Martin Loridan

Rethinking the Body of the Piano and Its Vibration

An Extended Pedal for Intra-Piano Playing

As a composer, Martin Loridan began by noting that since the end of the 19th century, and despite the many musical experimentations in the body and strings of the grand piano (*intra-piano*) since the 1920s (Cowell), and then those of the prepared piano (Cage) at the end of the 1930s, the instrument's physicality and structure had changed little or not at all.

The pedal, which is generally accessible from the keyboard position and whose principal action is to control the dampers, cannot be reached when the musician is playing inside the piano's body. Today, for exploratory *intra-piano* playing, standing, at the edge of the instrument, the musician must block the pedal or entrust its operation to another, thus giving up direct control. Martin Loridan decided to explore a third way, designing an extended pedal that would allow the performer to leave the seated position at the keyboard and play the piano while also operating the pedal.

For this research, Martin Loridan collaborated with piano maker Gaëtan Leclef, with whom he designed and built a pedal extension that can be adapted to any grand piano, meaning that it can be played immediately after installation. The collaboration also involved working with musician-performers, and not only pianists. Playing is transformed in terms of sonority, but also with regard to gestures, which become very visual and open up new possibilities for musical composition. Four new pieces have been written thanks to these collaborations and improvisation sessions: *Reverberated Impacts*, for percussion, in collaboration with Tom De Cock; *Reverberated Feedbacks*, which incorporates an amplification system, created in collaboration with Gian Ponte; *Reverberated Grain* is a duo that explores mobile playing with pianists Sara Picavet and Tomoko Honda; and *Reverberated Breath*, for wind, harnessing the sympathetic resonance of the piano, played by clarinetist Jean-Marc Fessard.

This is the beginning of a repertoire that will only grow through playing and the composing of new musical creations.

The following interview was conducted in Brussels during the summer of 2023.

(A/R) As a composer, you've developed research into the piano's augmentation to expand playing possibilities, in terms of resonance and playing positions, as well as movement in contact with the instrument. What led you to embark on such a structural development of the instrument?

(M.L.) This research fills a gap I perceived in my practice as a composer. Playing *inside* the piano in the usual concert configuration —keyboard—is full of constrains. Not only does the performer have limited access to the different parts of the instrument's body and strings, which in some models can be over two meters long, they find themself in an uncomfortable, even painful, playing position (standing, arms outstretched, body bent, and right foot on the pedal). When exploration extends beyond the keyboard or the strings—which are far more accessible on the piano's tail side—all direct control over the pedal mechanism has to be abandoned. In this configuration, the performer cannot control the expression of their playing or the resonant impact of their actions, having to block the pedal mechanism or call in an assistant.

Despite their sophistication, piano pedals have not changed in any physical way: there is no action lever except for the traditional configuration, positioned at the keyboard. Controlling the dampers is the center of working with sound.[1] Mastering the pedal that activates them is a subtle action, perfected throughout piano studies. The subtleties of pressure enable the *legato* at the heart of the *sound work* in traditional pieces, and the *exploration of timbre* and *reverberation* in contemporary pieces. Pedal-controlled reverberation is unique: it has influenced both classical orchestration and electroacoustic research, bringing to life the infinite sounds and noises produced by the various parts of the strings and the piano's body.

Pianists and composers today are faced with this contradiction: on the one hand, the emergence of a wealth of techniques exploiting the different parts of the strings and the piano's body (the *intra-piano*); on the other, the practical impossibility of effecting an essential action, controlling the dampers from a distance. The two most common solutions to this problem are blocking the pedal —in the depressed position, which lifts the dampers, locking them in a fixed positions—and to have a second assistant performer operate the pedal from the "keyboard" position. In the first solution, the strings resonate freely: their vibration can't be changed. In the second, it is not the musician at the source of the sound who decides its impact and expression, but an "operator" with a limited number of actions. In either case, letting go of any ambition for direct control over the resonance of *intra-piano* playing is taken for granted.

There is a third, as yet untested, solution: to install an extension to compensate for the lack of access to the pedal from all around the piano. The first extended pedal prototypes were created to fill a structural gap that I felt in my piano research (several works composed between 2017 and 2020). A prototype was designed for the piece *Un eco di soffio II* (2019). This work, for clarinet and resonant piano, proved to be a catalyst. By approaching the piano as a real instrumental space, the clarinetist explores various points of excitation, triggering the strings' sympathetic vibration. The resonances are reworked using the extended pedal prototype, thanks to which the instrumentalist can directly manipulate the resonances that are generated. The piano's body becomes an evolving amplifier, explored via the "polarizations" (sides, tail) harnessing different forms of vibration. In this way, the piano *produces* the concert space: open body, lid removed, it is revealed and laid bare. The musician controls the resonance of their actions remotely, using the prototype.

The extended pedal is a logical step in the piano's evolution, especially considering the integration of playing modes that circumvent the keyboard's function to develop *intra-piano* playing, creating new possibilities but also new constraints. It is a kind of technology that simultaneously extends and augments what the piano is, continuing its evolution without revolutionizing its structure, but allowing it to be rethought. Since the implementation of the double escapement action (1885), the piano has reached the apogee of its functionality and the end of its evolution. The modern instrument has been at a near standstill for 130 years: today's piano has an almost perfect action, but the structure dates from 1880. The relative stagnation of the instrument's design runs parallel to a diametrically opposed phenomenon in composition.

The piano expanded, becoming an enormous instrumental body, multiform and multifunctional. The *intra-piano* explorations of the 1920s (Cowell) prefigured the preparations (Cage, prepared piano from 1938). The almost-universal adoption of double keyboard/strings playing, or simply the renunciation of keyboard playing, were firmly established. Percussive, plucked, and resonant playing are among the many examples of extensions pianists and composers use today. The research also looks back to the piano's development and composition's key role in spreading new instrumental approaches. If, as Anton Rubinstein maintained, the pedal is the soul of the piano, then this musical extension brings the soul into the very body of the instrument, enabling the realization of actions that were previously impossible.

(A/R) The piano's percussive function has been replaced, and its resonance is no longer due to the hammers striking the strings, but to other *intra-piano* interventions. Did you want to make the musician stand up?

(M.L.) This project does indeed circumvent the traditional hammer-keyboard-string functioning and perspective, opening up new forms of approach and resonance. The *extended pedal* is a system with its own actions on resonance and vibration, its ways of playing and "sensations"—the relationship to weight, to the body, to the instrument, to the gesture, and elasticity. The new possibilities imply new approaches to gesture and to writing: the piano becomes an enormous body whose internal parts generate complex timbres and reverberations. The piano, as I said, also generates the concert space: here it is an open body (with the lid removed), revealed and laid bare.

This methodology, treating the piano as an "instrumental space" raised new compositional, corporeal, and gestural questions regarding the emergence of the instrument's hybrid identity and that of the musician, suggesting a revision of the usual concert configurations. Whenever possible, we encourage the audience to stand and listen, encircling the piano played from the "inside."

While this research is fundamentally organological and musical in nature, the opening up to the choreographic arts, through spectacular gestures, through new and unconventional positions of the instrument in relation to the public and the musicians in relation to the piano—in this case an instrumental body whose multiple facets are made use of—is also fully considered within the compositions and recreated through the writing. The scores are hybrid, indicating gestures, zones, actions, sometimes taking the form of a timed scenario or drawn instructions. As part of this process, the development of the space and the staging, of sound and gesture, using unusual stage configurations, allows the audience to be placed in many different listening situations: all-encompassing, close, diffuse, participative, or receptive. Far from the usual *frontal* concert position, these configurations allow us to perceive the inner life of sound, encouraging immersion. In addition, with the piano completely open and repositioned in relation to the public, we're able to show the slightest nuances: the visual aspect is incredibly important. For our next performances, we're thinking of a live video projection of the piano's internals, focusing on the wood, metal, and vibrations and the contact with the hands and other equipment.

(A/R) As part of the project, you wrote four new compositions for this extended piano. Could you tell us about them?

(M.L.) The four works also form a cycle that can be played as a whole—which happened at a concert in the main hall of the Royal Conservatory in Brussels. These works (details below) correspond to phases in the research's development; they've made it possible to explore the revival of *intra-piano* playing. *Reverberated Impacts,* for percussionists, focuses on the various percussive ways of playing and the complexity of their reverberation. *Reverberated Feedbacks* incorporates an amplification system that allows for profound work on the thresholds and fusions between reverberation processed acoustically by the instrument and transformed electronically. *Reverberated Grain* is a duet exploring double action and mobile, choreographed, and multi-controlled playing. *Reverberated Breath,* for wind, develops the interplay of sympathetic resonance, here self-controlled. These four works enable the development of a dispositif through composition. Collaboration with the performers is absolutely essential. Many working sessions and a lot of testing helped perfect different aspects of the design and construction: control and precision, dual and multi-access handling, sympathetic resonance and sound filtering.

Reverberated Impacts, created in collaboration with percussionist Tom De Cock, has a ritual dimension: at its core is the idea of an incremental exploration of the piano's body as a complex space of reverberation. The piece, which lasts twenty-five minutes, is a gradual journey *around* the piano, starting on the "low strings" side where the soundboard (the resonant and amplifying part of the piano) initially serves as support for repeated percussion that ripples through the whole piano. The pedal's action can be used to modify the reverberation of the continuous impacts, the driest tones to the deepest sounds drowned in reverberation, in this case that of the strings, which though not touched, *vibrate* due to the percussive impact on the instrument's *body*.

Progressively, the exploration extends to the internal parts, where there's combination of several materials—the wood of the soundboard, the metal of the frame's bars and their deep resonances—to arrive, finally, at the "monochords," the longest of the low strings. This first section is the beginning of a journey that extends to the tail, then to the opposite side, where the highest strings and the piano's amplifying and "binding" elements are found (soundholes, duplex strings, clasps) and played using various sticks, objects, and preparations.

With this approach, we did a lot of work on the different ways of making the piano's internal parts vibrate and "live." Our piano builder suggested that we explore a key point in the piano's structure, equidistant from each different side and thus possessing an optimal resonance quality. We were interested in working on sound's "second life": the work integrates long resonances reworked by the pedal. The latter functions as a modulable filter for percussive, inharmonic, and saturated sounds, which are further enriched thanks to their reverberation incorporating many vibratory phenomena (beat, infrasounds, harmonics, etc.) that we can rework.

Reverberated Grain involves two performers. A radical extrapolation of "four hand" works, this piece explores *intra-piano* playing amplified by double control of the pedal. Here, we're exploring the piano's grain, friction and touch, both light and saturated, produced with the hands and different accessories from the piano's various internal parts and strings. The choreographic element dominates: the performers move around the piano in an almost circular way, approaching the instrument like a place of exploration, feeling their way around, first by contact and then by impact. The extended pedal is a shared tool that the performers swap and can pass to each other. In several configurations, the performers face each other, on either side of the piano. Each musician feels the actions of the other because the double control is shared, meaning it is possible to grasp any movement on the mechanism through a sense of common pressure, "feeling" the dispositif's movement. Through this evolving double game we advance a cartography, a topology of the instrument's body: working in zones and on materials, unfurling and moving from a space that the instrument generates.

This piece is probably the most visually impressive. We worked a lot on the choreography of the movements and shifts. Even the outfits and accoutrements of the performers —Sara Picavet and Tomoko Honda—were composed considering the need to "touch" the body of the piano and explore the "grain" or the strings through various materials. The performers stand around the piano: wearing gloves, they rub and scrape the strings and parts of the piano in parallel, opposing movements, following their breath. A specific combination of gloves was used, with one of the gloves open at the ends to allow access to specific parts of the instrument with fingernails and fingertips, and the other completely closed to allow the palm to rub the strings or other parts of the instrument.

The work's evolution is a slow ascent from light, almost imperceptible friction to saturated sonorities and highly pressurized gestures. Thus, the nature of contact with the instrument changes, from the absence of pressure to overpressure. A very light, sometimes whistling friction is gradually spread through different modes of granulated playing (progressive scraping of picks and cards on the strings,[2] allowing their "grain" to emerge), toward complete saturation of gestures and sound. The extended pedal gives you the ability to subtly control this ascent to saturation, and to perceive its evolution.

Several sequences in the musician's journey include the keyboard as a rubbed, percussive, and filtering material. In the "combat" sequence at the end of the work, the performers face each other from the keyboard and the piano's tail—the furthest possible distance. A "challenge" emerges, with one pianist using the keyboard to first strike the instrument's lowest strings. The other musician, opposite, at the other end of the instrument, reproduces this strike by directly hitting the strings, the same strings, with a piano hammer controlled by the hand/arm, like a percussive accessory. These two spectacular gestures alternate, challenging each other, placing direct striking in competition with hitting the keyboard. The actions accumulate, but neither prevails, with the percussive power of the hammers striking the keys being equaled, even surpassed, by that of the hand and the arm.

Reverberated Breath explores another feature of the extended pedal: controlled sympathetic reverberation. Through the phenomenon of sympathetic vibration, the piano, here the resonant body, extends the sound of another source, here the clarinet. The clarinetist projects complex sounds toward the piano (breaths, multiphonics), causing the strings to vibrate, while controlling the resonant impact via the extended pedal system. The clarinet becomes a mobile extension, creating a dialogue between its own sound and the reverberation controlled by the pedal. A system of microphones positioned in the piano's holes (amplification holes) and contact microphones positioned on the lower strings amplifies and makes reworking the sound and vibration possible in two ways, combining the technological and mechanical: a mixing desk and the extended pedal, which acts here as a sound controller and filter.

The absence of contact suggested by the use of the phenomenon of sympathetic resonance creates a strong contrast with the previous works in which the "touch" of the resonant material and of the piano's internal "materials" dominates. Starting from this principle of extension, the piece evolves toward a progressive "hybridization" of the instrument and the body of the piano, resulting in complete contact, bringing together the clarinet bell and various internal parts of the piano. The soundboard, sound holes, and metal frame are all vibrating supports that extend the clarinet's bell, projecting it like a speaker, or like the membrane in a speaker. The work moves from contactless exploring, by sympathy, to a more intimate exploration, during which the instrument is literally fixed to the body of the piano, creating one entity.

Reverberated Feedbacks incorporates electronics and an amplification system, creating a double story around the instrumental hybridization by spotlighting two forms of "augmentation": the extended pedal, handcrafted and mechanical, the meeting of instrument making and industrial design, and electronics, the result of amplified media and the treatment of sound. The intersection of these two worlds is fraught with vulnerabilities, thresholds, and confusions that suddenly appear at the border between the human and its "double." Visible and invisible, these imperfections are a source of the never heard before. Feedback reworked by the piano's body dominates, which the piano reverberates, amplifies, and modifies.

(A/R) Work on the composition happened at the same time as that of the piano's design and production. You worked with a piano maker to create the piano hardware. What were the effects of this collaboration?

(M.L.) Like all kinds of musical technology, the extended pedal is a tool at the service of creation, and which could only derive from it. It is through relationships between organology, design, construction, performance, and composition that the pedal has developed and continues to do so: composition raises questions but also challenges that design and construction then work on (for example, the need for a double control or enhanced precision), all tested and validated through works and performance. Shared requirements and contributions from the performers and composer are necessary conditions for the validation and dissemination of a construction project focused on augmentation. With this in mind, the research involved a builder and performers to *guide* and *validate* the technical aspects in relation to the musical *requirements*. The expertise of Gaëtan Leclef, combining the expertise of piano maker and technician, was essential. Thanks to him, we were able to create a dynamic collaboration based on a composition-test-design loop: questions arose during the composing and influenced the development of the design and construction stage. Each step was validated through the works being composed in dialogue with the performers.

From the start, our goal was to develop a complete tool, creating multiple possibilities for controlling the sound. Today, the system we created is "graftable"—easily attached and removed without the help of a technician—and "playable" as soon as it's installed. It is instinctive to use and there is no impact on the piano's structure. It can be adapted to any kind of grand piano by taking direct control of the pedal (Our first plan, lifting the pedal directly by the lyre was rejected due to universality, as some models have closed lyres). The extended pedal creates a range of accesses to the piano's different sides and *contours*: doubling the extension system allows multiple manipulations from different action points.

(A/R) Only three of the musicians you've been working with are pianists. There's also a percussionist and a clarinetist. Why these choices?

(M.L.) The extended pedal is based on a completely new system. Thus, it is vital that a variety of approaches be used to develop, test, and evaluate this system. Five musicians took part in the testing/design/production phases: pianists from different backgrounds (Gian Ponte, Tomoko Honda, Sara Picavet) and two non-pianists (Jean-Marc Fessard, clarinetist, Tom De Cock, percussionist). The diversity of skills meant that throughout the composition and construction stages we could work on the new ways to activate the dampers and the access points created, but also on the elasticity, the weight, and comfort of handling. Improvising with the performers—here, really co-creators—was also part of the process. When the works were being composed, improvisation was key: everything had to be recreated, had to be experiment with, and so on. Improvisation produces material, sometimes rich or unexpected, which is channeled by the writing. This duality is integrated into the pieces' scores with precisely written passages and others that are freer, which also fosters a certain kind of energy. The extended pedal makes it possible to compose musical actions with precision, adding exact pedal control to *intra-piano* playing—no mean feat—and thus we open the door a freer improvised expression.

(A/R) You've used electronics in your new creations, and you've mentioned elsewhere that the instrument's reverberation is richer than its amplification. Could you talk about this in more detail?

(M/L) The piano's reverberation is incredibly rich, and here it becomes modulable, allowing us to approach the piano like a real sound processor. But it is also the interaction and confusion between the two forms of reverberation "processing," acoustic and electronic, that opens up new lines of thought. I'd already explored the thresholds of amplified electronic processing in other contexts (in *Tracer le souffle* for accordion and effects pedals). The particularity here is that it is applied to an instrument that is unique in its structure and functionality as an extended "instrumental body." By working on the infinite number of sound objects available inside the piano and reworking them through both the extended pedal and the amplification system based on the piano's internal playing,

opening the door to a hybrid, fragile, and unstable world capable of creating new compositional pathways through the interaction created between the acoustics, amplification, and electronics.

In *Reverberated Feedbacks* the extended pedal is coupled with an internal amplification system, making the piano "active." This work is based on the idea that the piano, through its reverberation function, is a sound processor and that this function can be enhanced. Unlike other acoustic-amplified encounters involving other, smaller instrumental bodies, the piano itself has its own way of amplifying, filtering, and working with sound through the use of the pedal. The latter's control of reverberation brings an infinite number of *intra-piano* sounds and noises to life. By coupling the extended pedal system with an active amplification/electronics system (with internally positioned microphones and amplifiers and a mixing/effects desk), this work raised new compositional questions: about the interactions between acoustic reverberation and amplified and reworked sounds, the boundaries between these two worlds through focus on hybridization, instability, and fragility, the role of the instrumental body and its medium of extension/augmentation, and the overturning of hierarchies.

(A/R) Do you consider this research finished?

(M.L.) FRArt has allowed the development of a tool that has been refined to the last detail. While the structural work is finished, it is now available for musicians, pianists, and composers who would like to utilize it. Instrumental inventions can only evolve through the repertoire associated with it, which is what I wanted to initiate with the project's composition. In this sense, we are only at the beginning of an adventure that could endure.

This research's musical application is part of my everyday work. My composition projects incorporate the extended pedal; pieces with electronics and for large ensembles are planned for the future. I'm starting a series of lectures and workshops at conservatoires and Higher Schools of art, to present students and composers with this dispositif's possibilities.

My future projects include the development of an "active" piano system for *intra-piano* playing. This system will incorporate the extended pedal as a core feature, meaning the piano will be used as a real sound processor, opening the system up to an immense range of possibilities.

1. Dampers are the movable levers, fitted with soft felt, that press down on the piano strings to dampen their sound.
2. Picks or plectrums are thin pieces of hard material used to vibrate the strings of certain musical instruments.

CAPTIONS

fig. 01 Extended pedal, detailed overview. Photo credit: Thomas Purcaro Decaro.
fig. 02 *Reverberated Feedbacks*, excerpts from the score.
fig. 03-04 *Reverberated Grain* for two performers. Gestures, choreography of actions, grain and percussive movements. Photo credit: Thomas Purcaro Decaro.
fig. 05 *Reverberated Impacts,* wide view, pedal and musician. Great hall of the Conservatoire Royal, Brussels. Photo credit: Thomas Purcaro Decaro.