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Microtunings, complexity, variability: A new sound map for the guitar

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Microtunings, complexity, variability: A new sound map for the guitar

Abstract

How do microtunings help broaden the guitar's sound map and bring new musical possibilities? In this contribution, we present a set of works in which the guitar is tuned in the 72 or 96 equal temperament. They are representative of Pascale Criton's writing and were composed between 1996 and 2019. Each type of tuning favors its own map of harmonic relations and the generation of specific acoustic behaviors. We examine their structural, technical and expressive peculiarities and highlight how the writing and the instrumental gesture are renewed by these tunings.

Keywords

guitar, contemporary, composition, microtonality

Cover Page Footnote

Keynote given at The 21st Century Guitar Conference 2021.

Microتونings, complexity, variability: A new sound map for the guitar¹

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How do microتونings help broaden the guitar's sound map and bring new musical possibilities? In this contribution, we present a set of works in which the guitar is tuned in the 72 or 96 equal temperament. They are representative of Pascale Criton's writing and were composed between 1996 and 2019. Each type of tuning favors its own map of harmonic relations and the generation of specific acoustic behaviors. We examine their structural, technical and expressive peculiarities and highlight how the writing and the instrumental gesture are renewed by these tunings.

Pascale Criton (PC): In this article we present a set of works with guitar that I wrote between 1996 and 2019. They are scored for solo guitar, as well as for chamber formations (duets, trios, quartets) and larger ensembles (see Appendix for a complete list of my works with guitar). Each of these works investigate ways of modulating the guitar's tuning and explore micro-tempered expressive techniques. The tunings employed in these pieces are essentially in the 96 or the 72 equal temperament (96-ET/72-ET). That is, the octave is divided in 96 or 72 equal parts respectively, for which the whole tones are divided respectively in 16 or 12 equal parts. These dense microتونings profoundly renew expression, listening and instrumental techniques. Such non-standard practices have been developed through experience, thanks to long-term collaborations with performing musicians. Caroline Delume and I have been working together for nearly 20 years! Here, we will present works for which we collaborated.

Caroline Delume (CD): I have been interested in contemporary music creation from very early on. An important part of my work is to collaborate with composers to create new music. New instrumental music challenges playing techniques inherited from the past. The interpretation does not settle into a routine, I am constantly evolving in terms of listening and playing technique. When I met Pascale Criton in the late 1990s, I had already experimented with scordaturas and different temperaments on the guitar and theorbo. But Pascale Criton's music requires intervals of 16th or 12th tones. The guitar sounds very differently and this leads to a transformation in listening and playing processes.

Pascale Criton has been composing for guitar over the last 25 years. In her extensive catalog of works for guitar solo or in ensemble, Pascale Criton creates and renews instrumental writing for the guitar in all its dimensions, and performers are faced with multiple and overlapping questions. Firstly, the use of scordaturas in micro-intervals of 16th- or 12th-tones requires a preparation of the guitar by changing the usual strings of the instrument. On the other hand, the use of playing modes to obtain continuous or constantly evolving sound textures requires the guitarist to experiment both with technical flexibility and listening skills. Finally, Pascale Criton's music can be presented as a cartography of gestures that the performer modulates and shapes. To realize this sound writing, the interpreter puts into play (experiments)

¹ Keynote given at The 21st Century Guitar Conference 2021.

the energy and the temporality of the instrumental gesture. Such research favors the collaboration between performer and composer to make the instrumental technique evolve. In this article, we will present some aspects of the sound writing in Pascale Criton's music for guitar according to several characteristic criteria: scordaturas in micro-intervals, gestures of micro-variations of timbre, playing techniques with bottleneck and playing harmonics.

Microtunings: a new sound map for the guitar

PC: I became interested in microtunings in the 1980s, first intuitively and then in a more reflected way after discovering a piano tuned in 16th tones, designed by the Mexican composer Julian Carrillo.² I was captivated by the sound of this instrument! A world opened up, a sensitive field between notes became accessible! I first composed several pieces for this unique piano.³ Then, in 1995, I was able to extend the 16th-tone tuning thanks to Didier Aschour,⁴ who imagined how to adapt it for the guitar. I then wrote *La Ritournelle et le Gâlois*, the first piece for guitar tuned in 16th tones, the circumstance being a tribute to the French philosopher Gilles Deleuze who had just passed away (Criton, 2005). The first piece using the 12th-tone tuning, *Maanakut*, dates back to 2000. This tuning is the reference tuning proposed by Ivan Wyschnegradsky (1993-1979), a Russian composer, visionary and pioneer of microtonal music, who lived in Paris, and with whom I worked in the 1970s (Criton & Kanach, 2019). Within this trend, I consider equal temperaments as decomposable, combinable sound milieus, a kind of more or less tightly woven weft that allows one to penetrate the minute variations of sound relationships.

The dense temperaments obtained by scordaturas broaden the guitar's sound map and renew musical possibilities. The guitar, thanks to its system of frets and stretched strings of the same length, allows a modulation of the tuning. From a musical writing point of view, the interest of modular temperaments is multiple. Each tuning has its own sound, depending on the range and type of string used. Tunings in 16th and 12th tones are advanced preparations of the instrument which modify the listening and playing conventions. It should be noted that the 16th- and 12th-tone intervals (which amount to 12.5 cents and 16.6 cents, respectively) are not distinct intervals whose auditive image can be memorized independently like the semitones. They are "small differences" that mark an almost imperceptible progression in the "ultrachromatic" continuity of pitches, to quote Ivan Wyschnegradsky (2013, pp. 391-403). These small differences or *variables* have a strong impact on the relationships between sound parameters, in particular on pitch/timbre relationships. Each frequency distribution sensitizes a color difference, reveals active acoustic properties, beats and intermodulations. These narrow distributions allow us to get between the usual pitches and work inside the sound, beyond the identity of the note. Within this concept, as opposed to a global scalar system of pitches (*gamme* in French), it is rather an adjustable sampling grid that can be arranged and applied locally from near to close (micro level) within freely determined frequency bands. Beyond the characteristics of each type of tuning, I consider the equal-tempered microtunings as sound milieus whose acoustic properties and expressive qualities are interesting to explore. These are close to the flexibility of natural (or even electronic!) sound signals and voice intonation. They offer continuity possibilities

² Julian Carrillo, a Mexican composer (1875-1965), designed a set of pianos called *Metamorfoseadores* using 14 different subdivisions of the whole tone. The pianos tuned in third and sixteenth tone were exhibited in the 1958 World Fair (Brussels), after which they were entrusted to Jean-Etienne Marie. The piano tuned in sixteenth tones has been on deposit in various Music Conservatories since 1990, including the National Conservatory of Music in Paris. It is now part of the collection of the Museum of Music Paris, which acquired it in 2000.

³ *Mémoires* (1982), for piano tuned in 16th tones; *Déclinaison à l'Ombre des Choses Familières* (1985), for piano tuned in 16th tones and tape; *La Forme Incontournée* (1985), for two pianos (one of which tuned in 16th tones); *L'Étendue Inclinée* (1985), for quintet (flute, clarinet, violin, cello and piano tuned in 16th tones); all published by Editions Jobert, Paris.

⁴ Didier Aschour, guitarist, founder of Dedalus ensemble and artistic director of the Centre National de Création, Albi, France.

ranging from pitch/timbre variability to spectrum/noise transitivity. Harmonically, it is possible to incorporate the quarter and eighth tones that are present in the 16th-tone tuning, as well as the quarter, third, and sixth tones that are present in the 12th-tone tuning. The 16th- and 12th-tone intervals can be used in many ways in harmonic combinations, but also as adjustment values to approximate natural, just, or freely defined intervals (Hasegawa, 2019). These tighter and looser frames allow for transitive, continuous shifts from one density state to another.

Works for guitar tuned in 16th tones

La Ritournelle et le Galop (1996) for solo guitar

CD: Pascale Criton composed *La Ritournelle et le Galop* in 1996. This is her very first piece for guitar and also the first for guitar tuned in 16th tones. It requires a guitar fretted in quarter tones with six low E strings: strings 1-4 are tuned one sixteenth of a tone apart; strings 5 and 6 double in unison strings 3 and 4 respectively, which increases the possibilities of finger positioning. The left-hand playing positions are therefore more numerous, which requires a lot of flexibility and precision. The range of the guitar covers an octave and a half for the stopped pitches, plus the harmonic sounds contained in the E string. Figure 1 depicts the quarter-tone fretted guitar, Figure 2 the 16th-tone tuning and Figure 3 an excerpt of the piece, which exemplifies the notation used. The upper staff indicates the fingerings to be played; the bottom staff indicates the resulting pitches. The 16th-tone pitches are notated by using an index in half- or quarter-tone accidentals (e.g., a 2-indexed accidental increases the pitch by two 16th tones). This notation is not intended for instrumental playing, it is a reading convenience that allows to quickly locate the real pitches.



Figure 1 Detail of a quarter-tone fretted guitar.

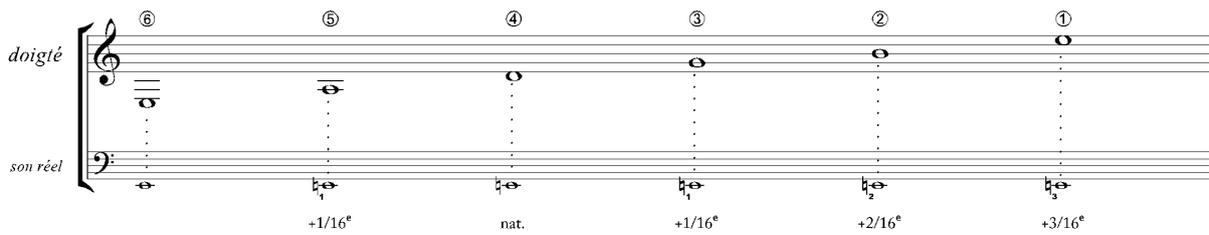


Figure 2 Guitar scordatura in 16th tones used by Pascale Criton.



Figure 3 Example of the notation used by Pascale Criton in works for guitar with microtonal scordatura. Reprinted with permission from *La Ritournelle et le Galop* (letter C) by P. Criton, 1996, Éditions Jobert.

CD: The sound of the guitar is considerably altered by this scordatura. The performer experiments with variations in the texture of the fundamental resonance of a broadened low E (multiplied and shifted four times) according to different gestures of continuity to be developed in the listening of the sound. Moreover, the quarter-tone guitar has 24 frets per octave, which multiplies the possibilities of left hand positions. The playing spaces are smaller and the guitarist must adapt his or her fingerings. The player's listening must also adapt to the sound space of strings tuned at a distance of a 16th of a tone, or in unison for those that are doubled. There are also consequences to the left hand technique: the fingers need to press with a little more weight because the smaller the spaces between frets, the less flexible the string: one must be careful to let the block chords vibrate without unwanted noises. An ultrachromatic motion in arpeggio must be made smoothly by fingering without jumping. For example, the turning motion initiated in system 7 displays an ascending ultrachromaticism in 16th tones in continuous arpeggio, as depicted in Figure 4.



Figure 4 Continuous arpeggio in 16th-tones in Pascale Criton's *La Ritournelle et le Galop* for solo guitar. Reprinted with permission from *La Ritournelle et le Galop* (system 7) by P. Criton, 1996, Éditions Jobert.

PC: The figures and characteristics I developed in *La Ritournelle et le Galop* are mostly in continuous transformation, made possible by micro-intervals. I sought to exploit the plasticity and malleability of sound accessible through this dense milieu of 96 notes per octave. The open strings produce an ultrachromatic cluster of close pitches that spans a quarter of a tone. The repeated shifting of neighboring strings introduces a diffracted differential play, that is, in a (left hand) position there is a myriad of pitches available, which offers the possibility of a temporal stretching of the figures and their transformations. The extension of the playable degrees within a position allows to shape the fluidity of the transitions. Vertically, the ultrachromatic density enables the formation of new intervals and chords. Their combinations oscillate between a pitch-tonal identity and a pitch-timbre versatility. It is necessary to slightly amplify the guitar to balance the ways of playing.

Sound color variations

CD: Continuous textures are obtained on the guitar through repetition techniques: trills and oscillations of the left hand alone, tremolos and arpeggios of the right hand and continuous rolls (rasgueados); I will come back to this below. The left-hand fingers not only play along the strings (between the nut and the bridge), but also change their pressure on the strings (between pressed and muffled sounds). The sound is continuously transformed by right-hand playing modes that vary the sounds' speed and timbre by differences in energy and points of contact of fingers and nails. The listening is as close as possible to the microvariations in order to intensify the perception of the temporal unfolding. In order to play *La Ritournelle et le Galop*, one must experiment with all the variations and seek technical means to progressively give voice to the transitions of timbre in the temporal unfolding. The result is a listening requirement for the performer and for the listener. Playing in *bisbigliando* (with or without accents, alternating on two fingers, with double alternation) seeks to make us hear the transitory states of a chaotic texture concentrated on a small interval up to points of rupture, as exemplified in Figure 5.

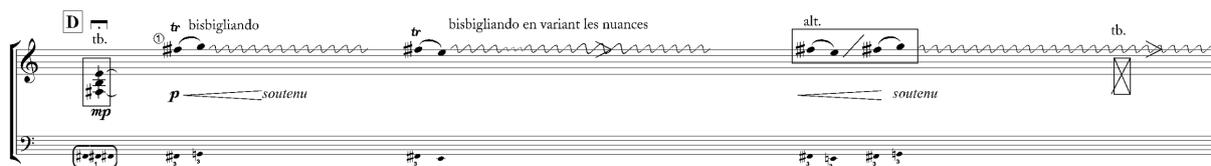


Figure 5 Bisbigliando playing in 16th tones in Pascale Criton's *La Ritournelle et le Galop* for solo guitar. Reprinted with permission from *La Ritournelle et le Galop* (system 5) by P. Criton, 1996, Éditions Jobert.

The guitar, being an instrument that requires synchronized gestures, allows for a fine differentiation of ways in which the fingers of each hand operate when touching the string. Pascale Criton integrates all the differences in pressure, contact area and attack speeds in *La Ritournelle et le Galop*. Its scordatura in 16th-tone tuning generates in itself a metamorphosis of the instrument's timbre. Slow shifts in playing positions along the neck are accompanied by variations in pressure of the fingers on the strings. Arpeggios and rasgueados contribute to the listening of the changes in the sound material, between resonance and noise granulation, letting the harmonics sounds appear in a brighter color, or damping them towards a darker sound. The score points out moments of these changes by indications such as "to slide slowly in the white noise", "to let appear the low register", "to muffle progressively" and "to roll until the noise," as depicted in Figure 6.

Figure 6 Arpeggios and rasgueados in 16th tones. Reprinted with permission from *La Ritournelle et le Galop* (systems 21–24) by P. Criton, 1996, Éditions Jobert.

***Territoires Imperceptibles* (1997) for bass flute, guitar and cello**

CD: The scordatura of *La Ritournelle et le Galop* is also used in the guitar part of *Territoires Imperceptibles*. In this piece, Pascale Criton associates to the guitar two other low-register instruments. This composition assembles and articulates gestures whose fluctuations play at the limits of their differences and create a malleable material between rubbing and breathing. Colors are indicated by words such as "progressively timbre", "dark", "muffle and let the harmonics appear", "make the sound reemerge" and "very white". Differences in tremolos or rasgueados speed are combined with variations in cello bow tremolos. All three instruments play on half timbre sounds: breath limits in the bass flute, bow without pressure in cello and or changing sounds in the guitar. This is exemplified in Figure 7.

Figure 7 shows two systems of handwritten musical notation for the first moments of Pascale Criton's *Territoires Imperceptibles*. System 1 (labeled 'A') includes parts for Bass Flute, Cello, and Guitar. The guitar part features 'Rasg' (rasgueado) and 'acc' (accents) markings. System 2 (labeled 'B') includes parts for Flute/Bassoon, Cello, and Guitar. The guitar part features 'HG' (harmonics) and 'Vib. Large' (large vibrato) markings. Both systems include dynamic markings like 'ppp' and 'pp', and performance instructions such as 'sans pression d'archet' and 'non trem'.

Figure 7 Rubbing and breathing sounds in the first moments of Pascale Criton's *Territoires Imperceptibles* for bass flute, cello and guitar. Reprinted with permission from *Territoires Imperceptibles* (systems 1–2) by P. Criton, 1997, Éditions Jobert.

Remarks on sound continuity on the guitar

CD: Pascale Criton's music subtly plays on the particular relationship of a plucked-string instrument with sound continuity. The 12th- or 16th-tone intervals between the vibrating strings cause an amplification of the resonances, especially when the guitar is prepared with six low E strings. It is interesting to compare this sound with the guitar in its usual tuning. As an instrument based on the articulation between attack and resonance, the technique adopted to maintain a sound texture has a history. Arpeggios are used to maintain chords through the repetition of rapid gestures; all guitar methods make them an object of study – a virtuoso must be able to play them very quickly. They are always measured, unlike trills and sometimes rasgueados, which are also employed to achieve sound continuity. A paradigmatic example of this kind of usage is Luciano Berio's *Sequenza XI* for guitar, written in 1987–1988, in which there is a culmination of the traditional techniques of arpeggios, trills and rasgueados (Delume, 1992). However, modes of playing that sought continuity of texture without the regularity of arpeggios can be found in earlier years of the second half of the 20th century. The context of the 1960s was favorable to visual notations of random figures. Guitarist Leo Brouwer, for example, developed the play of indeterminate sound textures, notably with the creation of *El Cimarrón* by Hans Werner Henze in 1970. With *Tellur* (1977), Tristan Murail composed a piece for guitar based on an evolving construction of timbre. The notation symbolizes modifications of playing modes and indicates durations in seconds: it is up to the guitarist to develop his own techniques to produce the sound material between harmonicity and noise. Unlike random gestural processes like those found as early as 1960 in Mauricio Kagel's *Sonant (1960/...)*, which juxtapose noisy elements, the continuous transformation of timbre sought by Tristan Murail is neither narrative nor theatrical. Pascale Criton's music is located in this aesthetic of sound making. Moreover, her choice of dense tunings in micro-intervals opens a new access to complex resonance phenomena.

Works for guitar tuned in 12th tones

PC: In the 2000's, I started using the 12th-tone tuning (72-ET) on a conventionally-fretted guitar (i.e., in semitones), reproducing the same principle of identical strings as in the pieces with 16th-tone tuning, distributed this time at a distance of a 12th tone, as depicted in Figure 8. And I used the same principle of notation. For the performer, the upper staff indicates the fingerings to be played. The bottom staff indicates the resulting pitches. The guitar range is within an octave and a half for the stopped pitches, to which are added the harmonic sounds contained in the chosen string.

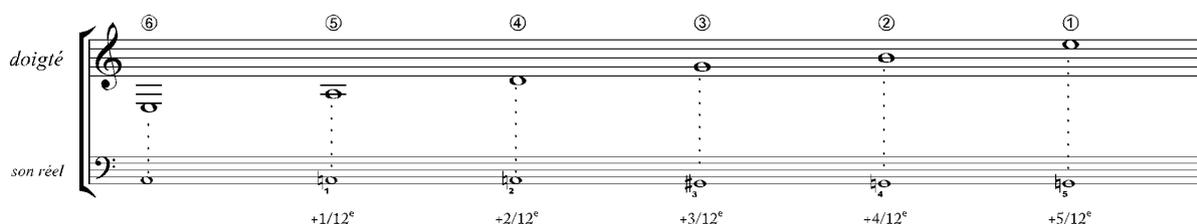


Figure 8 Guitar scordatura in 12th tones used by Pascale Criton.

The 12th-tone tuning is very similar to the 16th-tone tuning. We find a sonority characterized by a sound halo extending the resonance and acoustic behaviors specific to dense tunings. In the 2000s, I became interested in vibratory behaviors in the context of research on physical models conducted at IRCAM (Paris). I was particularly interested in the coexistence of two opposite vibrations when a string is played with a bottleneck. These vibrations, which can be called complementary, correspond to the different lengths of strings on either side of the point of contact, so that two opposite frequencies can be heard simultaneously, one going towards the treble and the other towards the fundamental (Criton, 2011). I used this principle as a structuring model in several pieces I wrote between 2000 and 2003 for guitars tuned in 12th tones, exploring different playing techniques in different formations: gestural playing techniques performed with one or two bottlenecks in *Mobiles* (2000), *Artefact* (2001) for ensemble, *Objectiles* (2002) and *Scordatura* (2003) for guitar quartet, as well as in *Plis* for guitar (2003). Then associated with the voice in the duets *Elle est mignonne* (2001) and *Debout les morts !* (2002). In this 72 equal-tempered millieu played with one or even two bottlenecks, the notion of interval disappears in favor of speeds and motion amplitudes that evolve in a free, untempered space. The idea is to modulate a cluster of six 12th tone intervals into a morpho-dynamic continuity producing more or less inharmonic friction effects, up to white noise. The works I wrote afterwards are more oriented on a spectral micro-harmony as developed in *Intermezzo* (2009), and in various ways in *Trans* (2014-2016) for two guitars and in *Moiré* (2017) for guitar quartet. We will present here some of these works, as well as some of the earlier works.

***Objectiles* (2002) for four guitars**

CD: Pascale Criton has composed several pieces for guitar quartet tuned in 12th-tone system, in which each guitarist plays on a different string range (i.e., the three lower strings of each guitar are respectively E, A, D and B). For example, we find such disposition in the fourth movement of *Objectiles* (titled *Plastique*). Figure 9 depicts an excerpt of this movement.

of the sound comes occasionally to streak a listening all in continuity. Figure 10 presents examples of this gesture.

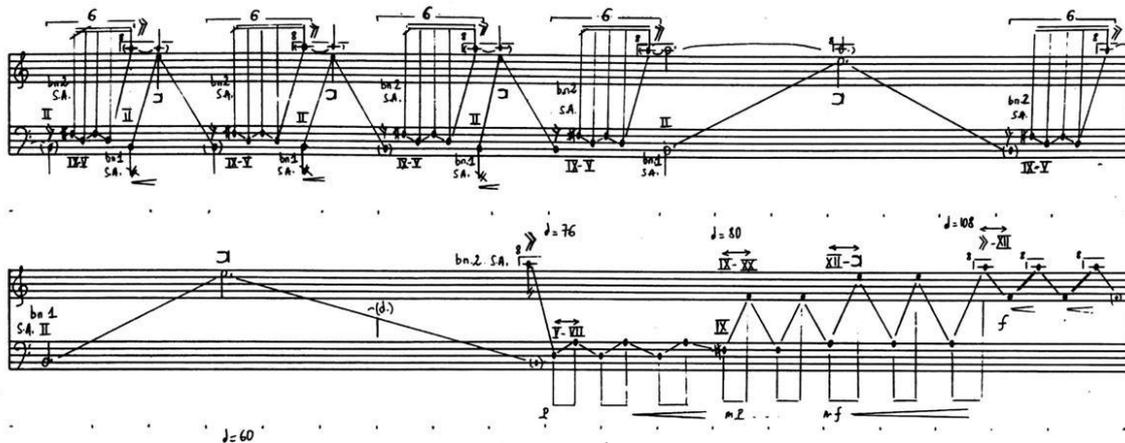


Figure 10 Bottleneck sliding in Pascale Criton's *Plis pour Guitare*. Reprinted with permission from *Plis pour Guitare* (systems 29–30) by Pascale Criton, 2003, Éditions Jobert.

Instrumental playing: complex sound production and reading techniques

CD: As a guitarist, I seek to understand the relationship between notation and sound: the search for technical gestures is intimately linked to a projection of what will be heard. Pascale Criton's scores belong to the "aesthetics of complex sound" (Lienhard, 2020, p. 10). That is to say that traditional solfeggio pitch notation communicates imperfectly the material of this music, which circulates between harmony and timbre according to a fluid temporality. The performer must seek continuity and progressive sound textures transformation by a fast modification of the modes of play. The notation specifies certain intermediate states of the recommended playing modes. The instrumental techniques that make the continuous sound evolve are built through the imbrication of gestures under a listening control.

Remarks on sliding play with bottleneck

CD: The continuity of the glissando is an unusual technique for a guitarist. The use of the bottleneck (metal or glass tube) opens up possibilities. As early as 1963, Maurice Ohana requested the use of a wooden stick for sliding chord sections in *Si le jour paraît...* for ten-string guitar. In the 1960s, the bottleneck was mainly used to create sound objects with smooth contours. The novelty of the bottleneck enriched the guitar's palette of timbres. Helmut Lachenmann rigorously developed this mode of playing, requiring the two guitarists playing *Salut für Caudwell* (1977) to be extremely precise in their handling of the bottlenecks: the resonances on either side of the contact point, the silent poses, the muffles, the transverse rubs, and the dynamics are all the subject of an unambiguous sound construction and notation. Criton's use of the bottleneck in her pieces of the 2000s provokes a variety of vibratory states in the strings. In the pieces involving several guitars (*Artefact* for ensemble with three guitars, *Objectiles* for four guitars) the bottleneck releases a material densified by the 12th-tone tuning. The listener must anticipate changes around the pitch poles. There is a great pleasure in manipulating this object while listening to the sound phenomena produced according to speed and intensity!

multiphonics, especially in relation to the harmonic rank. Combined attacks are necessary when chords combine 3rd, 4th or 5th partials with multiphonics. The first open harmonics tend to dominate the less stable ones. Listening determines playing. The emission of each open harmonic is different; the lower the harmonic rank, the richer the sound's spectral content: for example, partial 6 is less dense than the partial 3. The emission of multiphonics varies according to the placement, the weight of the finger on the string, the point of attack of the string and the speed of the attack. To make several harmonics and/or multiphonics sound at the same time, the attacks must be differentiated.

Remarks on harmonics and multiphonics

CD: The use of multiphonics has remained rare in guitar music and has been recently the subject of research (Torres, 2015). Bells imitations in the form of multiphonics can be found as early as in Fernando Sor's *Fantaisie Villageoise* for solo guitar op. 52 (ca. 1832). In this case, the notation indicates a fret to be played rather than the pitches that will be achieved. Multiphonics sounds are not always easily reproduced nor perceived the same way. In *Intermezzo* harmonics and multiphonics are sometimes played simultaneously.

Trans (2014–2016) for two guitars

PC: *Trans* is a set of five movements for two guitars that are organized on temporal trajectories or scenarios for a performative listening. Each trajectory gives rise to transformations involving the organization of dynamics and fluctuations of variables according to a particular temporal and directional behavior. In *Diagonal*, the last movement of *Trans*, a trajectory transverse to the temperaments contained in the 72 tones per octave system imperceptibly transits through chords in quarter, thirds, sixths and twelfths tone division and their sub-multiples. *Diagonal* is based on a principle of alternating block chords between the two guitars. The swaying is interwoven and exchanged on a floating rhythmic figure (short/long) that splits and overlaps, introducing slight temporal shifts. This repeated swaying gives a continuous pitch-timbre variation which is displayed on a cycle of 19 positions, in a descending movement. The positions are notated by chord grids distributed on a clockwise dial, as depicted in Figure 12.

The economy of the diagram notation is intended to free the attention of the players' "performative listening" (Criton, 2019, p. 301). This is focused on energetic tension and rhythmic reciprocity. The more or less tight or relaxed repetition of the exchanges plays on minute differences that participate in the continuous transformation of timbres. Unlike a regulating metric, *Diagonal* plays on a flexible energetic rhythmicity that shapes the intermodulations. This takes into account the relative balance of the two instruments in the constant evolution of the physical phenomena they are producing.

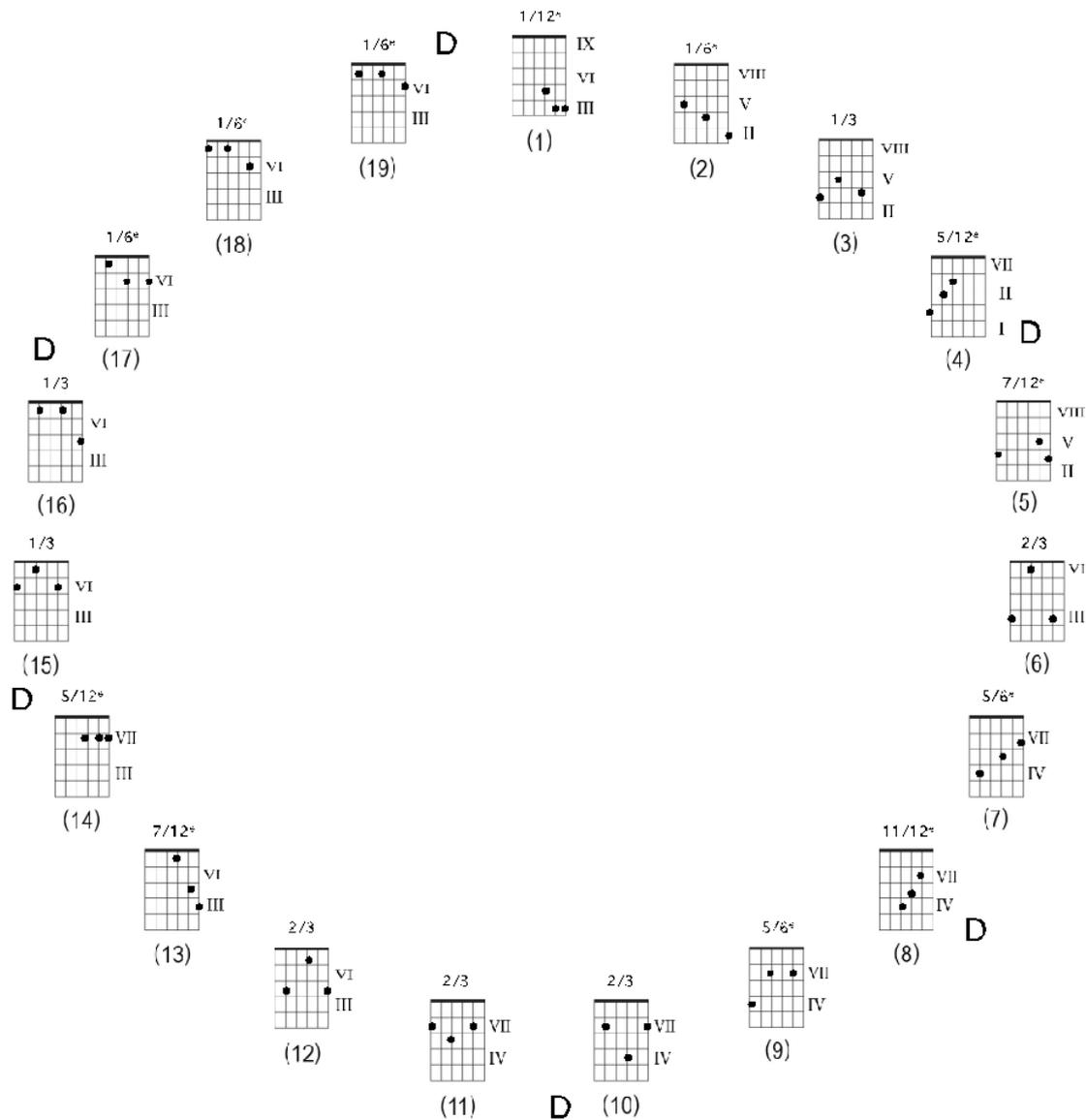


Figure 12 Excerpt from movement IV of Pascale Criton's *Trans* for two guitars (2014). Reprinted from *Trans* by P. Criton, 2014, The author (Art&Fact).

A performative listening

PC: This style of playing, which we call *sensitive to the conditions of emergence*, can also be found in *Double* (the first movement of *Trans*) and in *Moiré* for four guitars. These pieces explore the full spectrum in 12th-tone tuning, this time through a continuous and slowed down harmonic *barré*. In a different way, here too, the spectral flow is regulated by the instrumentalists in order to manage a timbre/frequency continuum as regularly as possible. Active or performative listening is based in some way on a perception-action loop. This poetic posture or “enaction,” as the anthropologist Varela (1995) calls it, implies the musician’s subjectivity towards choices of generative behaviors including the relative margin of unstable acoustic behaviors. The question of subjectivity is an important dimension of these sound writing approaches. It is possible that the expectations towards a music including minimal inflections are part of it.

But what animates and runs through the different pieces featured in this article is, in my view, the solicitation of an imaginary scope of sound. To produce this imaginary scope, to make it audible, is to release the gesture, the notation, the meaning. It means assuming it is possible to share this imaginary scope. In this sharing, the relationship between composer and performer shifts, bounces around. By chance, the guitarists with whom I have been involved in the elaboration of this experience have formed a constellation of interest, sharing know-how, attentive to developments, and I am grateful towards them for that!⁵

CD: Pascale Criton's guitar pieces form a rare body of work among non-guitarist composers. The works for several guitars, combining scordaturas in several registers, significantly enhances the palette of timbre. In *Artefact* for ensemble, the three guitars each polarize an instrumental trio around a zone of the guitar's range: they are at the center of the sound texture, likewise in *Territoires Imperceptibles*. Pascale Criton's sound writing is experimented in each of these pieces by a renewed invention according to the different scordaturas and the modes of playing developed. Her music for guitar opens up a new map, along with new spaces of exploration and expressivity.

To conclude, these micro-temperaments provide access to new components of sound and favor the activity of slight differences, beyond the identity of the note. Composing and playing this music consists of exploring the transitivity of sound, extending the control of complex variables, and understanding the temporalities of acoustic phenomena. Experimenting with ways of playing mobilizes expressiveness through adapted notations (tablatures, gestural writing, diagrams) and calls for extended prescriptive indications: the conventional note escapes its fixity and gains the temporal domain of unstable acoustic behavior. For the performer, producing complex (noisy, multiphonic) and unstable sounds requires letting go of the control of the note, a renunciation of the univocal reference point usually given by notation. The accuracy of the reading results in an adaptive production integrating fluctuating boundaries, a flow in transformation, a sound realization contained between limits, degrees of indeterminacy. The sought-after acoustic phenomena question the performer through a notation where her know-how and skills serve flexible gestures and listening to the timbre. Through these modular tunings, Pascale Criton's music experiments with new sensitivities, involving enactive listening relying on a perceptual and psychoacoustic experience of sound.

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⁵ Guitarists who performed Pascale Criton's works: Didier Aschour, Caroline Delume, Marie-Thérèse Ghirardi, Wim Hoogewerf, Estelle Lallement, Felipe Marques, Markus Hochuli, Jean-Marc Zvellenreuther, Bertrand Chavarria-Aldrete.

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Pascale Criton is a French composer born in Paris in 1954. She studied composition with Ivan Wyschnegradsky, Gérard Grisey and Jean-Etienne Marie and musical computing at IRCAM (Paris) in 1986. Passionate about the sound continuum, she uses microtonal tunings (quarter, twelfth, and sixteenth tones) along with instruments and electronics. Associate researcher in the Lutheries Acoustique Musique team (Sorbonne université). Criton's music is characterized by a flexible approach using pitch, timbre, noise, and acoustical phenomena to stimulate the emergence of unexpected sonorities.

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Caroline Delume is a guitarist and theorist, who collaborates with composers, conductors, singers, instrumentalists, sound engineers, and plays with ensembles specialised in early and contemporary music. She has premiered works for solo guitar and solo theorbo by Jean-Pascal Chaigne, Pascale Criton, Christopher Fox, Félix Ibarrondo, Pascale Jakubowski, José Manuel López López, Francisco Luque, Clara Maida, Florentine Mulsant, Franck Yeznikian. Caroline Delume teaches at the Conservatory of Versailles and the National Conservatory of Music and Dance in Paris.

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Appendix

List of works for/with guitar by Pascale Criton

- 1996 *La Ritournelle et le galop* for guitar (tuned in 16th tones) (8'30")
Premiered by Didier Aschour, guitare, Institut Culturel Italien, Paris, 26/03/1996.
Score published by Jobert (1996); CD published by Assaï (2003).
- 1996 *Entre-deux, l'éternité* for guitar, lever harp and tape (13'30")
Commissioned by the French Ministry of Culture premiered by Marie-Thérèse Ghirardi, guitar, and Denise Mégevand, lever harp, Radio France, Paris, 09/11/1997.
Score published by Jobert (1996).
- 1997 *Territoires imperceptibles* for flute, guitar (tuned in 16th tones), and cello (15')
Premiered by Pierre Roullier, flute, Didier Aschour, guitar, Hervé Derrien, cello, Ensemble 2e2m, Radio France, Paris, 21/03/1998.
Score published by Jobert (1997); CD published by Assaï (2003).
- 2000 *Maanakut* for voice (soprano) and guitar (tuned in 12th tones) (5')
Commissioned by Armelle Orioux; premiered by Armelle Orioux, soprano et Marcus Hochuli, guitar, Torcy, 10/03/2000.
Score published by Jobert (2000).
- 2000 *Mobiles* for 3 guitars and 2 timpani (6')
Commissioned by Ville de Bagnolet; premiered by Erik Satie Music Conservatory students, Wim Hoogewerf (cond.), Bagnolet, 21/12/2000.
Score published by Jobert (2000).
- 2001 *Artefact* for ensemble (Fl., Cl., Cor, Perc [Timp], Vln., Alt., Vlc, Cb) and 3 guitars (tuned in 12th tones) (11'30")
Commissioned by the French Ministry of Culture, premiered by Ensemble 2e2m, Paul Méfano, conductor, Didier Aschour, Caroline Delume, Wim Hoogewerf, guitars, Trianon, Paris, 21/05/2001.
Score published by Jobert (2001); CD published by Assaï (2003).
- 2001 *Elle est mignonne* for voice (baryton) and guitar (tuned in 12th tones) (5')
Premiered by Vincent Bouchot, baryton, Didier Aschour, guitar, Institut Cervantes, 05/12/2001. Score published by Jobert (2001).
- 2002 *Objectiles* for guitar quartet (tuned in 12th tones), (10'), commissioned by Radio France
Premiered by Didier Aschour, Caroline Delume, Wim Hoogewerf, Jean-Marc Zvellenreuther, guitars, Alla breve, Paris, 15/03/2003.
Score published by Jobert (2002).
- 2002 *Debout les morts!* for voice (baryton) and guitar (tuned in 12th tones) (3'30")
Premiered by Vincent Bouchot, baryton, Didier Aschour, guitare, Institut Cervantes, Paris, 13/02/2000
Score published by Jobert (2002).

2003 *Scordatura* for guitar quartet (tuned in 12th tones) (13')
Commissioned by CIRM (Nice); premiered by Caroline Delume, Didier Aschour, Wim Hoogewerf, Jean-Marc Zvellenreuther, guitars, Chagall Museum, Nice, 03/04/2003.
Score published by Jobert (2003).

2003 *Plis pour guitare* (tuned in 12th tones) (8')
Premiered by Didier Aschour, guitare, Atelier du plateau, Paris, 28 /11/2003.
Score published by Jobert (2003).

2005 *Elle est mignonne*, scenic version for soprano, baryton and guitar (tuned in 12th tones) (50')
Premiered by Didier Aschour, guitare, Valérie Philippin, soprano, Vincent Bouchot, baryton, Musée d'Art Modern et Contemporain, Strasbourg (11/2005).
Score published by the author (Art&Fact, 2005).

2009 *Intermezzo* for guitar (tuned in 12th tones) (5')
Premiered by Caroline Delume, 7e Festival International de Guitare, Salle Cortot, Paris, 27/11/2009.
Score published by the author (Art&Fact, 2009).

2014–2016 *Trans* for two guitars (tuned in 12th tones) (24')
Premiered by Estelle Lallement & Felipe Marquès, Studio Le regard du Cygne, Paris, 18/05/2014 and 05/06/2016.
Score published by the author (Art&Fact, 2014-2016); CD to be published by Stradivarius (2023).

2013 *Steppings* for flute, trombone, violin, cello and guitar (tuned in 16th tones) (4'30)
Premiered by Dedalus Ensemble, Amélie Berson, flute, Thierry Madiot, trombone, Didier Aschour, guitar, Silvia Tarozzi, violin, Deborah Walker, cello, Fondation Suisse, 05/05/2013.
Score published by the author (Art&Fact, 2013); CD published by Potlatch (2013).

2013 *Process* for flute, trombone, violin, cello and guitar (tuned in 16th tones) (7')
Premiered by Dedalus Ensemble , Amélie Berson, flute, Thierry Madiot, trombone, Didier Aschour, guitar, Silvia Tarozzi, violin, Deborah Walker, cello, Fondation Suisse, 05/05/2013.
Score published by the author (Art&Fact, 2013); CD published by Potlatch (2013).

2017 *Moiré* for guitar quartet (tuned in 12th tones) (5')
Premiered by Caroline Delume, Estelle Lallement, Felipe Marquès, Wim Hoogewerf, Studio Le regard du Cygne, Paris, 19/05/2017.
Score published by the author (Art&Fact, 2017).

2019 *Les mots* for voice, ondes Martenot and guitar (tuned in 12th tones) (10')
Commissioned by the French Ministry of Culture, to be premiered by Ensemble Itinéraire.
Score published by the author (Art&Fact, 2019).

All these works for microtonal guitar require a slight amplification to balance the playing modes and the acoustic effects sought (use directional cardioid microphones close to the instrument(s); diffusion on loudspeakers (monitor type) near the source, if possible, on stage).