

## PLAYING THE LAPTOP

### The instrument as access

Until I started studying composition, I didn't recognize the difference between an instrumentalist and a musician. By this, I do not mean that an instrumentalist is not a musician, but that it is possible to be a musician without being an instrumentalist. Before studying composition, the instrument was simply a way to access music. I didn't even understand it as a way of externalizing something that I already had inside; for me it was as simple and as difficult as picking up my saxophone, my flute or my bass clarinet and playing. It wasn't until later that I understood that an instrument could also be an object with and through which to think about music, something that mediates between a purely mental if not entirely clear conception, and its subsequent manifestation as sound.

So, at least from an improviser's perspective, an instrument is part of the creative process rather than just a tool for expressing something completely defined beforehand. This is a delicate issue. A flea believes that the dog is his, and I have met many musicians who consider themselves the owners of the music they make, despite the obvious difference between the duration of a human life and the practical eternity of music as a human activity. Music was doing very well before we arrived and it will continue to do so long after we are gone. Let's take note of Native Americans, who did not understand how you can own land. Land is eternal, people are not. For them the Earth does not belong to us, we belong to it. For me, the same is true of music and musicians.

Likewise, instrumental expertise and musical insight are not only not the same—Sometimes they don't even get along. Who, at a concert, has not been initially impressed by a musician's enormous instrumental control, only to find himself bored by the lack of musical depth before the third piece arrives? The association of virtuosity with musicality is due in part to how music is taught, to deeply held values rooted in certain types of music. But it can also coincide with how musicality and instrumentality are taught as one and the same thing in childhood. In most cases, we learn our first instrument at the same time as we acquire basic notions of music. So, in addition to understanding an instrument as a way of accessing music, we accept, often without even thinking about it, that its technique will be determinant in the development of our musical language. The relationships between instrument and musical language are multiple and reciprocal. Moreover, they are too formative for us not to be aware of their reciprocity as we grow into musicians.

Sometimes a musician's relationship with their first instrument lasts a lifetime. Some musicians have such a deep relation with their instrument that their own musical evolution generates the changes in technique that they need to maintain its viability, even when they cover a wide range of increasingly varied musical languages. There are also musicians who have almost completely defined their repertoire before they turn thirty and do not look any further: musicians who are happy to play, for example, in a symphony orchestra where they only rarely encounter repertoire that demands skills they have not already mastered.<sup>1</sup>

Some of us, however, evolve in such a way that the instruments that once provided us access to the music we wanted to play, that allowed us to channel our musical thought and translate it into sound, no longer suffice. Our music and our musical thoughts call for things that the instruments that

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<sup>1</sup>Happily, this is not the case with all symphony orchestras, nor with all symphonic musicians.

accompanied us since childhood cannot give us. We continue to live in the land of music, but we have changed neighborhoods—in some cases, entire continents.

Hence begins the search for an instrumental situation more akin to our needs. And here is where we find two ineluctable realities that also reflect the dual function of an instrument in a musician's hands. First, language, including musical language, is a means not only of making sound but also of thinking about, with and through sound. So, to the extent that we consider sound our medium, an instrument that does not allow us to make the sounds we need will not easily favor the type of sonic thought we must necessarily engage in if we are to actually make music. And here, of course, by musical thought we mean both the exploration of sound itself and the equally delicate and demanding task of relating some sounds with others.

## Adapting

It can be a really drastic decision to switch to a new instrument after years with one that we not only control but that has become a part of our identity (personal and professional) as a musician. First of all, it means learning to play the new one when you are already an adult, which is very different than how you learn as a child. Still, one comes to the new instrument with a world of both musical and instrumental/corporeal experience, much of which is adaptable, especially when the new instrument is from the same family. Passing, for example, from the clarinet to the flute is very different than passing from clarinet to trombone. Here language issues come into play again, and with them, the possible advantages of adapting the already known instrument to meet new needs.

To a considerable degree, the origin of traditional instruments lies in specific uses. As those uses expanded, the instrument's design evolved adapted to address them. For example, the horn began as a hunting instrument, a round tube with a mouthpiece at one end and a bell at the other. Its evolution to its current state as a French horn, with valves that turn it into a chromatic instrument, is well known and constitutes a good example of this response to evolving musical needs. However, there is a moment when the changing nature of music leads the composer, improviser or instrumentalist (often, all three) to demand from an instrument a musical language and role quite distant from the one that led to its invention and development up to that moment. This may call for some sort of *extension*, a term which can apply to instrumental technique, to the instrument itself, or to both. In fact, the valves on a French horn are a perfect example of both, as they not only transform the instrument itself, but also its playing technique.

*Extended techniques* are those that a musician learns to generate a variety of new sounds, some of which will eventually become a part of the instrument's canonical technique. Moreover, they are generally expected to be possible with little or no intervention in the design of the instrument itself.

*Extended instruments*, on the other hand, are conventional instruments which have been modified to allow the musician to embrace new sonic demands. Nowadays this often involves incorporating electronic devices into an acoustic instrument to expand its possibilities. And here we must not lose sight of the combination of time and effort necessary for a musician to acquire the techniques required for operating that extension in a way that can ideally be seamlessly combined with traditional technique to generate a new version with an expanded but coherent language.

In between, there is another resource: the prepared instrument. This consists of temporarily intervening in the instrument to change its sound possibilities. This, of course, is not new. Mutes for brass (trumpet, trombone, etc.) or stringed instruments are centuries old and their use has been explored by every kind of musical creator, from the brilliant use of string mutes by Ravel in *La valse* to the fluid and very vocal combination of vocal growls with various types of mutes developed by "Tricky Sam" Nanton, "Cootie" Williams and other trumpet or trombone players from Duke

Ellington's orchestra. Equally exemplary is the prepared piano invented by John Cage and brilliantly exploited in his *Sonatas and Interludes*. There, the introduction of screws, bolts, pieces of felt or rubber between the strings in very precise places, produces a truly surprising range of sounds that the pianist can employ with an almost completely conventional instrumental technique. And just as with the mutes, these "preparations" do not permanently alter the structure of the instrument, even if they lead the musician to expand his or her technique to get the most out of them.

## Adopting

Adopting a new instrument does not necessarily require abandoning one's usual one. Many musicians are multi-instrumentalists, either out of creative necessity or due to professional demands, if that distinction can be drawn. And there are many who continue to play their habitual instrument while learning to play their new one. Often, this is not even a decision. They say that life is what happens while we are busy making plans, and often it is not even a matter of what happens as of what happens to us. Having a new instrument can allow a musician access to situations where his or her first instrument does not make much sense, or simply cannot be found, a familiar situation for pianists. Still, no matter how much instruments admit extensions, no matter how much they can be adapted to new needs, there are limits. In an ideal world, "preparing" a piano is doable. Transporting a grand piano to a venue so that it can then be prepared may not be, and sometimes one cannot even obtain permission to prepare it when it is already there. Even taking a plane to play a concert in a place with a beautiful piano may prove impossible when airport security confiscates the bags of bolts and screws with which it was to be prepared, as well as the tools needed for the job. Asking festival organizers to provide you with all the materials necessary to prepare the piano is usually equally fruitless. To play piano exclusively, for example, is to be limited to situations and places where there is a piano, so having an alternative is a good idea. On the other hand, even when both your regular and new instruments are portable, it may not be easy to travel with both. Any musician who travels frequently by plane will know this, as will anyone who finds themselves playing in venues at the top or bottom of a long flight of stairs. So, over time, a musician may find themselves traveling only with their new instrument. Each musician makes this transition as best they can, but it is important to recognize that it is not always a matter of choice.

So, besides the need to expand one's sound palette or one's musical or professional opportunities, there are other more banal ones that emerge as part of daily life for a professional musician and are frequently best measured in kilograms and/or kilometers. There may also be psychological reasons. The rigors of musical training often include the pressure to play "well." And that pressure can engender numerous problems, some physical, others emotional and others that combine both somatically. There are many musicians with the intelligence and creativity necessary to conceive a new musical direction, but who find themselves unable to undertake it with their primary instrument. Since childhood they have been inculcated with a set of musical values that eventually become barriers to change. Some musicians choose to avoid the psychological discomfort involved in playing their first instrument in a way that conflicts with their lifelong training. Having received praise and encouragement from their childhood teachers when they played in a normative way, doing so has become an identity act. If they no longer choose to play that way, then who are they? For them, the transition to a different kind of music may be less violent if it is carried out with an instrument that they do not associate with years of indoctrination.

## Criteria for change

In *The Common Good*, Noam Chomsky observed that "the intelligent way to keep people passive and obedient is to severely limit the spectrum of acceptable opinion, but to allow very lively debate within that spectrum." On a significantly less damaging scale (hopefully), something similar happens with musical instruments, at least in the West, where there is a canon from which few instruments

escape. The reasons for this uniformity include many aspects of our society, from the predominately industrial production of instruments to the musical roles associated with them. There are even books—orchestration manuals—which specify what can be expected from each of the orchestral instruments: its registers, its notes or "difficult" areas, its timbral possibilities, its tunings, how it combines with other orchestral instruments, etc. And of course these specifications affect the instrument itself, the person who plays it and the one who teaches it. Everything that a music store offers as a "trumpet" should allow you to perform what is specified in such a manual. Everyone who presents themselves as a trumpet player (at least a classical one), must be able to do so, and anyone considered a trumpet teacher should be able to teach their students how to do it.

Together, these instruments of the Western musical canon, each with its canonical possibilities, are the equivalent of the "spectrum of acceptable opinion" proposed by Chomsky. Thus, no matter how much one debates which one to choose, the result will be constrained by their limitations, their uniformity and their canon. Obviously, one can play on the border of an instrument's possibilities, but that will involve to some extent playing against the instrument rather than thanks to it, since the current state of most instruments reflects countless "improvements" to its design intended to specifically facilitate playing it canonically. Playing against the instrument (or at least, its canon) is, in some ways, a type of virtuosity, and not the worst. Likewise, difficulty and challenge are not necessarily bad when creating. As Dutch electroacoustic musician and instrument designer Michael Waisvisz observed: "I'm afraid there is some truth in the idea that one has to suffer a little when they play; physical effort is something perceived by listeners as a cause and manifestation of a work's musical tension"<sup>2</sup>

Thus, in the vast majority of cases, the musician who adopts a new instrument will choose from among existing conventional and normative instruments, whether or not they are from the canon of European classical music. What's more, in the vast majority of cases, s/he will make the right choice, managing to expand his or her possibilities within the range of what both s/he and most of society understand as music.

But what happens when that is not the case? What happens when a musician's concerns have expanded to such a degree so that they cannot be resolved with the addition of yet another conventional instrument? That was my case when a constellation of not entirely common circumstances led me to the laptop. In the mid nineteen-eighties, I was given access to the Columbia-Princeton Electronic Music Center, where I studied electroacoustic composition with Arthur Kreiger and Mario Davidovsky. For several years, I was able to use the main analogue synthesis laboratory there to produce works. That experience, combined with how much I learned from both teachers, provided me with a solid grounding in the language of electroacoustic music. Specifically, I learned a way of managing sound and time that germinated in the mid-1950s and matured, technically and musically, at enormous speed through the early 1980s, when the transition to digital media greatly changed its direction and aesthetics without diminishing at all its relevance as music.

When I finished my doctoral studies in composition I was no longer a student and therefore had only limited access to the laboratory where I had acquired my craft. Of course, I wanted to continue using the language I had developed there for my creative purposes, and that's where the conflict came. Despite my studies in composition, I am an improviser. I was one before studying composition and I continue to be one today. As such, I need a language I can handle spontaneously and in real time without sacrificing precision and nuance. But the language I had learned, and made my own, at the Columbia-Princeton Electronic Music Center during the 1980s *was not instrumental*, it was compositional and had been developed in a laboratory with techniques and technology rooted

<sup>2</sup>KREFELD, Volker and WAISVISZ, Michel (1990): "The Hand in the Web: An Interview with Michel Waisvisz", Computer Music Journal, vol. 14, n. 2, pp. 28-33. Available at: <[www.jstor.org/stable/369709](http://www.jstor.org/stable/369709)> Consulted on 13 April 2022.

in the practices of electroacoustic studies dating from the nineteen fifties. Essentially, it involved creating each sound or small group of sounds, recording them on magnetic tape and splicing the pieces of tape together to generate the work. Like almost all compositional processes, its preparation time had nothing to do with the internal time of the work itself.<sup>3</sup> In that setting, one could easily spend six hours making twenty seconds of music. In a nutshell, I wanted to improvise with (or in) a musical language that had not been conceived for real-time creation.

Things were changing rapidly, however. Modular synthesizers already existed (Among many other things, I had used a large Buchla at Columbia) and in the digital field Yamaha's iconic DX-7 came out when I was finishing my studies at Columbia. Voltage control and the earliest version of MIDI, plus software for managing it from a computer, combined with the incorporation of organ-like keyboards, allowed synthesizers to be played with a certain spontaneity and no little interest and musical value. At the same time, the exploration of live electronics carried out by John Cage and his colleagues with relatively simple do-it-yourself kits soldered by themselves were producing fascinating sonic results, but neither of these practices allowed (or seemed to be seeking) nuance with the degree of precision offered by conventional electronic-music studios. I was looking for something different: an instrument that did not yet exist.

### The first direct contact

It was with the arrival of the portable computer, the now ubiquitous laptop, and the increasing speed of processors that I glimpsed the possibility of at least starting to think about what that instrument could be like. My first notions came through contact with another improviser: Phil Durrant, whom I had been working with for a few years. Since finishing my doctorate, I had been working with the bass clarinet and the flute, which I had considered more as "acoustic synthesizers" than in their canonical version as essentially melodic instruments. In fact, I had dedicated myself to developing a palette of extended techniques with which to build a personal language for thinking and creating my music. During that period I was invited to teach a three-day master class at the Paris Conservatory, and decided to extend my stay and organize a series of recordings at the French National Radio's Radiophonic Creation Workshop. I called Phil to come from London to record with me. He arrived with his usual violin, but he also brought a Macintosh laptop on which he had installed the German program *Reaktor*. The minute he began playing it I was fascinated. It was not the same as an electroacoustic laboratory but it allowed, in Phil's hands, a degree of nuance and an ability to generate sounds in real time that I could immediately identify as *instrumental*. I had been playing with Phil on violin for some time, so I was familiar with his approach to playing and interacting as an improviser. Needless to say, I was very pleased to discover that what was coming out of his laptop came from the same sensibilities and the same musical intelligence that characterized him as a violinist.

Back in Madrid, I bought a Mac laptop. By then I had been working with Apple computers for almost ten years but I had never owned a laptop. Following Phil's example, I installed *Reaktor* and set to work. Years earlier, I had worked with the first commercially available version of *MAX*, when it was basically a sophisticated system to handle MIDI signals, so I wasn't totally in the dark, but having a computer fast enough to actually synthesize sound changed everything. It was the first step towards designing my instrument.

### Conceiving the initial instrument

This is where things started to get complicated, at least conceptually. In practice, I knew what I wanted: to use a programming system (at first *Reaktor*, then *MAX-MSP*) to create an instrument that I

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<sup>3</sup> For the purposes of the present text, the time employed in making a composition will be referred to as *compositional time*, while the time actually structured by the piece, and therefore equal to its duration, will be called *real time*.

could configure to play in a language similar to the one I had developed during my years of studying electroacoustic composition at the Columbia-Princeton Electronic Music Center. In other words, being able to create music in real time with a language whose origins were entirely rooted in compositional time.

First, I needed to find a way to generate those analog-based sounds in a totally digital environment. The answer lay in digital (wavetable) models of shapes of classic waveforms such as sine, square, triangular or sawtooth, which I could *play* with digital versions of the most common analog synthesis techniques, such as frequency modulation and amplitude modulation as well as digital models of the devices present in classic studies of analog synthesis such as those of the RAI in Milan, the WDR in Cologne or Siemens in Munich, which I had learned to use at Columbia. These, of course, were ring modulators, a reverb system, oscillators, envelope generators and the *Klangenwandler*.

Second, I had to be able to operate all of those modules fast enough, not just to be able to play with them but to actually *play them*. To paraphrase Makis Solomos I was not going to be creating *with sounds*, I was going to be *creating sounds*, so all of those devices had to be *parts* of my instrument, not add-ons. I needed to manage my language in real time with something similar to the degree of nuance I had been able to achieve in a laboratory in compositional time. That called for two more things: an interface and very clear mapping criteria.<sup>4</sup>

For the design of the interface, the device that receives a musician's gestures and converts them into zeros and ones, I had to deal with two different matters. The first was what anyone who designs a digital instrument faces: how to manage the relationship between the human body and the external object that receives and digitally quantifies your gestures. The second was more banal but no less important. I had to design my new instrument so that it would fit in a case that I could carry on board a plane. I knew from my own experience that checking an instrument involves a series of risks that it is not even necessary to enumerate here. I also knew that I wanted to take the *entire* instrument with me. What I did not want was to have a large version for local concerts and another more limited one that would fit on the plane. I had seen some electroacoustic or electronic musicians who operated (sometimes "played" is not the most appropriate term to define what they did) the laptop with an interface larger than the computer itself. Called Launchpad, it consisted of an array of 64 square buttons with colors that lit up when you pressed them. The spectacle of a person gyrating their hips as they pressed buttons that turned on and off was certainly amusing, but I couldn't help but notice that, like mine, their laptops already had about 70 keys that they didn't seem to be using at all! I decided to see if I could save on the cost, weight and dimensions of the Launchpad by programming the keyboard that was already part of the computer. It turns out that it was not particularly difficult. With the computer's keys, two volume pedals and a track pad, I was ready to start mapping.

Having an interface means that you can send information to the computer, but that is of no use if it does not know what to do with it. The information must be assigned to the aspect of the digital instrument you want it to control. Turning sounds on and off, opening and closing filters, controlling volume or other parameters requires mapping, which is not at all an exclusively intellectual question. It requires combining musical needs with how the body interacts physically with the interface. This can be much more intuitive than it seems, as you discover if you are thinking purely about the programming without really considering the body. Intuition emerges when you choose a specific gesture to control a parameter in what seems to be a logical manner only to discover that you cannot play that way. It turns out that your body understands the gesture differently, that is, in a way you had never imagined before you programmed it. What you logically expected would be *left* turns out to be *right* for your body. *Up* has, instead, to be assigned to *down*, and suddenly, with those

<sup>4</sup> For a more in-depth treatment of interfaces and mapping, Spanish speakers can consult: *Matthews, Wade. 2022. El Instrumento Musical. Evolución, gestos y reflexiones*. Madrid: Turner Música. Especially the chapter titled "El Instrumento II. Del instrumento a la instrumentalidad."

apparently innocuous changes, your body perfectly understands the mapping. In short, trial and error...lots of error.

### Coexistence and reciprocity

Once the initial process of designing the instrument is over, it's time to learn it. And that means more than just learning *to play* it. As we saw previously, an instrument that belongs to the canon has its canonical technique, its canonical language and its canonical learning methods. But when you design your own instrument to meet your own personal, physical, creative and musical needs, none of this exists. There are no exercise books, no classical method books such as *Klosé* for the clarinet or *Arbans* for the trumpet. There is also no one who knows more about the instrument than you and can help you avoid pitfalls.

On the other hand, an instrument programmed in a computer, although it may be inflexible in many senses (it does not have the advantage of 300 years of evolution like the violin, or more than 30,000, like the flute), in others it is considerably more flexible than a traditional instrument. Learning to play it means encountering difficulties that do not always have to be overcome with years of repeated practice. Some can be solved with a small programming change. But there is no way to reduce the hours of direct, physical and musical contact that help develop the neurological and cognitive circuits necessary to play fluidly and intuitively. At the end of the day, no matter how new and digital it is, it is still an instrument and if you want to play it as such, you have to put in the time, a lot of time.

Of course there are people who don't understand it that way. They are not looking for a musical instrument in the laptop and they don't want to have to approach it as something that needs to be played; they are looking for a tool that they can handle for musical purposes without needing to develop the deep connection that every instrumentalist has with his or her instrument. Here it would be easy to succumb to value judgments, but with just one question can we banish them, hopefully forever: Does the music they make work? If the answer is yes, nothing more needs to be said. And let's not forget that music has many functions, in our culture and in all others. Music works when it fulfills its social mission, be it the mating rituals of our discotheques, more formal settings like funerals or concerts; television soundtracks; advertising, and a long list of whatever. Let's leave aesthetic considerations for another time.

Finally, the time comes to actually learn how to play the new instrument, and to do so without the didactic infrastructure that surrounds canonical instruments. The lack of that infrastructure, with its method books, conventional instrumental technique and exemplary repertoire calls for an extra layer of effort. Before we can learn the instrument itself, we have to take on what Gregory Bateson called deuterolearning, that is, the cognitive process of *learning to learn*. After all, designing an instrument cannot possibly be more difficult than figuring out how to actually play it. In the case of my own instrument, there are 28 independent modules, each of which is turned on, off or activated with its respective computer key and actually controlled with innumerable virtual buttons and sliders visible on the screen and accessible from a trackpad.

Part of the learning process involves acquiring the habits needed to play intuitively. This means being able to play something without first having to figure out how to do it. So it is imperative to develop what we might call "habitual technique." And yet, improvising cannot consist of playing the same things the same way, over and over. So another part of this process is not allowing habitual technique to completely control musical content.

In order to overcome that potential pitfall, I decided to approach it in terms not of what I do over and over again, but rather in terms of what I *never do*. In short, I needed something that would oblige

me to shrink my *lacunae* by obliging me to fully explore the less-comfortable or less easily imagined combinations of modules, expanding their use and, of course, their usefulness until they, too, became accessible to my musical intuition. To do so, I designed a small device that randomly specifies combinations of two modules with the push of a virtual button. So “practicing” consists of pressing that button, and then improvising a piece exclusively with the two randomly specified modules. Some combinations are easy, others, very far from what I would do intuitively. Thus, I force myself to discover new combinations, and above all, to extract new sounds or behaviors from the specified modules. The results don't always convince me, but they push me into unforeseen territories, deepening my knowledge and forcing me to play something new.

Here, attentive readers may have noticed an apparent contradiction in what I have written so far. On one hand, I have implied that the instrument I created in and with my laptop is not canonical, and on the other, I have commented that I designed it so that I could play in real time an electroacoustic language developed over the course of three decades in analog synthesis laboratories around the world. That is indeed the case, or more precisely, that *was* the case. But as I also mentioned before, life is what happens while we are busy making plans and this instrument is a fine example of exactly that.

Starting with a clear goal—in this case, to design and fully program an instrument that would allow me to play in real time with an already existing electroacoustic language—might seem to imply that the process itself was essentially teleological. Indeed, that might actually have been the case had it been possible to go through the entire process without being affected—that is, changed—by any of its constituent elements. The reality is that it is impossible to undertake and experience such a process without learning, growing and changing. They say that experience is what you have just after you needed it, but in what turned out to be an unquestionably cybernetic process, the experience of carrying out this process functioned as part of a feedback loop absolutely consubstantial with the trial and error mentioned above. Simply put, the efforts to achieve what we want changes us, and that change inevitably includes the transformation of what we want. The metamorphosis of Arethusa so poetically narrated by Ovid is a perfect example of how desire leads to the transformation of the desired object. What it doesn't tell us is to what extent it also transforms the one who desires it. And in the case that concerns us here,—changing from one's customary life-long instruments to a new and, in my case, previously non-existent one—we would have to add that a considerable part of the desire that drove the process was precisely the desire for self-transformation.

In the time it takes to conceive and program an instrument on a laptop, both computers and software continue to evolve, as does the sound universe of the musician who is designing the instrument. S/he continues listening to music, discovering new things, maturing as a person, as a musician and as a musical creator. Moreover, the process itself is strewn with “errors” that can be more fruitful than the successes. Thus, the person who design an instrument changes, the means s/he employs changes, his or her concept of who they are and what they want changes—even the world in which they imagine themselves playing changes. Attentive readers will therefore understand that no matter how much the original project had a canonical electroacoustic language in mind, that language and approach began to change almost instantly when the real possibilities of a computer began to emerge. Compared to the individual modules of a classical laboratory designed for electroacoustic composition in the third quarter of the last century, the comparatively tiny laptop computer offered an enormous territory of sonic and instrumental possibilities to be explored, and that territory continued to expand throughout the period in which the instrument was being designed. In other words, the process of designing and programming my instrument turned out to be as immediate, unforeseeable and improvisational as the music I wanted to make with it.

The evolution of the instrument and the player



This constant change is what most characterizes and best guides the process leading to a "one point zero" model, and it expands and accelerates enormously with the arrival of that first fully playable version. It is at that moment that the creative and the everyday combine to generate situations that cry out for urgent interventions. The new instrument may do perfectly what you were seeking at the beginning of the process, but by then it is likely that a huge gulf will have opened between that initial goal and what you have come to need in terms of sonic and performance resources. Even if it complies with initial expectations, it is very possible that the first concerts with this new instrument brings out unforeseen and possibly not even musical challenges—issues as banal and unpredictable as the fact that, while you were busy developing your instrument, airlines decided to reduce the dimensions and weight allowances for carry-on luggage. Suddenly, your new instrument is too big, too heavy. Or, perhaps it runs on some type of power-cell or battery prohibited by new safety regulations. Even the need for a screwdriver can be an impediment to smooth sailing through airport security.

Setting up an instrument and, above all, playing it on stage can also produce unforeseen demands. Even when your instrumental elements have been reduced to the bare minimum—a laptop, an audio interface, two pedals, your MIDI/USB connection, one or another power supply, and the cables—you still have to place them all on a table high enough to fit your legs under when you have your feet on the pedals. It seems like a small thing, but being on tour, every night you encounter a different table and chair, and that's after going around the entire theater or venue to see what's available. If you're in a theater with a large stage, you may be able to get away with using a gigantic table, but when the performance takes place in a smaller venue, a table can take up half the space you're supposed to share with the other musicians. And when the tables are small, you may find yourself one night with a rectangular table and the next with a square one, so that the arrangement of your components changes from one night to the next. It is difficult to be fully involved in music when you reach out to adjust something and it turns out that tonight it's on the other side of the computer, or behind it, or in the corner...

This brings us to something seemingly unrelated. The term "laptop" obviously refers to a computer you can place on your lap. However, except for me, I have yet to see a musician who plays this instrument on their lap. There is *always* a table, and it usually carries much more than the computer. For the reasons outlined in the previous paragraph, I was fed up with that setup. And I was equally tired of having to plug in every single cable before each concert and unplug every single one afterwards, as well as having to then put each component into its respective box and somehow fit all of them into an ever smaller carry-on bag. So, I decided that for version two of my instrument I would look for a way to change that. The result is what I call *Laptop laptop*, that is, a laptop computer that you actually play *on your lap*.

Goodbye table, goodbye plugging and unplugging everything, goodbye having to store everything in separate boxes. Version two (and three, and now four) of the instrument consists of two plywood panels only slightly larger than the computer that one screws together to create a discreet platform adapted to the size of their lap. The audio interface, MIDI/USB converter, power supplies and piezo buffer, are all fixed to the left panel with velcro and "permanently" interconnected. So setting up consists of screwing one panel to the other, mounting the touchpad on the right one with velcro and fixing the computer on top of the audio interface with the same velcro. Outgoing cables are all routed to the right, where they exit beneath the touchpad for connection to the mains, the speakers and the pedals. Then, you sit down with the instrument on your lap and your feet on their respective pedals, and turn it on to play. When the concert is over, you remove the computer and touchpad, unscrew the left board and velcro it to the audio interface to produce a package with the same footprint as the computer, though slightly thicker, protected on both sides by one of the panels. This

slides into your backpack alongside the computer, the two pedals and a few loose cables, and off you go!

When it comes to software, the original language has expanded considerably. The original digital models of analog synthesis and the virtual devices that shape their sounds (filters, envelope generators, etc.) remain, but several modules have also been added to manipulate field recording. Thus, synthesis is complemented by a powerful and very flexible element of real-time *musique concrète*. The hardware has been expanded with the addition of a contact microphone that is placed on the surface of the computer to the left of the keyboard and permanently plugged into the audio interface. Within the program I have designed a module that makes it possible to transform the sound of this real-time microphone input with a formant filter and other related devices. This allows me two things. First, I can manipulate external objects in contact with this microphone, transform the resulting sounds, and bring them into my musical language, and second, that same manipulation requires visible gestures directly related to the resultant sounds—something sorely lacking in most laptop performance.

## Conclusion

There are many other issues associated with the transition from my usual instruments to the laptop, some whose interest extends beyond a simple chronicle of personal experiences. These include aspects of software design, especially interactivity and randomness, as well as cognitive questions such as how I identify bodily with this instrument when it is on my lap instead of on a table. I haven't touched on them here because most are already covered in much more depth in my book, *El instrumento musical. Evolución, gestos y reflexiones*, published in Spanish in 2022 by Ediciones Turner in Madrid.

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