sound) solicited during its use must be rethought as a fundamental part of the digital instrument, as it is intrinsically for an acoustic instrument. The interface in these digital instruments brings physicality to abstract musical concepts. In the context of a live performance, it can allow the audience to project themselves into a visual dimension that underlines the artist's sound universe or that comes to explain the technical dimension of the musician's creative choices.

The creative possibilities offered by this research on the new interfaces of digital sound creation lead the designer to ask himself several questions: how can digital instruments better integrate the audience in their principles of use? How can sensoriality in digital music creation be reinvented in a new form? How can digital interfaces propose new forms of participatory instruments that think how they will be appropriated by novice users? How can the digital instrument be thought of so that it allows both the novice to take an interest in it and the possibility to evolve towards a subtle dialogue from musician to instrument?

The Bolide collective's project aims to provide a form of response to these questions through the creation of participatory digital musical installations. Personally, I wish, following this dissertation, to further investigate my reflection on the link between the form of the sound tool and the creative possibilities it brings to the user. Ultimately, my ambition is to design instruments that reconcile the constraints of physical form with the freedoms offered by digital technology by developing new typologies of interaction within the framework of contemporary violin making.