

Composer-Performers Interaction in Pieces Featuring Specific Instruments: A Case Study of *Essai de coexistence sonore* for Electroacoustic Guitar, Karlax, and Double Bass

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Introduction

Essai de coexistence sonore (ECS) is a composition by Mael Oudin for electroacoustic guitar (Andrea Gozzi: AG), Karlax (Benjamin Lavastre: BL), and double bass (Mael Oudin: MO). In this artistic report, we focus on the relationship between the composer and the performers, and the role of timbre (the characteristic sounds of instruments and strategies for blending and organizing them) in pieces with specific instruments. By “specific instrument,” we mean an original design, limited existing literature (methods, repertoire, etc.), or highly individualized practices (Appleton, 1990).

For this project, we developed a collaborative approach in which decisions regarding composition, performance, and notation are discussed at various stages, an approach particularly suited to specific instruments (Hron, 2015). This approach relies on the dynamic interaction between suggestions and changes in the composition process (Kubiak-Kenworthy, 2020). The major stages of the project alternated between moments of demonstrating instrumental possibilities (sound morphologies, playing techniques, gestures, etc.), sharing ideas and materials (recordings), and guided improvisations.

In ECS, the electroacoustic guitar, played by AG, is laid flat on a table and played using various exciters (pick, double bass bow, Ebow), with the sound processed through effects (Guitar DSP + various guitar pedals). On the other hand, the Karlax²⁴ is a digital musical instrument (DMI) that resembles a clarinet. It is equipped with several sensors: 10 continuous keys, 8 pistons, an axis, and an inertial measurement unit. Connected to a computer that hosts sound synthesis and mapping strategies, it allows performers to shape the sound through both subtle and larger gestures. In ECS, the Karlax also processes the sound of the double bass via a microphone mounted on the body of the instrument.

ECS premiered on April 2, 2026, at Sala Rossa in Montreal as part of a concert by Collectif Radiance²⁵. Since AG was ultimately unable to attend the concert, the electroacoustic guitar part was pre-recorded and triggered by the Karlax.

Interviews

We chose to present the various perspectives of the project's protagonists in the form of interviews to highlight the collaborative approach and the interactions between composer and performers.

²⁴ www.dafact.com

²⁵ A recording of the performance is available at the following link:
https://zenodo.org/records/20209217?token=eyJhbGciOiJIUzUxMiJ9.eyJpZCI6Ijc3NTUwZjgwLWIwZjYtNDIyZC05NTlkLTc0OWRmY2Y2NTI2NCIsImRhdGEiOiJ9LCJyYW5kb20iOiI2NjY5YmQ4ZGJhMzM5MWZkZDA4NDcyZTRkMDM2MzkzNSJ9.bebjqdh_YoFt5UuQnKF2KvvjFEZiklh6GaafqBTp_A6x-Sr80TRbVw6kCrokNUNn7gkbaC4T9ucbV-Vw1dZw

Question: Could you describe the piece, its form, material and the role of the instrumentalists?

MO: The piece is around seven minutes long and is loosely organized in three parts. In the first part, there is a kind of canon between the Karlax, using FM synthesis, and the double bass, processed with a low octave effect. The double bass is bowed and mostly plays in the medium register. The musical material explores microtones and glissandi. At the same time, AG's pre-recorded guitar samples introduce a very high, thin sound, which gradually descends. In the second part, the relationship between the instrument's changes. This is probably the most unusual section, because the Karlax no longer only plays alongside the double bass, but controls the effects applied to the double bass in real time. In the final part, the Karlax returns to the opening material, while continuing to control the double bass effects. Meanwhile, the double bass introduces a new repetitive motive in the low register, using drop D tuning. AG's sampled guitar material also becomes denser, with delay and whammy effects, before a short outro closes the piece. The double bass and the Karlax are the two main musical characters of the piece, while the guitar acts as a kind of absent third persona, present only through pre-recorded electronic traces (Figure 1).

Q: What approaches did you take when composing the electroacoustic guitar and Karlax parts?

MO: The main challenge was that both instruments fall outside the traditional instrumental knowledge a composer would normally rely on, as they are highly customized performance systems. The first step was therefore exploratory: working with the performers to understand their sonic vocabulary. For AG's guitar, the focus was on his specific audio setup, which transforms the instrument into something closer to an electronic instrument through effect pedals. Since he ultimately did not perform live, the guitar part was built from selected recordings of guided improvisations. The Karlax required a different approach, since it depended on a custom Max/MSP patch developed collaboratively, based on previously existing patches. In this case, composing also meant shaping the instrument's sonic behavior. Notation was another challenge, so I decided to keep it simple and focus on active listening and interaction during performance.

Collaboration was crucial! Beyond presenting their instrumental setups, the performers also proposed material through improvisation sessions. As many compositional ideas could not be fully imagined in advance and had to be tested in practice, iterative rehearsals were important to refine the musical material. The composition emerged through progressive refinement across rehearsals.

Q: How was the question of timbre addressed in the composition?

MO: Timbre was central to the composition in several ways. Beyond making choices about the sound of each individual instrument, I also had to think about the sonic possibilities of the ensemble. One productive improvisatory exercise involved asking each performer to improvise only within a low, medium, or high register, changing register every 30 seconds. This helped me identify the different sonic textures the trio could produce, which then became a starting point for the compositional material. AG's setup influenced my decision to use similar digital audio effects in the Karlax patch, and to retune the double bass to D, matching the guitar's tuning. Finally, because the Karlax was more suited to legato style, it interacted more naturally with the double bass played arco.

Q: Could you describe your setup and how it fits into the ensemble?

AG: Knowing that I would be performing alongside a low-register string instrument such as the double bass and a DMI capable of continuous glissandi across multiple parameters (timbre, intensity, and

spatialization), I deliberately chose a string-based instrument setup consisting of an amplified acoustic guitar and a series of guitar pedals (Figure 2). The guitar was tuned in DADGAD, producing an open Dsus4 harmonic field. The pedalboard configuration served a dual purpose: first, to emulate or approximate certain sonic behaviors produced by the Karlax; second, to create a distinct timbral identity. I use several accessories to make the guitar strings vibrate: a pick, a double bass bow, and an EBow. The latter was positioned near the end of the neck. This transformed the instrument into a continuously resonating sound source comparable to an oscillator in sound synthesis. The sustained signal was then processed through the pedal chain.

The integrated DSP of the guitar enabled the addition of controlled reverberation, avoiding an excessively dry acoustic response. The Digitech Whammy pedal fulfilled three primary functions. First, it enabled continuous pitch glissandi, bringing the guitar closer to the Karlax's continuous-control paradigm. Second, it allowed me to occupy spectral regions otherwise unused by the ensemble, extending the instrument's range up to two octaves above or below its acoustic register. Third, it enabled instantaneous shifts in tonal center, destabilizing the harmonic identity of the instrument. Other pedals include an overdrive/distortion pedal (Boss OS-2) functioning as a timbral enhancer, a tremolo pedal (Boss TR-2) that adds a rhythmic pulse to the ensemble, and a tuner pedal (Boss TU-2) that doubles as a kill switch, enabling immediate silencing of the instrument when necessary. Finally, the delay pedal (Boss DD-6) was configured with asymmetric delay times, the left channel being twice as long as the right channel and was used primarily in "reverse" mode. The resulting effect resembled a continuous crossfade of the instrument's own resonance. Combined with the use of the double bass bow on the guitar strings, this processing allowed the guitar to approximate the sustained spectral texture of arco double bass performance.

Since I could not physically attend the performance, I prepared and sent a series of audio samples based on our improvisation sessions for diffusion during the concert.

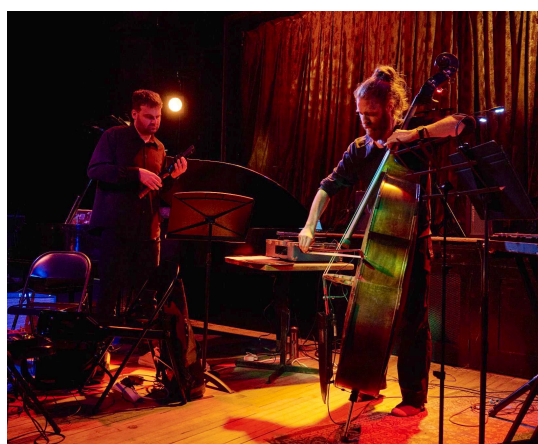


Figure 1: Photo of the concert



Figure 2: Electroacoustic guitar setup by AG

Q: Can you tell us about your experience with the Karlax in *ECS*?

BL: I began by presenting the composer with several sounds and playing techniques based on existing patches from the repertoire for Karlax. MO was interested in the synthesis used in Tom Mays's piece *Le*

Patch Bien Tempéré III for flute and Karlax (Mays, 2015). It is based on PAF synthesis, which stands for *Phase Aligned Formants* (Puckette, 1995). This is a type of synthesis based on frequency modulation using formants, which create adjustable energy peaks in the spectrum that can mimic vocal sounds. This instrument served as the starting point for composing the sonic identity and mapping strategies for the Karlax in *ECS*. Furthermore, it was particularly interesting to repurpose an existing instrument, adjust its parameters to suit the composer's needs (PAF voice pitches, glissando and tremolo ranges, reverb times, etc.), while developing new playing techniques. In this instrument, the keys on the left hand control up to five voices, the left hand controls the formants, while the rotation of the axis controls an amplitude modulation (LFO), and the left-right tilt of the Karlax controls a pitch bend, creating a glissando. This last element is central to the first part of the piece, where I had to realize a melody, progressively harmonized, by tilting laterally the Karlax, resulting in glissandi. In the second part, I controlled the sound of the double bass thanks to several effects inspired by the guitar pedals used by AG. The overall control of each effect is mapped to the combined action of the keys, the axis, and the tilt.

Q: What were your performance choices in terms of gestures?

BL: The piece's main movements are determined by the mapping strategies defined by Mays' instrument and by MO's compositional ideas, such as the melodic lines physically traced out in space. However, I have a large room for interpretation and can adjust the mappings. I chose, on the one hand, to perform broad movements inspired by my colleagues' bowing gestures, and, in contrast, more subtle gestures such as vibrato by shaking the Karlax or varying the pressure on the keys to shape the timbre.

Conclusion

From the interviews above, timbre plays a central role in the creation of *ECS* and is a fundamental element of the collaborative dynamic. The sounds produced by the ensemble's instruments—acoustic, electroacoustic, and electronic alike—serve as the primary medium of communication between the composer and the performers. The foundation of these interactions was also built on a kind of mutual influence between the instruments. For example, the tuning of the electroacoustic guitar's strings inspired the tuning of the double bass and the pitches of the Karlax's PAF voices. The glissando possibilities of the Karlax inspired the choice of effects pedals as well as playing techniques on the double bass. Structural aspects (form, canon motifs) were, moreover, formalized toward the end of the creative process.

The composer has expressed a desire to refine the score for future performances of the piece. At this stage, it seems important to develop the Karlax part, as it serves as an intermediary both in terms of register between the other two instruments, and for its possibilities of interaction (Lavastre & Wanderley, 2023). It is also evident that the boundaries between composition and performance remain fluid, with instruments that take shape as the composition evolves and are associated with specific performers. What initially appeared to be a challenge—composing a piece for specific instruments—was successfully achieved thanks to the composer's respect for the performers' individual sonic and artistic worlds, as well as through a gradual familiarization with the timbres and techniques of each performer.

References

- Appleton, J. (1990). Composer pour de nouveaux instruments. In *Musiques Électroniques*, édition Contrechamps, n°11, pp. 9–20.
- Hron, T. (2015). Composing idiomatically for specific performers: collaboration in the creation of electroacoustic music. Doctoral thesis, Université de Montréal.

- Kubiak-Kenworthy, A. (2020). Composer-performer collaborations in new compositions: Suggestions for change versus authorship. *Music & Practice*, 6(1).
- Lavastre, B. & Wanderley, M. (2023). Interaction Strategies in Composition for Karlox and Acoustic Instruments. In M. Aramaki, K. Hirata, T. Kitahara, R. Kronland-Martinet et S. Ystad (Ed.), *Music in the AI Era, CMMR 2021. Lecture Notes in Computer Science*, volume 13770, Springer, pp.163–179.
- Mays, T. (2015). L’harmoniseur augmenté : Le dispositif d’écriture mixte dans l’œuvre *Le Patch bien tempéré III*. In *Actes des Journées d’Informatique Musicale*, Montréal.
- Puckette, M. (1995). « Formant-Based Audio Synthesis Using Nonlinear Distortion », *Journal of the Audio Engineering Society*, vol. 43, pp. 40–47.**