PERCUSSIVE RESOURCES OF THE CLASSICAL GUITAR

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Ao país que produziu este trabalho

e suas pessoas bonitas.

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Dum! Dum! – retumbou o barulho outra vez,

como se mãos gigantescas estivessem transformando as próprias cavernas de Moria

num enorme tambor.

J.R.R Tolkien - The Lord of The Rings

ABSTRACT

In order to better assess the percussive capabilities of the guitar and the guitarists, this research analyzed the corresponding literature (theoretical and artistic) and engaged in a parallel artistic practice. For that, we have developed a model consisting of a network of concepts, a code to identify and classify percussive occurrences, and other analytical tools (PACT model). This model, whose main operator is the concept of *percussive resources* (PR), was based on preliminary analyses of guitar literature (musical works and methods) and made it possible to more efficiently analyze larger samples of guitar works with percussion. With it, a sample of 20 works of *contemporary music for guitar* (CG) and *modern fingerstyle guitar music* (FG) was analyzed, enabling a broader diagnosis of percussive guitar playing. The corresponding academic literature, methods, and other instructional material were also critically reviewed. Connected to that, artistic practice was conducted to create products with guitar percussion; they had strict artistic purposes but at the same time benefited from the application of the results of the analysis and fed it with new insights and data. The results of the analysis show several prevalences in guitar and body part usages and their interaction, along with a comprehensive survey of percussive occurrences and their characteristics. They enabled, through several grouping processes (statistical and technical), to explain approx. **65%** of percussive occurrences with **eight entities** alone (the *main group*), out of an initial count of 228 different *percussive resources* found. Artistic results consisted of several performances, recordings, compositions (authorial and in collaboration), adaptations, and a transcription, besides new percussive possibilities, theoretical insights, and the personal improvement of the researchers. Finally, gathering the results of both research fronts, it was possible to offer a description of *percussive playing* in its many aspects: the eight entities of the main group, along with several other families of *percussive resources* (either created in artistic research, extrapolated from the code, or subjectively selected for their interest), playing positions, body and guitar care, several technical issues, notation, and repertoire. The research points at ulterior work with the created database, development of pedagogic material grounded on hard evidence, some directions for further artistic exploration, and has several more immediate applications, such as informing institutional guitar curricula, usage as a tool for Music Theory, Analysis and Musicology, and in artistic practice.

Key-Words: Percussive Resources, Percussive Guitar, Contemporary Guitar Music, Guitar Repertoire Analysis, Extended Techniques for Guitar.

RESUMO

Para melhor compreender o potencial percussivo do par violão-violonista, esta pesquisa se propõe a analisar a literatura teórica e artística pertinente e, paralelamente, engajar-se em prática artística a isso associada. Para isso, foi desenvolvido um modelo teórico que consiste em uma rede de conceitos, um código de identificação e classificação de ocorrências percussivas e outras ferramentas analíticas – o modelo AGE. Tal modelo, cujo operador principal é o conceito de *recursos percussivos* (RP), teve seus alicerces plantados em análises preliminares de obras com percussão e no estudo de métodos e outras obras teóricas e tornou possível uma análise efetiva de amostras maiores do repertório. Com ele, uma amostra de 20 obras de música contemporânea para violão (CG) e *fingerstyle* moderno (FG) – dez obras de cada - foi analisada, o que possibilitou um diagnóstico mais amplo das práticas de violão percussivo. Conjuntamente, a literatura acadêmica, métodos e outros materiais didáticos foram criticamente revisados. De forma vinculada a esta frente analítica, foi realizada prática artística com o objetivo de criar produtos musicais com violão percussivo. Conquanto seus objetivos fossem em primeiro lugar artísticos, a prática artística não deixou de informar a análise com novos dados e ideias e se beneficiou da aplicação dos resultados daquela. A análise mostrou diversas prevalências no uso de partes do violão, do corpo e da interação entre estes, além de fornecer um inventário abrangente dos *recursos percussivos* e suas características. Estes resultados propiciaram, através de sucessivos processos de agrupamento de natureza estatística e técnico-violonística, explicar aproximadamente 65% das ocorrências percussivas encontradas – 228 *recursos percussivos* diferentes - com apenas oito elementos, o *grupo principal.* Já os resultados artísticos consistiram em diversas performances, gravações, composições (autorais e em colaboração), adaptações e transcrições, além de novas possibilidades percussivas, ideias teóricas e no aprimoramento pessoal dos pesquisadores envolvidos. Por fim, reunindo os resultados de ambas as frentes de pesquisa, foi possível oferecer uma descrição do violão percussivo em seus vários aspectos: as oito entidades do *grupo principal*, juntamente com várias outras famílias de *recursos percussivos* (criados pela pesquisa artística, extrapolados a partir do Código ou selecionados subjetivamente por seu interesse musical), posturas corporais, cuidados com o corpo e com o violão, diversos elementos da técnica, notação e repertório. A pesquisa aponta para novos trabalhos com o banco de dados criado, o desenvolvimento de material didático baseado em evidências e algumas direções para ulterior investigação artística. Além disso, ela tem várias outras possíveis aplicações imediatas, como informar currículos acadêmicos, ser usada como ferramenta para Teoria e Análise musicais e Musicologia ou diretamente na prática artística.

Key-Words: Recursos Percussivos, Violão Percussivo, Música contemporânea para violão, Análise de repertório violonístico, Técnicas estendidas para violão.

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LIST OF ABBREVIATIONS

APR – *Associated Percussive Resources*

CPR – *Composite Percussive Resources*

FH Code – *Fernandes-Hanah Code*

GF – *General Family*

PR – *Percussive Resource*

PRM – *Percussive Resources Mixtures*

RF – *Restricted Family*

SF – *Sound Family*

TG – *Technical group*

l.h – *left hand*

r.h. – *right hand*

pimac – *Right hand fingers (respectively: thumb, index, middle, ring, and pinky)*

P1234 – *Left hand fingers (respectively: thumb, index, middle, ring, and pinky)*

OTHER CONVENTIONS

Italics refer to technical terms with specific definitions, normally within the text, but occasionally borrowed from the literature. Many of them appear in the Glossary, for a quick consultation.

"Text between quotation marks" refer to *impromptu* names (and, on occasion, metaphors).

All the works quoted in the text are listed in a table as Appendix A. Because they appear so often, we opted to give the corresponding reference only in the final table, saving space and reading time. They are fully referenced in the proper section.

Obs.: a few works that were just passingly quoted, without further analysis, were not referenced.

Links appear underlined and in blue.

We recommend accompanying the reading with a copy of the glossary and of the figures of the FH Code (p. 64-67) at hand.

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INTRODUCTION

When emerging fingerstyle music got me caught in the magic of percussive guitar playing, after a decade spent playing the contemporary repertoire, I was mesmerized but at the same time paralyzed by the scarcity of formalized information. It was also somewhat surprising, considering its many decades of development and ongoing climax, that percussive playing so blatantly lacked instruction from institutions, widespread manuals, and general concepts. A part of it was already available[1]*, just waiting for a more in-depth research, but in general, I had the feeling that what I had at hand was not capable of offering a plausible explanation for the impressive things I was seeing (hearing) with my own eyes (ears). Attributing all to the geniality of specially gifted individuals was too romantic an approach for my taste. There should be a way of making sense of all that seemingly unfathomable myriad of techniques and* plims, puffs, scratches, ticky-dockies*, so masterfully crafted into music with notes and chords.*

The particular aesthetics of Fingerstyle, marvelously realized, did appeal to me as a listener (spectator), but not as a performer and composer. I was no novice in the world of "extended techniques" and the percussive capabilities of the guitar, having composed and played many related works myself, such as Four Poems of García-Lorca, Ritmata, Cenas Infantis (2011a), Silhuetas de uma Dança Imaginária (2010), Royal Winter Music I, Veneno (2013), Ginastera´s Sonata, among many others. Yet, I could not help but feel that somehow there was an enormous potential there to be used, of which we could reach only the tip while working in that piece-by-piece basis. So, aesthetic inclinations aside, I felt deeply compelled to pursue it.

Since the formal beginning of this journey, around the year 2015, much has happened. New publications hit the market which had a more systematic and modern approach, such as those by Josel and Tsao (2014), Schneider (2015), and Frengel (2017). Academic research gained momentum, in quality as well as quantity, with researches such as those of Titre (2013), Vishnick (2014), Carpenedo (2020), and many others. Fingerstyle grew even more, multiplying its

[1] Most definitely not for everybody, considering prices, language, shipping routes, etc.

practitioners, output of music, new techniques, and audience; more importantly, as a sign of its coming of age, it started producing formalized instructional material, such as those by Dawes (2017), Rauscher (2017), Kellie (2018), and Gomm (2018, 2019a and 2019b), mainly in video, as befits the genre.

We now inhabit a different environment concerning percussive playing, but some basic problems – a comprehensive and apprehensible collection of the existing possibilities and a model that makes that possible, for example – persist, and it is my hope that I have managedto address some of them in this work.

***

The guitar is a versatile instrument, in whose convoluted history a pleiad of practices – techniques, social functions and status, and music – coexist. Its many ancestors already participated in traditions as varied as the enormous output of European music for plucked instruments[2], oral and written dance music in the Americas, Arabic musical traditions, among many others. In all of those, different ways of playing were conceived that admit no simplifications. They offer counterpoints to critically observe what came to be accepted as the modern technique(s) of the "classical" or "concert" guitar.

The "concert" or "classical" music, traditionally prioritized in most music education institutions (universities, conservatories), distinguishes itself from other forms of acoustic works thanks to a series of characteristics, such as the importance given to writing (musical scores or tablatures), a specific crystallized notion of "works" (COOK, 2006), the differentiation/specialization of various agents in its production (especially composer and performers, sometimes seen as the "music makers", *versus* the public), and the focus on sound structures, seen as relatively autonomous, as the main vehicles for the expression of musical meaning (as opposed to more ritualistic functionalities, for example). From a guitaristic technical-musical perspective, two defining traces of the identity of modern classical guitar are: first, the use of nylon strings from the second half of the twentieth century on[3], which

[2] Such as the medieval and renaissance music for vihuelas, lutes, gitterns, ouds, etc., and the so-called Golden Age of the classical era (Sor, Aguado, Carcassi, Giuliani, etc.).

[3] Thanks mostly to the influence of Andrés Segovia (1893-1987) (OLIVEIRA, 2020, p. 150-154)

prompted distinct technical features and a specific sound signature; second, the so-called *punteado* (*plucking*).

For Cardoso (2006, p. 25), this way of playing consists of activating the strings "point by point", that is, note by note, with the fingers or with a plectrum. Taborda (2011, p. 25), in turn, states that in the *punteado* "the fingers of the right hand individually articulate the different strings, respecting the individuality of the voices". Both authors oppose the *punteado* to another form of playing that is characteristic of the lute family's chordophones, and the most disseminated in the guitar world: the *rasgueado*, or strumming, defined as a technique that strictly joins and links harmony and rhythm, much more developed with the use of the fingers than with a plectrum (Cardoso, idem, p. 26) or as a "technique (and style) of execution of the right hand, in which the fingers, with block movements alternating the upward and descending directions, reach all the strings, metaphorically tearing (*rasgando*) them" (Taborda, idem, p. 25). At least since the 18th century, plucking has been identified as the ideal technique for soloist practice, while the role of accompaniment has been delegated to the *rasgueado* (Taborda, 2011, p. 66). Professional concert guitarists devote most of their time and efforts to mastering the plucking, since the majority of concert repertoires are based on it. *Rasgueado* and other forms of playing are considered, at best, complements used in more specific repertoires (crossovers, nationalisms, some contemporary music), but never pursued with the same persistence dedicated to plucking. It was on this basis that the "School of Tárrega" (OLIVEIRA, 2020, p.123-146), whose establishment was not complete until the publication of the last of Emilio Pujol's[4] books in 1971, helped to lay out the foundations of the modern guitar technique.

Extended Techniques?

Parallel to the fixation of a "traditional" classical guitar technique in the twentieth century, the rate of technical transformations in guitar playing was enhanced when the instrument began partaking in the music of the *avant-gardes*. The implosion of the tonal system and the "common practice" took place in European music and its correlates at the end of the nineteenth century and beginning of the twentieth (GRIFFITHS, 1998, p.5; ROSS, 2009). But if "modern" music can be loosely placed in the many aesthetic trends then hatched, the guitar only progressively

[4] Emilio Pujol (1886-1980), a disciple of Tárrega and the author of a method in four volumes (1956, 1956, 1954 e 1971), the most important books to carry on the "School of Tarrega" principles.

enters this world between 1928 and the 1960s. For some, the turning point can be found in Villa-Lobos´ *12 Études* (CARLEVARO, 1988; ZANON, 2006); for others, in the sixties – more precisely, in 1963, when three cornerstones of the repertoire (Britten´s *Nocturnal,* Ohana´s *Si le jour paraît…*, and Company´s *Las seis cuerdas*) came to life (SCHNEIDER, 2015, p. 11). This aesthetic trend induced technical movements of both exploration and rediscovery, which were generally decanted by traditional musicology and performance studies in the concept of *extended techniques*.

The expression has a decades-long history by now, and many definitions that circle the ideas of "uncommon" or "modern"/"new" techniques. All of them are, however, problematic, for they either take a specific musical background for granted, establishing an improper universalization, or lack evidence for its temporal placement, creating an implicit – and unproven – history of the techniques. Oliveira (2020) shows that this evolution is neither linear nor teleological and that it involves movements of contraction as much as of extension. Techniques today considered "extended" are described in manuals as early as those of Sor - 1830 - and Aguado - 1825 -, having surfaced and been abandoned several times in the last centuries. He also highlights the many displacements between the narrative of a supposed traditional technique and actual classical guitar practice[5]. A late and more elaborate definition by Padovani and Ferraz (2011) describes the concept as "manners of playing or singing that explore instrumental, gestural and sonorous possibilities seldom used in a certain historical, aesthetical and cultural context". Despite the notable effort in theorization, it still leaves the concept relatively loose, as the establishment of what is "common", even in such a well-defined context, is generally left to subjective interpretation, being highly dependent on individual experiences with the repertoire and cultural background. We acknowledge that a certain degree of imprecision is inherent to every concept, and that the participants of a specific community can acknowledge some elements as belonging or not their collective musical praxis. However, we are not completely convinced that the concept sufficiently or properly delimitates what we understand as percussive practice in the guitar.

[5] A dramatic example is the *Concierto the Aranjuez*, the single most widespread guitar concert of all times. It has as its most prominent motif – the opening theme of the first movement – a *rasgueado* sequence, a technique considered to be "extended" by some authors.

It reveals itself especially inappropriate for analyses that comprehend more than a single musical tradition, such as the one we will develop here, as it will be unable to establish among them a unified set of conventions to define what is "common" or "extended". For example, many percussive techniques (such as the Bartók *pizz.*, the *tambora,* the muted rasgueados or even the *golpe*) have been in use in the classic repertoire for many decades now, at least since the 1960s[6], and are arguably common enough[7] not to be characterized as *extended*; on the other hand, in the realm of modern Fingerstyle, percussion is as used as any other technique, and not an "extension" abstracted from a supposed "technical core". Additionally, the concept does not adequately restrict what can be considered percussive, as it shelters many non-percussive technical extensions (*inclusion*): the use of the fingers in unusual positions to play plucking or strumming, such as the thumb of the l.h. to stop notes in the fretboard; many techniques of harmonics; multiphonics; pizzicatos; playing with *c* of the r.h.; certain extensions and contractions of both hands; *barrés* with fingers other than the 1 of the l.h.; *barré glissandi*; eventually, even some techniques such as tremolos; specific *rasgueado* formulas; etc. Lastly, to call something an "extension" means that there is a basis from which something diverges; it is very easy to derive that into some kind of hierarchy, and that goes in the exact opposite direction we are trying to establish here.

As a consequence of those facts, and even recognizing that *extended techniques* is the most common operator to deal with deviations from the plucking technique, we have avoided its use in this work in favor of the idea of *percussive resources*, which we shall examine timely. We shall also leave the question of whether and when percussive playing can be considered technical extensions aside. That does not mean denying the concept, only establishing other ways of thinking that work better for our purposes here[8].

Regardless of how we choose to name that technical-musical unrest, in the turmoil of the accelerated evolution it sponsored a whole branch of technique and music digressed from the assumed plucking nucleus towards a broader understanding of the intrinsic sound possibilities of the instrument, not limited to its more obvious "intentions"; this movement is probably

[6] Oliveira (2020) goes so far as stating that a truly consolidated "traditional" technique of the guitar did not exist prior to that, which makes calling something an "extension" (of what?) senseless.
[7] Despite not being "foreign" to classical guitar, these are still less used than other *punteado* techniques, and not formalized with the same sophistication.
[8] A critique of the concept, however, seems to be necessary especially for the guitar, and we refer the reader to the work of Oliveira (2020) for an extended discussion on the matter.

better situated as beginning in the 1950s and especially the 1960s, as put by Schneider. It is, more than others, responsible for radically reshaping not just the sound, but the very nature of the instrument and its practice. This branch is what we call *percussive playing*.

Percussive playing

The usage of the guitar as a percussion instrument is as old as it is intuitive: its inherently explosive sound was always recognized in its rhythmic, strong-attacked nature, as attested, for example, by the early Italian tradition of the *chitarra battente*[9] (JOSEL AND TSAO, 2014, p. 72; SCHNEIDER, 2015, p.388); Cardoso (p.28) lists several terms associated with playing *rasgueado* (presumably before the eighteenth century): *golpe, batería, batterie, botta,* all meaning "stroke", "to hit". Its resonant box is also an obvious and tempting percussive target, and that was not entirely lost to the guitar traditions, as seen in the early mentions of the *golpe,* a stroke on the soundboard (as early as 1732, according to JOSEL AND TSAO, 2014, p. 158). Many other instrumental possibilities were discovered over the centuries as the result of creative investigation, such as the *tambora*, described by Aguado in 1825 (JOSEL AND TSAO, 2014, p. 155; OLIVEIRA, 2020, p. 45), or the crossed strings, used in *Gran Jota* (1872), attributed to Tárrega (JOSEL AND TSAO, 2014, p. 164; OLIVEIRA, 2020, p. 45).

It is important to acknowledge that different guitar traditions – notably flamenco and Latin American guitar music – have also long used the guitar in ways that could be considered "percussive". But, as we proposed, Contemporary Guitar Music (CG) was especially enthusiastic about exploration and, as such, unveiled the largest collection of new instrumental possibilities, also pioneering their use as the foundation of the works, instead of as localized or ornamental uses[10].

In the latest decades, especially in the last fifteen years, however, another guitar tradition joined the struggle and considerably expanded the realm of percussive playing, precisely as it established itself as a (new) genre: the Fingerstyle Guitar (FG).

The term has a long history in guitar music from the United States and has come to encompass different meanings over time, most of them relating simply to the use of the fingers, as opposed

[9] Which consisted in complex strummings with rhythmic appeal.

[10] Sometimes it did so by drawing precisely from knowledge from the mentioned traditions, as is the case, to give one example, of Ginatera´s *Sonata para Guitarra op. 47*.

to playing with a plectrum. The meaning that interests us here, sometimes called *modern fingerstyle,* is the one covering very recent (from 2006 on) music associated with playing on the entire instrument, largely defined by its ambition of summing up a drumkit accompaniment to the melody and chords of the "songs", as in a "one-man-band". It is widely accepted that the genre was born, or reinvented, after the astonishing success of the "song" *Drifting*, by Andy McKee, on YouTube[11], in 2006 (DAWES, 2017; MISKO, 2019; STRICAGNOLI, 2018). Despite that, its roots travel way back in time, from the 1970s to the 1990s, with precursors Michael Hedges (USA, 1953-1997), and later Preston Reed (USA, b. 1955), Tommy Emmanuel (Australia, b. 1955), and Eric Roche (Ireland, 1967-2005), followed by Thomas Leeb (Austria, b. 1977) and a few others. After 2006, the genre gradually became more popular and linked itself inextricably to the internet and the video medium. It came to an exponential growth in the last decade, with an ever-increasing number of practitioners and a matching output of music and videos and, more recently, written publications and instructional material. It is generally seen as "popular music", with many intersections with the blues, jazz, and, above all, pop music. Because of the extensive use of guitar percussion, rarely seen in those musical contexts, it displays a strong innovative character associated with a scenic flavor organically related to the video environment.

Defining and discussing genres is outside the scope of this work. However, because we detected a lack of organized information about the practice we are trying to distinguish here, we will propose a few sets of characteristics to start a discussion on the subject and identify what we are referring to. As is always the case, especially with creative practices, an inventory of features in such general lines will leave plenty of space for exceptions.

1. *Tocautoria* (FERNANDES, 2014, p. 106-112 and 202-215 - see entry in the Glossary and Chapter 1): Most artists seem to conduct their artistic and professional practice in a *tocautorial* way, that is, creating and performing (and confusing these categories) a solo repertoire tailored for themselves, in which the idiosyncrasies of their instruments and technique merge. This practice is often associated with self-management and nomadism (FERNANDES, *op. cit*), in addition to a specific cultural background.

[11] As of Aug. 2020, the video has over 59 million views.

2. Solo: The majority of Fingerstyle production is for solo guitar.

3. Performance effect: FG can in no way be analyzed only from an auditory perspective that credits the aesthetic effect solely to the relationships between sound structures. The scenic effect of the technique, which emanates in part from its novelty – we can imagine that it wears off a little as *memory* crystallizes (FERNANDES, 2014, p. 48 and 208) –, greatly influences meaning, and, although it is associated with innovative sonorities, it can be regarded as a major aspect by itself. This performance element can even make up for some instrumental limitations that arise from the “one-man-band” approach, which is common in the genre. Their favored form of “written record”, the video, lies also a step before video-art/video-clip, with its own characteristics.

4. Little improvisation: so far, most fingerstyle authors seem to work with more fixed performances, although the compositions themselves retain the characteristic flexibility of popular music. In this sense, improvisation, be it taken in its “jazzy” meaning or more strictly (in the sense of creating something, even if small, in real-time), seems to be relatively scarce. This contrasts with the enormous improvisational potential of the guitar percussion. Perhaps a next generation of artists, working from a more established basis, will feel freer to explore those realms of music performance.

5. Tuning: An important technical-musical characteristic in the field is the intense work with "alternative tunings". They are used a) as a way to expand the instrument register, b) as a timbre modification, and c) as a technical solution to: facilitate the performance of chords and counterpoints, make open strings more docile for melodies and the percussive use of the l.h., and decrease the string tension, reducing the effort of playing. The genre "inherited" many tunings of the electric guitar and other musical traditions. Some examples of common tunings (out of dozens) are:

Open D: D A D F # A D

Modal or suspended D: D A D G A D

Dropped D: D A D G B E

Dropped C: **C A D G B E**

Cmaj7: **C G D G B E**

Open G: **D G D G B D**

The tuning is also directly associated with the musical form through the harmonic structure, the latter being closely related to the idiomatic possibilities left by each tuning.

The use of a wide range of tunings in different works ends up disrupting live performances due to the time and risks involved in constantly re-tuning the guitar. This fact has been generally circumvented with the use of various instruments on stage. The same time-consuming problem affects the daily practice routine.

6. Musical characteristics: FG is strongly associated with musical genres of the Anglo Saxon culture (blues, jazz, and especially pop), sharing some of their features. A relative structural simplicity, with well-defined and repeating parts (often in the manner of the song's structure, with verses and choruses) is the most usual. The tonal/modal harmony coinciding with the parts is, in most cases, non-modulating. Despite the repetitions, used to generate familiarity and extend the songs, most are within the "standard" duration of mainstream music (about 4 minutes), with exceptions that can reach up to nine or ten minutes. The degree of redundancy[12] is high, at least compared to CG. Texturally, despite some variety, melodies accompanied by basses, rhythmic ostinatos (percussive), plus the eventual harmonic filling prevail. The melodies are frequently developed with the use of tapping.

7. Internet: The genre was born with and consolidated within the internet. Traditional media seems to fulfill a minor role in its diffusion (MISKO, 2018; STRICAGNOLI, 2020). That is highly variable depending on the artist, affecting the newer generations more intensely, and they are the majority of the artists. It is easy to imagine that, as with everything else, the 2019-2021 pandemic will have a long-term impact on that characteristic. In any case, its natural habitat is undoubtedly *YouTube* and, more

[12] Repetition of chord progressions, melodies, and rhythmic structures.

recently, other video streaming platforms; that relates to its scenic nature. This also impacts the learning methods (which are inclined towards a "do it yourself" approach of self-learning from the videos or video lessons), with musical consequences (the tendency to mimic the interpretation "embedded" in the reference recordings).

8. Labels: This online production has been organized, in part, by large labels or YouTube channels. One of the best-known is CandyRat Records, specialized in the genre and whose catalog features dozens of contemporary exponents; Windham Hill Records is also historically important for having released the music of Michael Hedges.

Along the research, we have also learned that FG can be characterized by its particular selection of percussive elements and their use, such as the way it connects them with plucking and strumming. We shall describe a few of these features.

There are radical musical, social, and *praxis* differences between Fingerstyle and Contemporary Guitar, and that helps to unveil the versatile potential of the guitar as a percussion instrument. Moreover, the creative enthusiasm they share is continually enriching and reshaping the world of the guitar.

A practice with no theory

Despite the achievement of the mentioned artistic developments in percussive guitar playing, they have so far been insufficiently followed by matching technical literature. It is generally available only in the form of artistic products or internet lessons focused on specific works, with little ambition of generalization. Because of that, they lack standards, proper vocabulary, identification of recurrences and patterns, accurate descriptions of the percussive techniques and sonorities, etc. As we mentioned earlier, isolated and non-systematized percussive techniques have appeared in guitar manuals since the eighteenth century (JOSEL and TSAO, 2014, p. 158; OLIVEIRA, 2020, p. 45). The traditional methods of the twentieth century either ignored them or gave them a superficial approach. In any case, that was always done sparsely and never considering them as a viable technical system that could offer raw material capable of building complex musical structures. Even in more modern works that deal with contemporary music (INDA, 1984; JOSEL AND TSAO, 2014; SCHNEIDER, 2015; FRENGEL, 2017),

they were not given proper specific, comprehensive, and systematic treatment, mostly appearing isolated in the form of entries in "catalogs of extended techniques" with different degrees of organization. Nowadays, despite the astonishing increment in the technical literature in the last ten years, we still have no manuals focusing specifically on *percussive playing* or *guitar as percussion*, and few that acknowledge this technical sub-area [13] (HIRSCHELMAN 2011; WOODS, 2013; JOSEL and TSAO, 2014; SCHNEIDER, 2015; DAWES, 2017; GOMM, 2018, 2019a and 2019b; RAUSCHER, 2017; KELLIE, 2018); the lack of focus results in the lack of in-depth discussions**.** Despite the growing number of publications, they tend to have more pragmatic than comprehensive concerns. As such, they do not exhibit systematic nor globalizing approaches, showing a still incipient inner consistency in categories, criteria, terminology, etc. Additionally, most of them do not focus entirely on what is (or could be understood as) strictly percussive, mixing it with techniques of different natures, like harmonics, melodic/harmonic tapping, etc., or, on the other hand, they limit what could be defined as 'percussive' to taps in the soundboard, sometimes the sides of the guitar, ignoring many percussive possibilities. Most, if not all, rely too much on the personal experience of the authors, avoiding the exercise of comprehensive inquiries into the existing literature; as vast as that experience might be, it cannot hope to match the overflowing output of guitar music with percussion without a systematic research, especially in the last decade. As a consequence of that, they tend not to dialogue with each other. Lastly, the works focused on FG assume steel-string guitars and cannot uphold the validity of their content to the nylon-stringed paradigm of the concert guitar.

This state of affairs has other consequences. For one, a wide variety of incompatible score instructions and notational systems for the same or very alike results. Worse, a kind of general incommensurability that establishes itself out of an enormous variety of percussive playing in guitar literature, spread through sixty years of *praxis*, always appearing and reappearing with new names and secondary or even irrelevant variations. Such a chaotic environment of informational proliferation makes it difficult for the guitarist to recognize elements from one work to another and to form stable mental models to organize his or her technique. This lack of identity of percussive techniques could also hinder their technical refinement over time,

[13] On the other hand, the organization of "extended techniques" in pitched/unpitched is quite common and arguably theoretically sound. In practice, however, the limits between these categories are not always clear.

both at individual and community levels. On a social scale, all of this prevents deeper dissemination of percussive playing, by extension hindering its general artistic reach.

One last problematic area is the repertoire. Firstly, because of the still ongoing diffusion of the specific set of skills required for percussive playing; secondly, because many works are not written down in scores, or are not immediately available to concert (nylon) guitarists; lastly, because most of this repertoire exhibits a high level of technical and/or musical difficulty.

RESEARCH PROPOSAL

We expect to address a number of these issues in this work. **Focusing on solo guitar literature with hand techniques, excluding all kinds of guitar preparation**[14], we proposed analyzing artistic, academic, and pedagogic literature related to percussive playing to form a global overview of the practice, creating concepts to describe it, surveying the instrumental resources that exist so far, and organizing that information. At the same time, we aimed at engaging in various artistic practices (composition, adaptation, improvisation, performance, collaboration) to obtain products that, on the one hand, were informed by that knowledge, and, on the other, applied, tested, and expanded on it, without losing the character of objectives by themselves.

In **chapter one (Understanding Percussive Playing)** we approach the problem of delimiting what percussive playing is. In that process, we created a network of concepts that enables an understanding of the practice from different perspectives. To allow for a systematic approach, that is at the same time comprehensive and consistent in categories, criteria, and terminology, we present a model (PACT) for organizing (identifying, classifying, grouping) percussive instrumental resources and analyzing their musical occurrences.

In **chapter two (Analysis),** to fulfill the lack of a systematized approach to the percussive literature, we present the results of two different analytical procedures: an exploratory one, which helped to develop the tools described in chapter one (FH Code, Analysis Form, some concepts), and a systematic one, applying the PACT model in a larger sample of 20 works, to survey instrumental resources, find out to which groups they belong, in which frequency each

[14] This focus is as much a personal choice as it is a necessary restriction to make the research viable in the given conditions.

of them appears, and to gather other information about their occurrence, use, and notation in the literature.

On a personal artistic level, we aimed at developing an effective and organized percussive technique. To achieve that, on one side, a consistent, economic, and organized mental model for understanding the practice is indispensable, as approached in chapters one and two; on the other side, constant artistic practice is mandatory, and that is what we report in chapter three (Creative Practices): our practices in performance of the repertoire, adaptation and transcription of works, improvisation, composition, and collaboration with other artists. These experiences constituted also an application and test of the previous results and at the same time fed them with new inputs, in a circular interdependent research circuit that provided much information on percussive playing, such as how to play, new techniques, experiments on notational systems, etc. We argue that this methodological reciprocity, stretched along the whole period of the research, constitutes and exemplifies a specific direction for *artistic research.*

In chapter four (Playing Percussively) we discuss the aggregate results of the previous chapters from a practical perspective, presenting a discussion on many aspects of percussive playing, a detailed description of the technical and musical characteristics of the components of percussive playing and selected percussive resources, along with a discussion on general technical principles, specific techniques, technical combinations, notation, and repertoire expansion. Aiming at reuniting all the organized information on the percussive guitar practice, it has a more "catalographic" character, similar to that of a reference work meant for consultation.

Applicability

First and foremost, this research contributes to our qualification as artists, empowering us with tools to embrace percussive guitar playing.

Endeavors in that direction have already been carried out, constituting the artistic legacy of this research: new works and video recordings of several performances.

The research can assist classical guitarists in enriching their repertoire and developing percussive skills, diversifying their expressive and professional possibilities – reaching new repertoires or shedding new light upon the classicfleixbl ones, updating their practice to attract more public, finding new roles in bands and chamber music -. Composers can also benefit from it, understanding the many instrumental resources and receiving insights into usage and notation. Theory, Analysis, and Musicology can also benefit from the organization we established, the tools we developed, and the results of our analysis to pursue their own objectives.

The research can also contribute to discussions on guitar curricula in universities and other institutions at different levels, from basic to advanced.

The various results will hopefully fill some of the gaps we discussed in the introduction, and can at the same time unfold into different fields of academic investigation specifically concerned with percussive guitar playing, such as notation, new surveys, organizational questions, research methodology, etc.

This research was developed at the *Universidade Federal de Minas Gerais* (Brazil) with cooperation with the *Westphäliche-Wilhelms Universität Münster* (Germany). It was conducted from August 2016 to December 2020, in Belo Horizonte (2016-2018, and part of 2020) and Germany (various cities, 2019-2020).

METHOD OVERVIEW

OBJECTS

The main objects of this research are

a) The **Percussive Resources (PRs),** as defined in **chapter one**, as proxies for "Percussive Playing", in the context of solo six-string guitar playing directly with the hands and with the hands only, without any accessories or preparation.
b) The **artistic products** created.
c) The **works analyzed**.

METHODS

The method we used can be divided into two different approaches: **the systematic/analytical one and the practical one**. Their ***methodological reciprocity*** is their most important feature. While the different methods and tools used on each can be individually classified as surveys, structural analysis, exploratory analysis, artistic creation, literature review, interviews, classes, and active participation, their permanent mutual interference is what arguably situates the research as a whole in the domains of the *artistic research*.

Artistic research is a consolidated field with distinct epistemological and methodological characteristics. These refer to its "internal vision" of artistic making, which implies treating the artist as the subject and object of the research and adapting the method's premises to the subjective content that prevails in Art (COESSENS, DOUGLAS, and CRISPIN, 2009). We would go as far as to state that it moves not only the methodological but the very epistemological premises of the research from the traditional scientific *objectivity* to a *subjectivity* that can be even more radical than that of the ethnography. It is a kind of research that has the artistic practice as its center: it is a referential framework, a method (research is done **through** artistic experimentation), the object (the research studies/modifies/focuses on objects or artistic

processes), and the result, since the research reports and products can be the artistic objects created by it (HASEMAN, 2006, p. 3-4). Today, it is sufficiently consolidated in theory and practice for certain authors to speak of a "performance" (HASEMANN, 2006) or "artistic" (COESSENS, DOUGLAS, and CRISPIN, 2009) turn. The specifically musical formalization of its principles into methods has been greatly advanced in recent years, with works such as those of Cook (2013) and López-Cano and San Cristóbal (2014).

We will detail the methods used in each part of the research and, afterward, deal with some specific aspects of their interaction, thus exemplifying some of its artistic-research aspects.

ANALYSIS

To understand what percussive playing is and its state of the art, it is necessary not only to review the specialized literature but also to look at the works themselves. In this endeavor, we decided to focus on FG and CG for their high density and variety of percussive occurrences. Also, contrasting their musical characteristics helps to abstract percussive playing from a particular genre and bring different percussive resources and musical uses to light.

EXPLORATORY ANALYSIS

We began with an extensive exploratory analysis of percussive playing in five reference works of classical guitar contemporary literature: Leo Brouwer's *La Espiral Eterna* (1971), Giacinto Scelsi's *Ko Tha* (1967), Ginastera's *Sonata op. 47* (1976); H. W. Henze's *Royal Winter Music I, I: Gloucester* (1976), and Arthur Kampela's *Percussive Study n. 1* (1990 – see FERNANDES, 2017a).

In a first phase, we ensured a preliminary and comprehensive familiarization with the entire corpus, studying the scores and listening to various recordings. Next, each work was approached individually, in two moments: in the first, to survey the percussive resources that were used, observe the characteristics of the notation proposed and how those resources were used in the work, the scores were analyzed, isolating percussive occurrences and the characters used to notate them. In the second moment, to understand the effect of the observed aspects on interpretative practice, we listened to several reference recordings, focusing on sound result and effectiveness – technical, of sound and score description – of the percussive resources, with special attention to a) the level of differentiation between them; b) the relationship

between the level of detailing or indeterminacy of the notation and the interpretative result; and c) the proximity between similar resources in the various works.

The next phase consisted of the survey of the various percussive resources, their description, and the notation proposals, work by work. Each resource was isolated and tested on three different instruments, to observe the variations in response: a) handmade guitar "Paulo Marcos", traditional construction with spruce top, 2009 (Brazil); b) Takamine Industrial guitar, model G-16 (Indonesia); and c) "Alexis Parducci" handmade guitar, traditional construction with spruce top, 2015 (Argentina). The recordings were also considered in these tests.

We then, in a third phase, elaborated a first approximate classification, with the sole purpose of facilitating the comparison between the pieces, while also sorting the percussive resources to eliminate redundancies (negligible variations), after which we proceeded to the final cataloging of the various resources, which were still treated without a definitive system of identification/classification.

This was followed by a thorough analysis of the data collected and elaboration of the conclusions (fourth phase).

The results, described in chapter two, enabled the creation of a model for understanding Percussive Playing, consisting of several premises, concepts, conventions, a code, variables and parameters, and tools. This model, called PACT, is described in detail in chapter one. It enabled a broader survey that followed the exploratory analysis. Some of the results that made that possible were:

a) the definition of the Percussive Resource concept (FERNANDES, 2017a, p. 213-216, 218)
b) the conceptual foundations for a systematic organization of the PRs (FERNANDES, 2017a, p. 218);
c) the definition of many analytical parameters, later translated into variables, to facilitate data collection.
d) Specific information about the use of percussive resources in the works analyzed.

Even though traditional musical analysis was not our focus, it was indispensable for understanding the role of the percussive resources in the works. For that, we used a method proposed by Argentinian theorist Dante Grela (Rosario, b. 1941) in his "Analisis Musical: Una

Propuesta Metodológica"[15] (1985), which proved useful also for developing some analytical parameters for percussive playing (notably the analytical area *Use*, referring to the musical function of percussive musical structures). The basic idea of the method is, departing from the "sound reality" of the works, to understand musical structures at distinct levels and from distinct viewpoints ("analysis areas"), continually comparing the partial results of the analysis with that "reality". The levels go all the way from the unitary event/note to the largest sections and finally the whole work. The various analytical areas he proposes are: 1. Statistic (counting, classification); 2. Parametric (Pitch, duration, intensity, timbre and space, and their combinations – articulation, harmony, melody, etc.-); 3. Articulatory (the study of the temporal and spatial divisions of the work, and how these divisions, at the various hierarchical levels mentioned, connect to each other); 4. Comparative (comparison between the units analyzed in 3, according to some parameters); 5. Functional (the role of the formal units in the work: Exposition, Transformation, Transition, Introduction, Interpolation, Extension, Conclusion, Interjection); 6. Interrelational (the most important phase, in which conclusions are drawn from the consideration of all the five previous analyses together). All the analytical dismemberings of the work should be subsequentially reintegrated to form an *analytical interpretation* of the work.

This method is part of the background of our musical analysis, despite appearing explicitly only in the Analysis Form, category 4 (see chapter one). It was also fundamental in establishing concepts to understand how percussion functions musically (see "PR usage in musical structure" in chapter one).

SURVEY

After processing the results of the exploratory analysis, it was possible to develop a model and tools to analyze larger samples of repertoire.

We initially defined the corpus to be worked on (SOUSA AND FERNANDES, 2018). We departed from a pre-selection of 23 fingerstyle composers (totaling 40 pieces) and 21 contemporary composers (22 pieces), gathered based on availability (convenience sample); for that, we searched in internet databases, *Youtube* channels, *Google*, FG labels and inquired our

[15] This work is difficult to find nowadays; for that reason, we refer the interested reader to the Attachments of a previous work of ours (FERNANDES, 2014, p. 312-321), in which we digitalized the relevant part of the original work (in Spanish), with the author's permission.

surrounding guitar community. From these, we selected 20 works – ten FG, ten CG – through their scores in the following criteria (3 points each from *a-c*, plus item *d*), obtained through a qualitative appreciation:

a) Significative presence of percussive resources: 3 points for percussion throughout the whole work; 2 points for extensive use of PR but with whole sections where they are missing; 1 point for eventual or ornamental use, or in just one section of the work.

b) Solo guitar without preparation: Minus 1 point for each extra guitar or preparation required.

c) Percussive innovations: 1 +1 for use of the guitar in different positions; +1 for presenting an innovative technique (one that was rarely used, even as variation, in the whole sample of 43 works); +1 for integrating the PR with other techniques in a particularly efficient or innovative way (according to a qualitative appreciation and in the context of the 43-works sample.

d) Variety of percussive resources: One point for each PR

Tables 1 and 2 show the selected works/composers with their respective scores:

N.	Work – Composer	Use Weight 3	Solo Weight 2	Innovation Weight 2	Different PR Weight 1	Total
1	These Moments - Antoine Dufour (DUFOUR, 2011)	3	3	2	7	26
2	Dance Of The Last Rhino - Jon Gomm (GOMM, 2014)	3	3	1	9	26
3	Boogie Shred - Mike Dawes, (DAWES, 2010)	3	3	1	9	26
4	Telepathy - Jon Gomm (GOMM, 2013)	3	2	1	10	25
5	The Impossible - Mike Dawes (DAWES, 2012)	3	1	2	10	25
6	The Mirror - Oscar Méndez (MÉNDEZ, 2016)	3	3	1	8	25
7	Passionflower - Jon Gomm (GOMM, 2011)	3	2	1	9	24
8	Drifting - Andy Mckee (MCKEE, 2006)	3	3	1	7	24
9	Hunter's Moon - Andy Mckee (MCKEE, 2010)	3	3	1	7	24
10	The Future - Luca Stricagnoli (STRICAGNOLI, 2014)	3	2	2	5	22

Table 1: FG selected Works in priority order.

N.	Work – Composer	Use Weight 3	Solo Weight 2	Innovation Weight 2	Different PR Weight 1	Total
1	Estudo n.1 - Artur Kampela (KAMPELA, 1990)	2	3	1	10	24
2	Las Seis Cuerdas - Alvaro Company (COMPANY, 2014)	2	3	1	10	24
3	Cenas Infantis – Stanley Levi (FERNANDES, 2011a)	3	0	1	12	23
4	Ko-Tha I - Giacinto Scelsi (SCELSI, 1965)	3	3	1	5	22
5	Op.47 - Alberto Ginastera (GINASTERA, 1984)	1	3	0	10	19
6	N-Dimensional - Gabriel Data (DATA, 2006)	3	2	0	6	19
7	Kurze Schatten II - Brian Ferneyhough (FERNEYHOUGH, 1989)	2	3	0	7	19
8	Royal Winter Music - H.W.Henze (HENZE, 1976)	2	3	0	6	18
9	Tellur - Tristan Murail (MURAIL, 1978)	2	3	0	6	18
10	Algo - Franco Donatoni (DONATONI, 1977)	1	3	0	7	16

Table 2: CG selected works in priority order

These preliminary analyses and surveys were made through audios, videos, and scores analysis, study of bibliography in general (percussive guitar manuals, secondary sources such as video or written interviews), and performance of percussive elements and some of the works.

Sometimes, percussive resources appear only in one movement from a much larger work, such as the cases of Royal Winter Music I (first movement) and Kurze Schatten II (third mov.). In those situations, the analysis focused on that movement, rather than the whole work.

Sources

We then proceeded to gather the sources for each of the chosen works. They consist of two source-types: scores and videos, which generally complement each other. There are open-access videos for all of the works on the internet (which the reader can promptly access); however, not all scores were available. This is due especially to the fact that FG compositions generally do not have one, which is, in turn, due to the deep aesthetic and practical differences between these two traditions.

We have discussed that modern FG is a very recent genre – ca. 15 years –, despite its earlier roots. It was born in the Internet era and, thus, was diffused on websites, blogs, social media, and, above all, *Youtube*. It is also strongly associated with popular music, especially *pop* and *folk*

– from English speaking countries like the USA, England, and Ireland[16] –, but also *rock* and *jazz*. The common guitar practice in these traditions does not include, but occasionally, the use of scores, and, when it does, the scores function very differently, being generally something closer to a draft that does not reject previous knowledge of the music through other means. The artists do not compose score-aided and they do not conceive the music through the mediation of score or score-trained thought and hearing. Instead, they favor a stronger relation to the idiomatics of the instrument, instrument-aided creating music directly in it and for it. As in an authentic *tocautorial* tradition, the music is conceived and played by/for the composer-performer and his guitar (the *tocautorial* entity) themselves. All of this means that the texts of authority in this musical tradition, updating what Hennion (2010) understood as *discomorphosis*, are not the scores, but recordings. In the FG case, those recordings exist mainly as streaming videos, which are therefore the authoritative Fingerstyle texts, and as such were considered the main references (generally the only one) in the research[17].

Contemporary classical music, on the other hand, having its roots firmly planted in ancient European written tradition, rely heavily upon scores to conceive, develop and write down the music[18]. Despite the fact that they are not "the works themselves", as thoroughly discussed by Cook (2006), it is mainly through them that performers learn how to play the music[19]. That means, firstly, that this tradition unfolded highly developed musical writing capabilities and the artists are accordingly trained; secondly, that scores are, or tend to be, the reference texts for the works. They can be, nevertheless, insufficient: previous analysis has shown that there can be significant differences in PR between score instructions and the actual performances – the latter tending to be more varied and providing, by their own nature, more precise information. Therefore, we have on occasion made use of videos and/or played the music ourselves. The scores maintain, however, their position as the primary sources for CG works.

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[16] This refers to mainstream percussive guitar. Artists such as Thiago Colombo de Freitas and Arleno Farias, (Brazil), for example, produce percussive music for guitar with very different roots, but it is unclear, as of now, if their music can be properly labeled "Fingerstyle guitar".

[17] It is interesting to note that different practices led to different authoritative texts, which in turn leads to other different practices: for example, the learning processes in the genre are very specific and it would be stimulating to see them explored in future studies in Musical Education.

[18] That, nonetheless, does not mean that CG possesses definite notational conventions; innovation having been the tonic music for many decades, the consolidation of a unified notational system never happened, and less so for the guitar. Nevertheless, in its own self-organized universe, each score can succeed in explaining the ideas that constitute the work.

[19] Of course the players also receive a great deal of input from other sources, such as teachers, recordings, etc.

It is always difficult to find common parameters to analyze music from different contexts. The epistemological displacement between CG and FG, reflected in their respective authoritative texts, presents no small problems for data compatibility. For example, if the performances tend to exhibit more variety and detailing of the different percussive resources than the scores, it would be expected that a video-based analysis for CG resulted in different scores for several variables not specified in the notation. Moreover, since performances can vary greatly between artists, which recording to choose? Even the few works that have a specific recording that could be considered referential cannot be "reduced" to that particular performance (and that holds true even when the performer is the composer himself).

The solutions we found were a) to maintain different types of main sources for each tradition, using other sources (when available) as complement and b) to favor the analysis with "Families" of percussive resources instead of very detailed individual percussive occurrences, equalizing the average level of specificity between FG and CG.

The analysis and its tools

As important as the visual aspect is for fingerstyle, we did not aesthetically evaluated that dimension in the performances, and for two reasons: firstly and more importantly, because such an analysis requires theoretical and technological tools that greatly complexify the analytical process and would moreover require a whole new approach to connect that to traditional musical concepts, a significant task that would take the research in another direction entirely; secondly, because it would not work satisfactorily with score-based analysis without yet another set of major adaptations.

Another aspect we chose not to analyse systematically due to research limitations is the audio technology (capture, amplification, editing, mixing). We did discuss it in the interviews and incorporated it in our artistic practice, the data so generated being already incorporated in the models, concepts, and descriptions. We can say that audio interfere but does not essentially change the nature of most PR (when so, we addressed that in the text); mostly, they make the PR easier or louder. Radical transformations, as seen in the practice of some artists, fall outside the scope of a classical-guitar-oriented work such as this, but the sound source that feed such transformations was, as befits any PR, taken into account normally.

The analysis itself consisted of scanning the various sources to find percussive elements, as defined by the PR concept. They were named, compared, classified, and eventually grouped in families using the FH Code**.** During this process, we also observed a series of other general, compositional, technical, and notational variables concerning the works. All of this data was first collected in an Analysis Form (AF) developed for this objective, in which the information can be quickly notated and retrieved using codes. It was then transferred to a database.

Let us take, for example, Ginastera´s *Sonata para Guitarra op. 47*. We begin with an initial scan of the score, followed by watching or hearing several versions available in *Youtube* or in *Spotfy* (including with score-following). In this case specifically we had also previously played the work, which bestowed the analysis with a much higher level of intimacy. After we feel sufficiently familiarized with the material, we start isolating the percussive occurrences in the recordings (taking notes of possible discrepancies) and in the score. In this case, there are PR described in both in the Instruction Pages (GINASTERA, 1978, p.2-3) and throgout the score. It is necessary to investigate which techniques are actual PRs, which involves testing them and looking at their occurrences *in loco*. Let us look at the soundboard taps. They are described in p. 3 of the score (Fig. 1) and they occur in movs. I, II and IV.

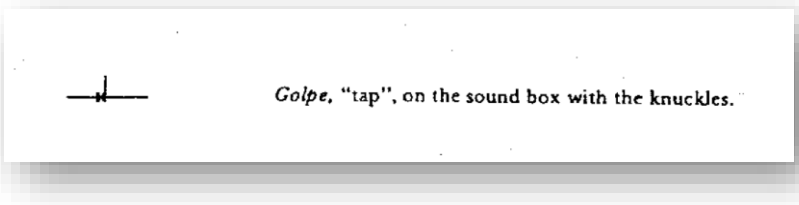


Figure 1: Soundboard tap (2/Bgp) in *Sonata op. 47* by Alberto Ginastera. Source: Ginastera (1978), p. 3

In all of them, they form strucutures whose main content is rhythmic, as illustrated in Figure 2, showing their texturally interpolated use to emulate Argentinan *Zamba* rhythms, evoquing the sound of the particular drums used in that style.

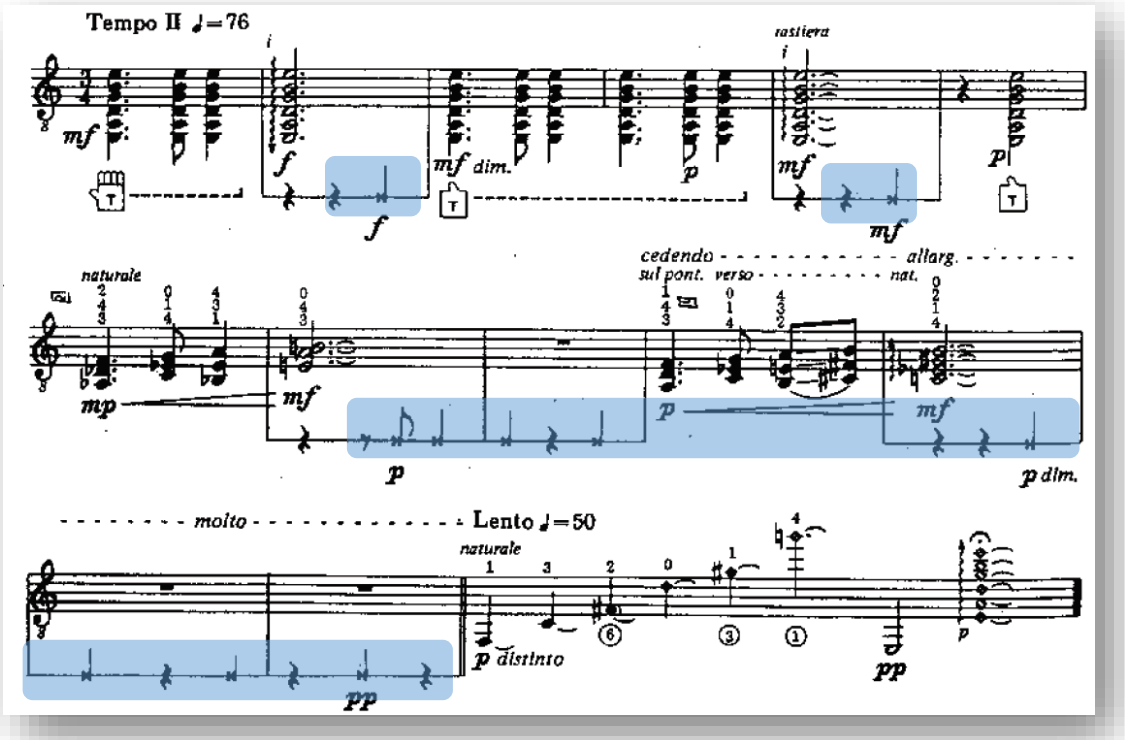
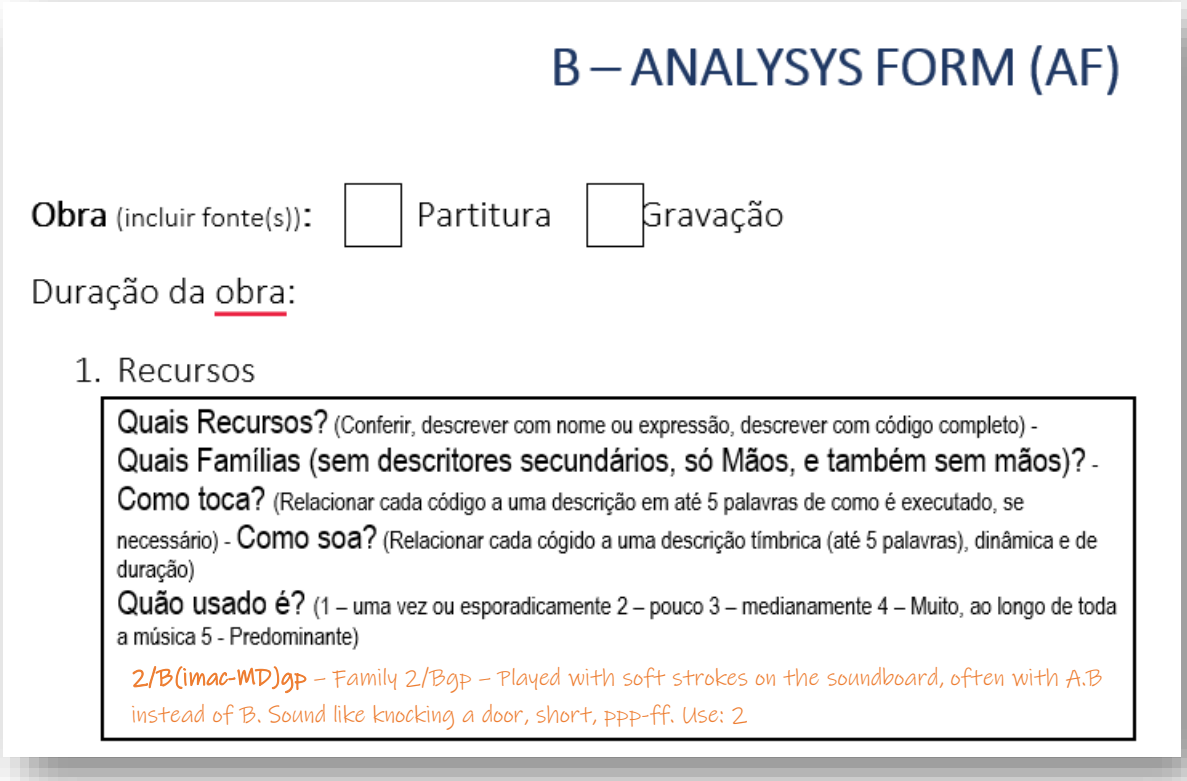


Figure 2: Use of soundboard taps in Ginastera´s *Sonata,* first movement. Source: Ginastera, 1978, p.5

In the next step, the information (in this case, preliminary, 2/Bgp) is transcribed to the Analysis Form (AF). Along with it go later the other PR and all the variables and general information about the workd collected. Discrepancies between sources are then assessed and, if there is stronger evidence elsewhere, they are incorporated (for example, when, despite score instructions, performance tradition imposes a different variation than notated for a specific PR. In this case, despite the lack of other indications, it is reasonable to assume – and all the recordings support that – that the PR will be executed with the right hand, and, when performed as described in the score, with fingers *imac,* thus resulting in the more complete 2/B(*imac*-MD)gp code line).

After the AF for a certain work is filled, the information is fed into the database. There, the PR appear complete, integrated into bigger groups (*Sound* and *Technical Families*), and then disaggregated into all of its constituent elements.



B – ANALYSYS FORM (AF)

Obra (incluir fonte(s)): ☐ Partitura ☐ Gravação

Duração da obra:

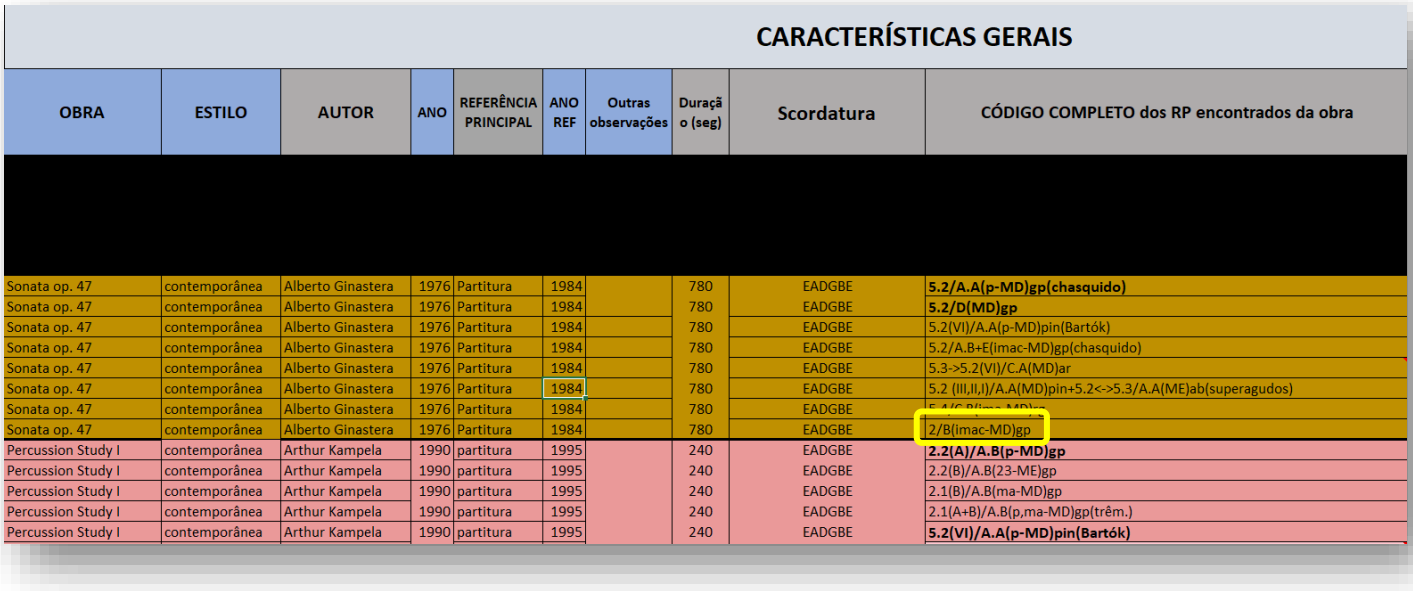
1. Recursos

Quais Recursos? (Conferir, descrever com nome ou expressão, descrever com código completo) - **Quais Famílias (sem descritores secundários, só Mãos, e também sem mãos)?** - **Como toca?** (Relacionar cada código a uma descrição em até 5 palavras de como é executado, se necessário) - **Como soa?** (Relacionar cada cógido a uma descrição tímbrica (até 5 palavras), dinâmica e de duração)

Quão usado é? (1 – uma vez ou esporadicamente 2 – pouco 3 – medianamente 4 – Muito, ao longo de toda a música 5 - Predominante)

2/B(imac-MD)gp – Family 2/Bgp – Played with soft strokes on the soundboard, often with A.B instead of B. Sound like knocking a door, short, ppp-ff. Use: 2

Figure 3: Filling the Analysis Form, field 1.



CARACTERÍSTICAS GERAIS									
OBRA	ESTILO	AUTOR	ANO	REFERÊNCIA PRINCIPAL	ANO REF	Outras observações	Duração (seg)	Scordatura	CÓDIGO COMPLETO dos RP encontrados da obra
Sonata op. 47	contemporânea	Alberto Ginastera	1976	Partitura	1984		780	EADGBE	**5.2/A.A(p-MD)gp(chasquido)**
Sonata op. 47	contemporânea	Alberto Ginastera	1976	Partitura	1984		780	EADGBE	**5.2/D(MD)gp**
Sonata op. 47	contemporânea	Alberto Ginastera	1976	Partitura	1984		780	EADGBE	5.2(VI)/A.A(p-MD)pin(Bartók)
Sonata op. 47	contemporânea	Alberto Ginastera	1976	Partitura	1984		780	EADGBE	5.2/A.B+E(imac-MD)gp(chasquido)
Sonata op. 47	contemporânea	Alberto Ginastera	1976	Partitura	1984		780	EADGBE	5.3->5.2(VI)/C.A(MD)ar
Sonata op. 47	contemporânea	Alberto Ginastera	1976	Partitura	1984		780	EADGBE	5.2 (III,II,I)/A.A(MD)pin+5.2<->5.3/A.A(ME)ab(superagudos)
Sonata op. 47	contemporânea	Alberto Ginastera	1976	Partitura	1984		780	EADGBE	[illegible]
Sonata op. 47	contemporânea	Alberto Ginastera	1976	Partitura	1984		780	EADGBE	2/B(imac-MD)gp
Percussion Study I	contemporânea	Arthur Kampela	1990	partitura	1995		240	EADGBE	**2.2(A)/A.B(p-MD)gp**
Percussion Study I	contemporânea	Arthur Kampela	1990	partitura	1995		240	EADGBE	2.2(B)/A.B(23-ME)gp
Percussion Study I	contemporânea	Arthur Kampela	1990	partitura	1995		240	EADGBE	2.1(B)/A.B(ma-MD)gp
Percussion Study I	contemporânea	Arthur Kampela	1990	partitura	1995		240	EADGBE	2.1(A+B)/A.B(p,ma-MD)gp(trêm.)
Percussion Study I	contemporânea	Arthur Kampela	1990	partitura	1995		240	EADGBE	**5.2(VI)/A.A(p-MD)pin(Bartók)**

Figure 4: Aspect of a small excerpt of the database, highlighting the inclusion of 2/B(imac-MD)gp. The titles read as follows: General Features, Work, Style, Author, Year, Main Reference, Ref. Year, Other Observations, Duration, Scordatura, Complete Code of the PR found in the work. There are many more fields not shown in the picture that deal with the other variables observed.

The process is very similar when the main source are the videos; the difference is that the collection focuses on sounds and images of a real performance, not abstract instructions from a score, ans uses simple resources such as pausing, slow motion and different angles (sometimes using multiple videos) to faithfully capture each PR.

It was not possible to count every single occurrence of the percussive resources we found in our sample. Instead, we qualitatively estimated how much each PR was used within each work (a variable we called ***Use*** – not to confuse with the group of variables with the same name, in the Analysis Form), using the following scale: 1 (unitary to eventual), 2 (little used), 3 (equal among other techniques), 4 (appears a lot, spread throughout the music), 5 (predominant in the whole work).

The analytic process, along with the continual improvement of the Code, underwent several stages throughout the research time. We ran a first analysis of the 20-Works sample with Analyst 1. The preliminary results were published in Sousa and Fernandes (2018), consisting of a survey of percussive events with an estimation of their recurrence through the various pieces. More importantly, they included the first version of the system of identification and classification of PR (FH Code) we used for the analysis (*Ibid.*, p. 59-64).

Since then, the concepts and tools of the analysis have undergone several developments, so we ran through the entire sample again with Analyst 2. Besides refining the concepts and the data, that made it possible to test the Code itself, comparing the results of both analysts.

All the information was again triple checked by Analyst 3, in a process that led to ulterior developments of concepts, tools, and observed variables[20].

The whole process was accompanied by tests of technique and sound performed on different guitars (see "Exploratory Analysis"). The performance of the percussive guitar works was also decisive at this methodological stage.

The analytical process was totally based on the PACT model.

FH Code Test

[20] It is worth noting that, since new variables were included in each new stage of the analysis, not all of them were triple or double-checked. These, however, are not discussed in this work.

Testing the reliability of the use of the measurement instrument (the code) is a common procedure in educational and psychological studies (STEMLER, 2004). In situations where different "judges" – in our case, analysts – must measure or rate phenomena according to a set of criteria, testing *interrater reliability*[21] (Ibid.) is essential.

Following the indications of that author, we used a *consensus estimate* because it is "well suited to deal with nominal variables whose levels on the rating scale represent qualitatively different categories" (Ibid.). It is based on the assumption that "reasonable observers should be able to come to exact agreement about how to apply the various levels of a scoring rubric to the observed behaviors". That means that "if two judges [as in our case] come to exact agreement (…)", then they "(…) may be said to share a common interpretation of the construct".

It is important to note that the interrater reliability so measured is a property of the test situation, *not the instrument itself*.

By comparing two full sets of analysis of the 20 works by two independent analysts trained in the code, we were able to form an idea of the extent to which the descriptors of the code generated similar results for the different analysts in this study. Since we considered the whole sample, we obtained the results through a simple proportion between coincidences and errors (the most common method used in consensus estimates, according to Stemler (Ibid.)).

Other methodological considerations for the survey:

1. If a work eventually requested apparatuses beyond the body of the player or the traditional guitar, these were not considered.
2. There were, in CG, some "incomplete PR": unspecific descriptions that did not allow for a complete code line (for example, a score requesting "a strike in the soundboard", without specifying in which part of it and with which part of the body). These incomplete descriptions correspond to upper hierarchical levels of the code (more general), comprising several more specific SFs within them. We thought a realistic statistical assumption regarding the scores of incomplete PRs could be achieved by distributing that value between all the various more specific SFs they encompassed, preserving the proportion in which these SFs occurred in the sample.

[21] Stemler (ibid.) defines this concept as "level of agreement of a particular set of judges on a particular instrument at a particular time"

3. *Composite PRs* were treated as single differentiated units, even if one of their parts coincided with other simple PRs.

OTHER (NON-ARTISTIC) METHODS

Literature review

We reviewed many theoretical publications on extended techniques, guitar percussion, and guitar technique in general. Only a few of those satisfactorily approached our object, albeit with the problems already discussed. They consisted in books – guitar handbooks, methods, theoretical works -, papers – very few actually approached the subject of percussion on the guitar specifically -, thesis, dissertations and monographs, methods – especially FG methods -, and audiovisual material – again especially in FG. A general analysis of the literature was presented in the Introduction; specific information extracted from is presented throughout this work.

Interviews

We conducted interviews with fingerstyle artists Petteri Sariola, Aleksander Misko, Mike Dawes, and Luca Stricagnoli, and with guitarists expert in the contemporary repertoire Marcin Dylla, Reinbert Evers, and Seth Josel (also the author of one of the theoretical works we consulted). The interviews were mostly semi-structured and used in this work not as primary sources of data, but rather to guide the research. They offered insights on the functioning of technique in FG, especially in relation to audio technologies; historical perspective in both FG and CG; suggested new pieces to work upon; and gave us some theoretical insights.

The structure of the interviews can be found in Appendix C.

Classes

The classes were part of the artistic practice, and, as such, integrated, even if at times indirectly, into the research. Through them, we had feedback on the functioning of the resources we were researching, both isolated and in context, and gathered ideas for interpreting and preparing works with percussion.

We had guitar classes with professors Flavio Barbeitas (UFMG), Fernando Araújo (UFMG), Reinbert Evers (WWU), and Marcin Dylla (WWU); Brazilian tambourine classes with prof. Fernando Rocha (UFMG, research advisor) and tabla classes with profs. Fernando Rocha and Stephan Froleyks (research advisor at WWU).

Active participation

We were present in several concerts of CG and FG, the former mostly in Brazil (2016-2018) and the latter mostly in Germany (2019). Some of them were treated in a more ethnographic fashion (participant or passive observation). Like the interviews, they were not used as main sources of information but greatly contributed to the general understanding of percussive practices and their effect in real performance situations.

PRACTICE

Artistic practice was developed in the following areas: **Performance, Adaptation, Improvisation, Composition, and Collaboration**. It was carried out in the usual fashion, whose methodological specificities will not be detailed here – some isolated aspects of it can be found in the description of the artistic products in chapter three. We must point out, however, that, because it had academic purposes and was constantly informed by the other approaches of this research, it was at times more systematized than our standard routine. That meant a more attentive and reflective practice and taking notes. The general methods used in each area were:

a) Performance: Daily practice routine of percussive works, rehearsals, classes, improvisation (solo and collective), and public presentations (understood as a test field for artistic proposals and products).
b) Adaptation: Creation of a percussive guitar version of a rhythmic study and several tests and systematic exploration to develop nylon versions of FG works for steel-stringed guitars.
c) Composition: Drafting with different notational systems, structural designing, use of non-linear evolutionary processes, exploratory improvisation, improvisation for the generation of raw material, test-and-reformulation routine of specific ideas and sections, collective creation, public presentations (in the sense that they helped to understand the practicality of some ideas), systematic instrumental exploration (separately addressing the parts of the instrument, testing, one by one, different forms of activation, playing positions, etc.), and re-composing the structures of other works.
d) Collaboration: Collaboration is a large research field in performance studies, and was a research tool, rather than object, in this work. We developed collaborations of different levels, from collective improvised creations (*Quantos violonistas são*

necessários para desconstruir um piano?) to just commissioning works with basic (percussive) directives. Our collaborations were all *intradisciplinary* (FERNANDES, 2013, p. 14), and of both the *synchronous* (there is a responsive communication between performer and composer) and *diachronic* (the collaboration occurs through mediators, in this case, the score) types (FERNANDES, 2013, p. 15-16).

We also carried out a specific experiment with techniques from two percussive instruments: tabla and Brazilian tambourine. That was used for general artistic training (strengthening the hand and developing control and consciousness; a more live experience of the rhythmic dimension of music) and for the adaptation of the techniques learned to use in the concert guitar (creation of new percussive resources). The specific methods used were:

a) Classes and study routine
b) Study of Percussion methods and video lessons (KUJAHN, 1990; Bhandari, 1999; SANKRAM 1994; Kumar, 2005; Lacerda, 2010).

METHODOLOGICAL RECIPROCITY

The artistic practice and the other methods (analysis, surveys, reviews, interviews, etc.) were linked, as stressed. To better understand how that process unfolded, we highlight the following points:

1. The PACT model was used in many compositions as it was being developed. That informed the very way we thought about percussion in the guitar and, at the same time, served as a test platform for the model. A notorious consequence of its use is the timbral work in pieces such as *Escutorium, As Entranhas da Terra,* and *Laputa Variations*. The PACT was also useful in the inherent analytical processes involved in composing. On the other hand, composition was what triggered the development of the model (back in 2010/2011 with *Cenas Infantis*).
2. After a while, the model becomes second-nature, and one starts to see the instrument through it. That influences performance, including improvisation.
3. The discoveries of the analysis were used in performance and composition.

4. Composition and performance also brought new PRs, new uses for the known PRs, and insights into notation and technique integration (percussive/non-percussive) to the more systematic aspects of the research.

SENSORIAL ANALYSIS AND PERFORMANCE

The process of artistic production is, by itself and albeit at times unsystematic, an inquire on the various aspects of percussive practice, such as the exploration of new PRs and usages for new and old PRs; notation; technical integration; functioning of the different guitar parts, body parts, and actions; and the function the PRs might have in a musical discourse.

Additionally, artistic practice can also be understood as analysis, and as so it has distinct characteristics in comparison to other analytical perspectives. Its compositional branch is traditionally so close to analysis that an explanation of the related mechanisms would be superfluous; it suffices to say that the perspective of the composer toward his or her work is unique, even in comparison with the analysis from other composers.

Performance, however, is not generally understood as analysis, but as an activity of a different nature that, to be optimally fulfilled, *requires* analysis. That is not the case here, however. We are not addressing any traditional structural, or even philosophical, sociological, or ethnographical analysis of the works to *enable* or to *enrich* – in other words, as a tool for – performance. On the contrary, we are discussing the very process of performing understood as a specific tool for analysis. That can be as obvious to some as it may be controversial to others, so we will highlight three aspects of this phenomenon:

Firstly, performing normally involves a prolonged and detailed exposition to the artistic product at such a level that it is very hard to emulate through other methods. That means experiencing every single unitary element of the music, one by one, time after time, and receiving sensorial input during that process that is impossible to achieve through other means, because of the distinct observational position of the performer and the physical vibration that comes with the proximity with the sound source: hear, feel, touch, play, over and over again.

Secondly, if the analysis has long incorporated media other than the scores (such as recordings) as tools or objects, that legitimizes *hearing* as an analytical tool. And one not reducible to what can be read in a score: rather, one that brings out elements that must be materially manifested

in the real world as sound to be understood. If that is so, then the performance must also be, at least potentially, an specific analytical asset, since it involves a special kind of hearing. This "performance-hearing" is as different from the regular (analytical) musical appreciation as the solfege is distant from a dictate: in the latter case, one must wait for the next sounds and instantly react to and process the stimulus that comes from an outer source; in the former, which is a performance, one must think ahead to read, remember or invent what comes next, according to a different inner process of decision-making.

Thirdly, and the most relevant application we found for "performance-analysis" in percussive playing, is the *physicality* involved. Performing allows for an assessment of *how* things are played, in a way that involves more than just the general idea of movement that one can, to some extent, extract from a score or recording. Performing necessarily involves the complete reality of actually playing, something irreducible to any model because it is a phenomenological totality: the slightest nuances, the exact effort employed, the reaction of the material activated, and the correlation of that to the different sound responses. One does not only see or hear, but now *feels* what the music *is* and sometimes perceives very clearly what it *could (not) be* as well, and *why*. This kind of hands-on knowledge was fundamental for a deeper understanding of the technical and functional aspects of percussive playing in our analysis.

***

CHAPTER 1

UNDERSTANDING PERCUSSIVE PLAYING

IN SEARCH OF A CONCEPT

What is, then, *percussive playing*? The term is as intuitive as it is misleading. There seems to be no strict definition for it; instead, we propose four different dimensions through which to approach a working concept: the sound, the conceptual, the musical, and the technical.

A four-dimensional approach

The term *percussive* is used by organology (Hornbostel-Sachs classification system[22]) as a subset of the greater idiophone[23] category, referring to those instruments excitable by the shock against a non-resounding body (WACHSMANN, 2016). This description does not establish physical parameters that define a percussive sound, does not include a significant portion of the percussion instruments, and is of little use in defining a specific set of techniques within a chordophone such as the guitar. Hornbostel-Sachs does not have a specific category for percussion instruments as defined by musical practice (for example, both percussion and concussion idiophones, such as the whip, are considered percussion instruments, in addition to membranophones, and some aerophones and chordophones), probably due to the absence of common constitutive, acoustic or technical features.

Acoustics, in turn, often associates the term percussive with both a pronounced attack and an inharmonic spectrum (see, for example, AGOSTINI ET ALL, 2003, and, in particular, FITZGERALD,

[22] The New Grove Dictionary for Musical Instruments (LIBIN, 2014) attests that the classical classification system Hornbolstel-Sachs is "(...) still the more prevailing among scholars, collectors and museusms (...)".
[23] Instrument whose sound is produced through the vibration of its whole body.

2010). However, even here there does not seem to be a well-defined category for these sounds: COOK (1997) states that

> Percussion instruments represent a broader spectrum of physical configurations than any other instrument family. Orchestration books, acoustics books, and taxonomies of instruments often limp some instruments into the percussion family not because of what they are, but just because they don´t fit into the other instrument families. One loose characterization might state that percussion instruments exhibit exponentially decaying modes that are excited by striking. This results in the piano's (SIC) being categorized as a percussion instrument, but this definition does nothing to address the many percussion instruments that can be shaken and rubbed continuously, nor those that don't exhibit any clear modal behaviors. The physical components of percussion instruments include bars, plates, membranes, cavity and tube resonators, and nonlinearities of countless types, all coupled to each other in a variety of ways. Because of this variety, there exist no common model features (…)

As it turns out, it comes close to the definition given in the percussion entry in the Grove dictionary (HOLLAND and PAGE, 2016), which says that

> "(...) any strange sound or sound effect not produced by conventional orchestral instruments ends up in the percussion section, (…). Unusual instruments and sound effects have appeared in all types of music, and virtually anything may be expected of the percussionist in the late 20th century."

These approaches seem to point to a pragmatic, empirical definition, departing from the practice of percussionists. In other words, percussion would be *that what is played by percussionists*, a broad definition, of a conventional nature, that encompasses from "the totality of instruments considered percussion" (an immeasurable set, for all purposes) to the even more generic "everything that is not played by the other instrumentalists".

This definition by exclusion comes partially close to our aim in this work, which wants to focus on those techniques and sounds that are not adequately contemplated in the universes of the *punteado* or the *rasgueado*. It is a negative delimitation that is necessary due to the impossibility of defining what exactly, from purely acoustic or technical parameters, a percussive sound is; that remains true even when dealing within the restricted universe of the guitar, an instrument percussive by nature and whose traditional sound properties are no less percussive than a xylophone or marimba.

That alone, however, does not yet provide a sufficiently clear delimitation of the phenomena we want to study. It will be necessary to gather elements from all of these descriptions to satisfactorily encircle the set of techniques relevant to our study. We would, therefore, be talking about those guitar techniques that

a) were not consistently described or explored in the context of the *punteado* or *rasgueado*[24].

b) produce sounds of pronounced attack, with the presence of strong inharmonic starting transients[25]; in other words, sounds with a large ***attack: resonance ratio*** (example: taps at the wooden parts of the instrument). When the discrepancy between the different phases of the sound is too strong, it can be analytically convenient to separate the percussive component (the attack) from the resonance (example: pizz. Bártok, when left to vibrate freely, or a tap at the soundboard from the following resonance of the strings).

c) have an inharmonic or tendentially inharmonic spectrum (example: rubbing the soundboard), and therefore differentiate themselves through timbre rather than pitch. When there is heterogeneity between the various phases of the sound evolution, this characteristic must be present in at least one of them, not necessarily the attack (example: *string buzz*).

From these guidelines it is possible to create a useful dichotomy between ***harmonicity***[26], understood as a characteristic of sounds with a lower energetic and durational ratio between attack and resonance (At/Rs), a tendentially harmonic spectrum, and/or which reach a stable spectrum more quickly (that is, their attacks and inharmonicity/instability regions are shorter), and ***percussivity***, its opposite, understood as a feature of the sounds that have higher At/Rs

[24] Thus eliminating the basic techniques of these two *technical groups*, considering that, from purely acoustical criteria, they can also be considered *percussive*.
[25] *Starting transientes* are short-lived components of sound, present during the phase called *attack*. In general, they possess pronounced inharmonic components. See PHYSCLIPS (200-?)
[26] Not to be confused with *Inharmonicity,* a similar concept used as an acoustic descriptor (SIEDENBURG et all, 2019, p. 311)

ratios, a tendentially inharmonic spectrum, and/or take longer to reach a stable spectrum, if ever.

Parallel to this definition departing mostly from the sound, we envision a **second one**, the *conceptual*, that derives from the interaction of the instrumentalist (the human), and the instrument (the non-human), that is, an eminently *tocautorial* notion (see the respective entry in this chapter). If we consider the instrument as an entity with a *program*, something like an intention of its own, we can analyze the different technical-musical outcomes of its interaction with the instrumentalist, which has his or her own program, as deviations from the original programs. The musician wants to imprint his will on the instrument; the instrument resists, deforms that intent, imposes constraints. Its reaction to the actions of the player is the sound itself. The resultant of this tensioned dance, which occurs inside a much larger network of agents and influences, is called guitar playing.

What interests us here are the moments in which the original program of both, for a variety of reasons (including external ones), gets transformed. This can challenge the nature of both or simply make hidden aspects of their programs surface. All guitar technology is based on generating optimal conditions for amplifying the sounds of the strings. For that, they must be coupled to a resonating box and stretched over a length of wood to enable pitch manipulation. That is the original plan; what percussive playing does is manifesting this story from another perspective, eliminating some hierarchies. The player wants to discover new music; what does the guitar offer, or in which direction does the guitar take him or her?

To answer that question, we will use five categories proposed by Oliveira (2020, p. 155-165) to organize the technical evolution (understood as transformations) of an instrument, in his case as in ours, the guitar. In other words, to classify the deviations of the original program of the *toucautorial* entity. In **category one**, he considers transformations in "conventional" [27] technique: "This category is connected to the natural transformations, expansions, extensions, restrictions, prohibitions, reductions and increases of the mechanical possibilities of the guitar

[27] He is referring to what we defined as *punteado* and *rasgueado* in this work, terms that suit better our purposes, as many percussive sounds can have definite pitches.

in the territory of the 'definite pitches' over time"[28]. Category two refers to the use of the guitar as a "total sounding body"[29], meaning the use of all its parts and material components as potential sound sources. Category three deals with the use of the instrumentalist's body to explicitly expand the possibilities of the instrument, in such a way that it merges with them – excluding, therefore, their mere simultaneous mobilization. Category four involves all kinds of preparations and manipulations of the physical or sound structures of the guitar, be them analogical or digital. Finally, category five points at "the technique without the guitar or the guitar without the technique", referring to situations in which the technique of the guitar is employed in other media, or when the guitar is played with techniques that are exogenous to it. From a conceptual perspective, we would situate the percussive techniques in categories number two – their seemingly natural habitat – and five, because the concept of abstracting the technique of its original application will be useful for our description of percussive playing.

A third approach to defining percussive playing, the *musical*, derives directly from the first. The focus on certain properties of sound has implications in the musical functions they will fulfill. As such, if we are dealing with sounds who differentiate themselves because of their varied spectra, as we described, we will be talking about musical works with timbre; if we are considering the punctual effect of a sound whose manifestation is mostly expressed by its attack, we will be dealing with rhythm. Not casually, the modern percussive repertoire has these two different musical directions at the core of its discursivity. To come to a more pragmatic definition, from a *musical discursive* perspective, percussive playing refers to contexts in which the rhythmic or timbral functions prevail over other dimensions of music, especially over those centered on pitch (melody, harmony).

The last approach we would like to present is the *technical*. It departs from the same *tocautorial* perspective to define guitar playing as an event involving two "material components", the bodies of guitar and the guitarist, and their interaction, whose result is the sound. Respectively, the *tocautorial entities* and the *actions*. More specifically, there is a *body part* of the player that (inter)*acts* with/over a *guitar area,* producing the *sound result*: four variables, of which we can easily ignore the last one, as it is completely determined by the preceding three. We must now

[28] "*Essa categoria está ligada à natural transformação, expansão, extensão, restrição, proibição, diminuição e aumento das possibilidades mecânicas do violão dentro do território das "alturas definidas" através do tempo."*
[29] "*Corpo sonoro total*".

once again resort to the "pragmatic" approach to separate that which is specifically *percussive* from the rest, and we can only do that by defining "the rest": plucking and strumming.

We chose this *technical* dimension, among the four, to be at the core of our model, developing descriptors (the *FH Code*) to deal with each of its aspects. After we present the model in detail, we will be able to finally define *plucking*, *strumming,* and *percussive playing* not as techniques, but as complete *Technical Groups* (TG)*,* in more precise terms, formalized in the *FH code*.

For now, the more complete definition for percussive playing we gather from all the four dimensions is **a way of playing that, excluding all that is already covered by the concepts of *plucking* and *strumming* as technical groups, considers the guitar as a *total sounding body,* mobilizing a *body part* through an (inter)*action* against(with) a *guitar area* to produce *sound results* whose main features are either a pronounced attack, an inharmonic spectrum, or both, and that are used in predominantly timbral or rhythmic musical constructions.**

THE *PERCUSSIVE ACTANT TRI-VECTOR* (PACT) MODEL[30]

The need for a model arose from the need to understand a specific set of phenomena, to find principles to organize that multiplicity. To what extent this model can be generalized to *any* form of percussive playing (or guitar playing in general) was not so much a question as was finding out whether or not it was flexible enough to comprehend all the material we had in hand. It had, therefore, *descriptive*, not *prescriptive* intentions – creativity must tension the limits of the model, not be constrained by them. It must be clearly stated that the percussive capabilities of the guitar are, for all practical purposes, infinite, and their exploration is one of the most exciting aspects of this practice. But also in that enterprise can the model help: it can be used to inform or generate performances and compositions; additionally, it can be extrapolated to generate new PR[31].

[30] *Modelo tri-vetorial Agente Percussivo* (AGE) – Portuguese; *Modelo Tri-Vector Agente de Percusión* (AGE) – Spanish; *Drei-Vektoren-Modell für Schlagwerk-Akteure* (SCHLAG) – German.
[31] Those are the reasons that lead us to name it a *model*, rather than a *system*.

The model is useful for the mental organization of the performer and can provide composers with a new systematized tool to approach the guitar (as previously done by CÂMARA, 1999; TITRE, 2013; and VISHNICK, 2014). While it can be helpful for the formulation of functional notational systems, it is not such a system by itself. It is also an analytical asset that can be used for different purposes in music theory, didactics, and musicology (we can see some applications in chapter 2).

The model consists of a network of concepts and premises used as a framework to look at what we defined as percussive. It also codifies the three technical vectors of percussive playing (guitar area, body part, action), making it possible to precisely identify (to name, to separate) and classify (to group) every single percussive occurrence. It also defines several categories to classify not only the percussive occurrences themselves but their uses – their musical functions and how they interact with other techniques. Additionally, we developed some simple tools to facilitate analysis.

Based on our working definition of percussive playing, we can lay the foundations of our model, beginning with three core concepts/premises: *Tocautoria*, *Technical Groups (TG), and Percussive Resources (PRs)*.

CONCEPTS

TOCAUTORIA

A concept that approaches instrumental musicking *from the perspective of the interaction between different* actants *(agents, including non-human) and practices. According to this premise, guitar music emerges out of the actions of both the player and the guitar, both at the same time composing (creating) and performing. This concept, useful to illuminate the conceptual recesses between those practices and actants, was instrumental in forming the FH Code, besides influencing the discussion on the different types of sources.*

The concept of *tocautoria*[32], which we introduced earlier (Fernandes, 2014, p. 106-112 and 202-215), is similar to the concepts of *aedo* (ancient Greece), bard (Medieval Europe), or *griot*

[32] From Portuguese or Spanish: *tocar* (to play) + *autoria* (authorship).

(Africa). It derives from the adaptation of the word *cantautor*[33] – present in several languages, but, in this specific form, in Portuguese and Spanish[34] – to an instrumental context. The morphological structure of the Portuguese word, by joining a verb – to sing – with a noun – author –, brings together an action (which refers to the dynamic and procedural nature of performance) to a name (which refers to the notion of concrete product, and, in this specific case, the idea of creation), and, thus, it gives us a clue to the phenomenon that it will describe. By forming a new word where the previous two are recognizable but no longer operate separately, an analogy is made to the overlap between composition and performance in this practice that is so characteristic of the guitar universe: the *tocautoria* understands that pair no longer as two separate entities, although not yet as an indivisible one. It treats them as two aspects of a same practice. In the concert music, where composition and performance – even the contemporary active, creative performance[35] – constitute different domains or professionalized *functions*[36], the concept is useful to occupy the narrow notional space between them, describing a professional musician, so common in many other musical traditions, who is not only (or completely) a composer or performer and, at the same time, is both. In doing so, it describes our artistic practice more precisely than the other two concepts or their mere sum.

We also proposed to use the term to describe a similar overlap, which occurs between the actants directly involved in the compositional-performance processes and products: the guitarist and the guitar. Based on the ideas of *composition*, *association of actors*, and *obscuration* introduced by Latour (1999, p. 206-212), we will observe the *tocautorial* processes as being developed not by a human alone, but by a complex actant resulting from the association of the individual with his instrument. This association, which incorporates a *translation*[37] process in itself, essentially modifies the two actants, so that the *tocautor* is not a simple sum of a guitar and a guitar player, nor can its objectives be predicted from the individual objectives of each of them.

---

[33] From Portugues or Spanish: *cantar* (to sing) or *cantante* (spanish: singer) + *autoria* (authorship)
[34] Italian: *cantautore* (male), *cantautrice* (female).
[35] See Cook (2006).
[36] Not necessarily different agents, as seen in Fernandes (2013).
[37] Translation is, according to Latour (1999, p. 207), "displacement, trend, invention, mediation, creation of a bond that did not exist and that, to a certain extent, modifies the two originals".

The concept impacted this research in many ways, some of which are explicit, while others are more pervasive. As for the explicit applications, they are:

A) the diffuse and dynamic articulation between the areas of composition and performance (sometimes understood as a mixture). That directed our analytical sight and artistic process;

B) the fact that we are dealing with a complex actant (artist + instrument), acting within a context. That resulted in a deeper consideration of the influences of the instrument.

For the PACT model the most important aspects of *tocautoria* are those concerning physicality – the body of instrument and instrumentalist, their interactions, and ergonomy.

GUITAR AREA

We will call *guitar area* a specific part of the guitar according to the FH Code. We divided the whole instrument into seven parts (numbered 1 to 7), and each of these parts into sub-parts (*sub-areas*), generally three. Complete descriptions of each guitar area can be found in chapter 4.

TECHNIQUE (BODY PART + ACTION)

We will name *technique*[38] the contribution of the instrumentalist for percussive playing. It is divided into *Body Parts* and *Actions*[39]. The parts of the body observed in the literature were coded in 6, from A to F, the first three of them further subdivided into *sub-parts*. We also recognized six different *actions*, with no subdivisions. Complete descriptions of the two vectors of the technique can be found in chapter 4.

SOUND RESULT

In our model, the sound result is a symmetrical reaction of the instrument to the action of the player[40]. As we discuss in chapter 4, it is completely dependant on the specific characteristics of the player as much as of the guitar. Because it is completely determined by the previous vectors, it was not considered in the FH Code.

[38] The term *technique* can be understood in several ways. In this work, from now on, we will be using it most of the time to refer to the descriptor of the FH Code, not to any other general concept of "technique".
[39] Which are actually an *interaction* between instrumentalist and instrument.
[40] Not in a Newtonian sense, of course.

PERCUSSIVE RESOURCES

We define a *Percussive Resource* (PR) (FERNANDES, 2017a, p. 213-216; SOUSA AND FERNANDES, 2018) as the fundamental, elementary technical-musical unit that constitutes the *Percussive Technical Group*. It consists of the application of a *technique* on a guitar *area*, with the potential to produce sounds with high *percussivity* to be used in predominantly rhythmic and timbral musical works, excluding all that constitute the core techniques of the TGs *punteado* and *rasgueado*[41].

There are four kinds of PRs: the simple PR, overwhelmingly more common, the *composite PR*, the *PR Mixtures*, and the *Associated PR*.

The PR can also be *iterative,* when they consist of a series of repetitions (e.g, tremolos, multitaps, and most continuous PRs at the millisecond level), *continuous*, when they can be sustained for a time (e.g., squeak, string rub, soundboard rub), or *unitary*, when they consist of an initial individual, well-discernible excitation only.

The perception of the PR can be *continuous* (for ex., *tamboras* with their resonances, string rubs) or *fragmentary* (e.g., tremolos, most squeaks, most string buzzes, most Bartók *pizz*, and their resonances).

THE FH CODE

From the insights provided by the combination of *tocautorial* notions (the agency of the guitar), the results of the exploratory analysis, a draft analysis of the 20 selected Works, and long-term artistic practice with the repertoire, we developed a system to identify and organize the different PRs. Its foundations are two variables connecting the main agents involved in sound production, according to the concept of *tocautoria*: the *guitar area*[42] and the *technique* (subdivided in *body part* and *action*). From that, we developed a series of descriptors based on what we observed in the literature: the main descriptors and their subdivisions, corresponding to the mentioned *area* and *technique*, and the secondary ones, covering a broad range of occurrences. One very important feature of the code is that it is capable of offering descriptions

[41] Variations of these techniques that have eminently percussive functions, such as the Bartók pizz or ghost notes, were considered as PRs.
[42] In the literature, the PRs generally do not occur or are requested in a very specific point or part of the instrument, hence the term *area*.

in different hierarchical levels, from the most general, encompassing several PRs of families of PRs, to the most specific. That is possible because the primary and secondary descriptors are independent and might or might not be assigned to any given coding, resulting in code lines (names) that can be anything from very synthetic (general description, high hierarchical level) to very long (specific description, lower hierarchical level). In this research, we worked with two analytic levels: **Individual PRs**, with the maximum level of specificity achievable with the available data, and the various **PR Families,** excluding some or all of the secondary descriptors or even the subdivisions of the primary ones. The individual PRs are more technical and give a microscopic view of the diversity of percussive playing, possibly reflecting the guitarists' present perception of the percussive guitar's "state of affairs"[43]. The Families relate more to aural perception and compositional functions, as they imply groups of PR with similar execution and sonority. It is worth emphasizing that many kinds of operations are possible at the various levels, as long as they are logical and consistent. For example, one can exclude information about hands and fingers from a sample; if that is made consistently through analyzed material, it results in grouping the PRs by their similarities (and, conversely, separating them by their differences) in the remaining descriptors. One could also exclude all guitar area information, to deal only with technique; or exclude sub-areas, to deal with more comprehensive guitar regions, and so on.

The latest version of the code[44] uses nomenclatures for guitar parts (soundboard, arm, headstock, etc.) and fingering following Josef and Tsao (2014, p.17, 28). It has the following descriptors and structure:

GUITAR AREAS AND SUB-AREAS:

As the percussive action approaches the borders of a given area, the sound tends to become brighter, less resonant, and quieter. This principle was not considered in the codification, as it is rarely specified in the literature.

Guitar Area primary descriptors (Area.Sub-area, at the beginning of the code line):

[43] Because tools to understand percussive playing are lacking, it is easy to be clouded by the apparent incommensurability of the possibilities or, inversely, to oversimplify.

44 The first version of the code was published in the annals of the first SIM! - International Guitar Symposium in Belo Horizonte (SOUSA AND FERNANDES, 2018).

Figure 5.1: Area 1 – Bridge and Saddle

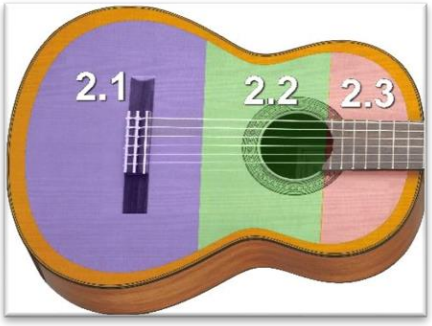


Figure 5.2: Area 2 – Soundboard

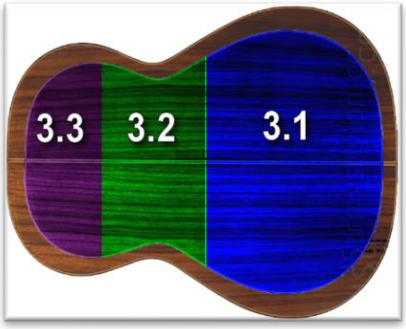


Figure 5.3: Area 3 – Back

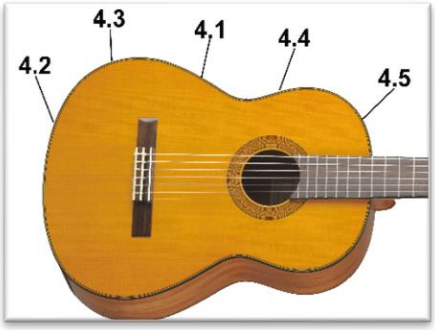


Figure 5.4: Area 4 – Side[45]

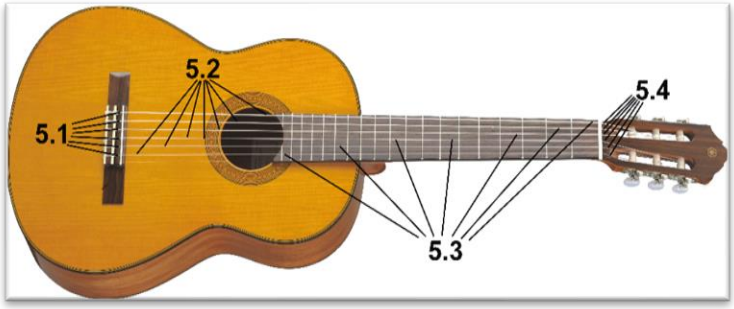


Figure 5.5: Area 5 – Strings and Fretboard

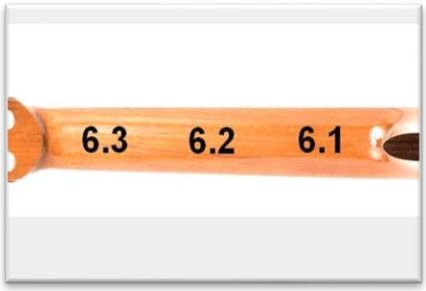


Figure 5.6: Area 6 – Neck

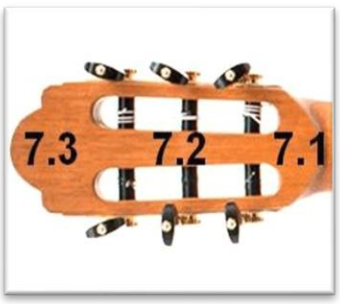


Figure 5.7: Area 7 – Headstock

Figure 5: Guitar Areas and Sub-areas (Source: Sousa and Fernandes, 2018)

[45] This original partition of area 4 tried to approach a progression from dark to bright sounds. It is, however, confusing, and as such will be revised, as discussed in Chapter 4, p. 194.

Guitar area secondary descriptors (in the code line, they come after Area.Sub-area, between brackets, just before the bar):

The guitar possesses a symmetrical body. We observed that the sound result does not significantly change when symmetrically opposed areas are used. What often happens is that the use of a certain area in its superior or inferior part facilitates the performance technically[46]. The secondary descriptors for that are:

A- Superior Half of the guitar (considering playing position)
B- Inferior Half of the guitar
Obs.: In Area 6, the above A/B indications refer to actions on the sides of the neck (therefore generally mobilizing the wood of both the neck itself and that of the fretboard)

→ Movement from one guitar area or sub-area to another
<-> Movement between guitar areas (circular, random, forward and back, etc.)
I-VI – Strings (from high E to low E). Exceptionally, we use a '-' to separate different simultaneous strings. In the case of more strings, continue the count for basses (VII, VIII, etc.) or add small letters for trebles (Ia for the high A, and so on).
1-19 – Frets
Other Specs (in parenthesis)[47]: *molto sp*, close to (vicinity of a certain defined area), crossings (of strings), etc.

TECHNIQUE (BODY + INTERACTION)

1 - Body Parts

Primary descriptors (BODYPART.BODYSUB-PART after the bar, in the code line)

[46] See also Chapter 4, "Guitar areas".
[47] For example molto sp, close to (vicinity of a certain defined area), crossings (of strings), etc.

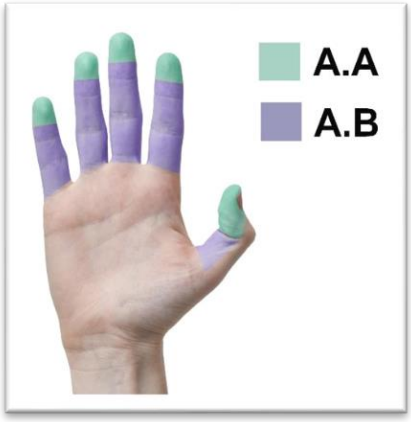


Figure 6.1: Part A – Fingers[48] (anterior)

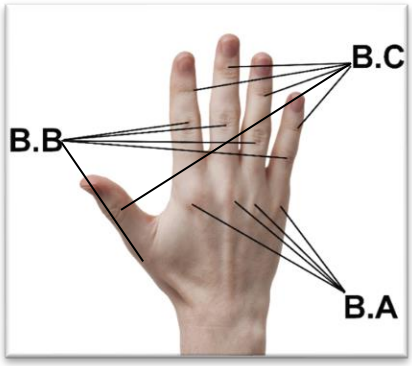


Figure 6.2: Part B – Hand joints (posterior)

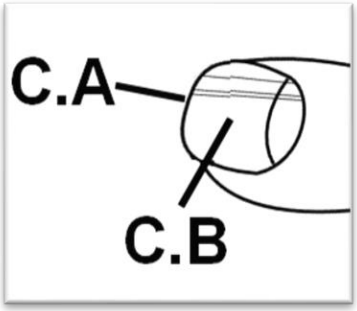


Figure 6.3: Part C – Nails

Figure 6.4: Parts D e E –Palm and Heel of the hand

Figure 6.5: Part F – Elbow

Figure 6: Body Parts (Source: Sousa and Fernandes, 2018)

[48] A.A is restricted to the very tip of the fingers; the area in the figure was exagerated for easier visualization. A.B includes the hard skin/bone area in the palmar face of the distal interfalangian articulation (B.C), a very often mobilized body part.

Observations:

Area **A.A** refers to fingertips, used in frontal impacts. Except in the strings, it is generally difficult to perform with the right hand because of the longer nails.

Area **C.A** is the one used also in normal plucking technique, as well as frontal hits with the tip blade of the nail (analogous to A.A). It is more easily performed by the longer nails of the right-hand.

Area **D** can be used to form an "air chamber" that makes the strikes resonate strongly.

Area **F** is generally used with the inner bone protuberance of the elbow.

Body part secondary descriptors (these come after the Body Part descriptors, between brackets):

MD – Right Hand (*Mão Direita*)

ME – Left Hand (*Mão Esquerda*)

Fingers (as in guitar traditional notation. When they act in sequence, they are written in the code separated by commas; when simultaneous, written together without spaces):

Right Hand: p – i – m – a - c

Left Hand: P (CAPS) - 1 – 2 - 3 – 4

Other specifications (in parenthesis)

B.2 – Actions (these come after the Body Part secondary descriptors, in lower case letters)

Active Interactions (produce the sound)

ar = Sliding (*Arraste*): movements with friction (rub, slide, scratch, etc.)

gp = Strike/tap (*Golpe*): schocks (taps, strokes, etc.)

pin = Plucking (*Pinçado*)

rg = Strumming (*Rasgueado*)

Passive Interactions (modulate the sound)

ab = Mute/Touch/Press (*Abafar/Encostar/Apertar*): contact without shock und elastic, but without significant deformation of the pressed body

(est = pull (*Esticar*))[49]

Action secondary descriptors (they come after the action descriptors, in brackets)

trem – tremolo

vib – vibrato

harm – harmonic

snap

slap

tapping

Bartók – pizz. Bartók

Other

OTHER SYMBOLS USED IN THE CODE:

\+ Simultaneity

→ or ← Movement/transition

/ Separates *guitar area* and *technique*

. Separates primary descriptors and their sub-divisions

, Alternation or sequence (non-simultaneous events)

? Existing and defined but unknown information[50]

\- Indicates an interval

_ Separates different secondary descriptors in the same parenthesis or can be used as space, if necessary

OR (spaced with "_") Separates various possibilities constitutive of the PR but that do not occur simultaneously. Enables describing several PRs in one code line (a *restricted family*). Various unspecified combinations of the different listed elements can be indicated by _OR COMB_. It

[49] This action occurred only in two PRs and was, therefore, not statistically relevant. It could, however, be used in the future to describe other phenomena where that action happens.

[50] As opposed to indeterminate information (for example, when a composer leaves some variable free, up to the performer).

must be observed that, in those cases, the code line will necessairily include **all** the combinations of two or more of those elements.

+ Most of the time, the PRs use a single *area* and *technique.* Exceptions should use this operator.

On rare occasions, it might be necessary to indicate optional elements in the code line. In that case, the symbol "[ ]" can be used to delimitate the optional elements[51].

The code standard is simultaneity and *l.v.* (let resonate). When that is not the case, because of alternations, sequences, or interruptions, it is necessary to specify it using the appropriate symbol.

The general structure of the code line, including all possible descriptors, is as follows (do not use spaces):

Basic structure:

GUITAR AREA.SUB-AREA/BODY PART.SUB-PARTaction

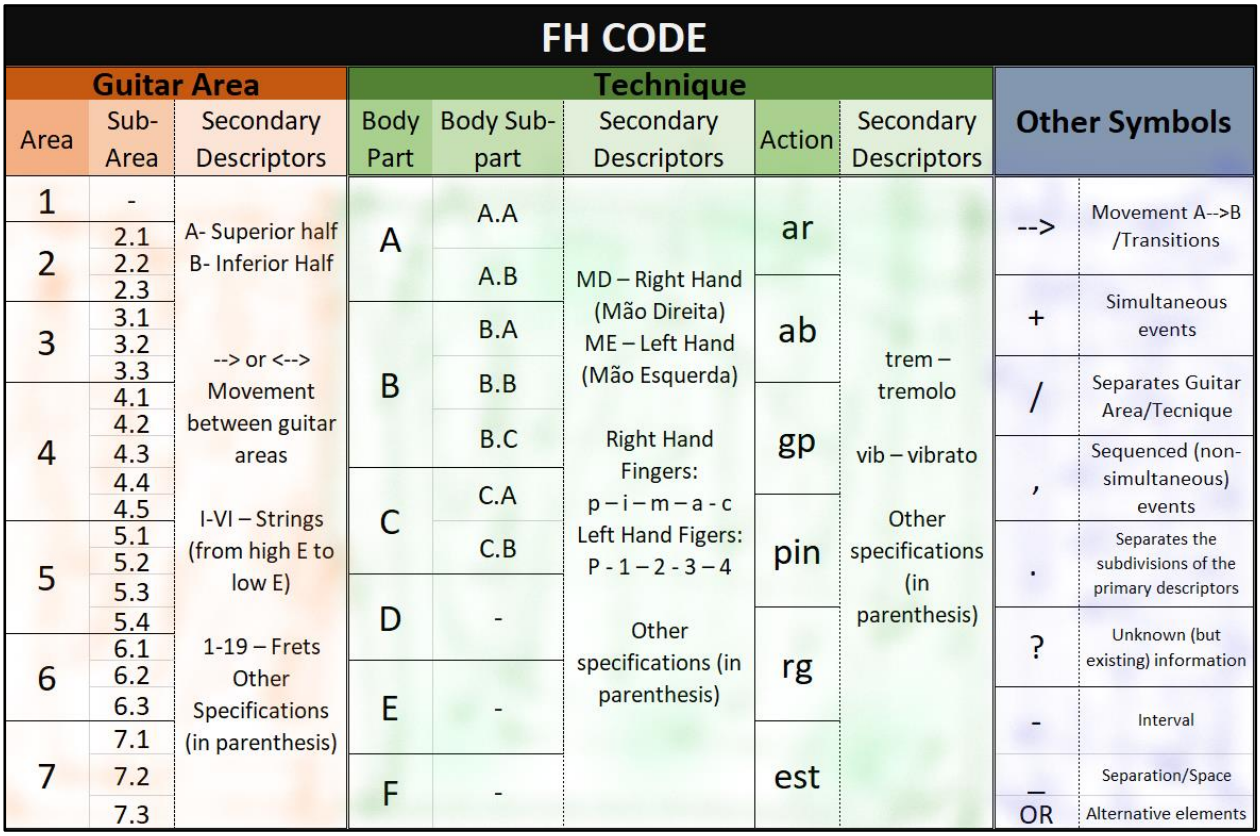
Complete structure:

GUITAR AREA.SUB-AREA(→AREA.SUB-AREA)(+AREA.SUB-AREA)(guitar secondary descriptors)/BODY PART.SUB-PART(body part secondary descriptors)action(action secondary descriptors)

Composite Resources are written in two code lines, generally one for each hand, bonded in one by the symbol "+" between them. The right hand (MD) always comes first.

Figure 7 presents a summary of all descriptors of the code:

[51] That was used in the definition of the technical groups but was not used in the analysis, and, as such, do not appear in Figure 3.



FH CODE

Guitar Area			Technique					Other Symbols	
Area	Sub-Area	Secondary Descriptors	Body Part	Body Sub-part	Secondary Descriptors	Action	Secondary Descriptors		
1	-	A- Superior half B- Inferior Half --> or <--> Movement between guitar areas I-VI – Strings (from high E to low E) 1-19 – Frets Other Specifications (in parenthesis)	A	A.A	MD – Right Hand (Mão Direita) ME – Left Hand (Mão Esquerda) Right Hand Fingers: p – i – m – a - c Left Hand Figers: P - 1 – 2 - 3 – 4 Other specifications (in parenthesis)	ar	trem – tremolo vib – vibrato Other specifications (in parenthesis)	-->	Movement A-->B /Transitions
2	2.1			A.B		ab		+	Simultaneous events
	2.2		B	B.A		gp		/	Separates Guitar Area/Tecnique
	2.3			B.B		pin		,	Sequenced (non-simultaneous) events
3	3.1			B.C		rg		.	Separates the subdivisions of the primary descriptors
	3.2		C	C.A		est		?	Unknown (but existing) information
	3.3			C.B				-	Interval
4	4.1		D	-				_	Separation/Space
	4.2		E	-				OR	Alternative elements
	4.3		F	-					
	4.4								
	4.5								
5	5.1								
	5.2								
	5.3								
	5.4								
6	6.1								
	6.2								
	6.3								
7	7.1								
	7.2								
	7.3								

Figure 7: The descriptors of the FH Code

Examples of PR description with code lines in different hierarchical levels follow. We begin with a high level of detail:

→ 2.1(A,B)->2.3(A,B)/A.B(p,ma-MD)gp(tremolo) = Alternate strikes (tremolo) between the thumb and joined *ma* in the soundboard (both inferior and superior) with a shift from the right to the left (guitarist´s perspective).

→ 1(A)+5.2(VI5+V6+IV7)/A.B(p+i-MD)gp = simultaneous strike of the right thumb on the superior part of the bridge and the index finger on the basses, with l.h. stopping frets 5, 6, and 7 in the sixth, fifth, and fourth strings, respectively.

Simpler descriptions are also possible:

→ 2.1→2.3/A.A(p,ma)gp(tremolo) = *Tremolando* strikes at the soundboard from the bridge area toward the fretboard with the thumb versus *ma* (any hand).

→ 1+5.2/A.B(p+i)gp = simultaneous strikes on the bridge with the tip of the thumb and the strings with the anterior part of the index finger.

→ 4.1(A)/C.A(i-MD)gp = Strike with the nail of the index finger on the superior side.

The system was developed to allow for a high precision description of the PRs. In the scores, however, it is often the case that the descriptions are presented in a more general way, simplifying, even more, the code line. Example:

2/Bgp (*Ko-Tha*, by G. Scelsi)= Stroke with some joint from any hand on the soundboard.

It is even possible to completely omit main descriptors (*Incomplete PRs*), as in this very frequent PR:

→ **2.1/gp** (*Royal Winter Music I, Gloucester* by H.W. Henze) **=** Hit the soundboard with any of part of any hand.

This flexibility in detailing is called *level change*. That allows the analyst to observe the PR in its uniqueness or in groups, groups of groups, and so on.

THE ANALYSIS FORM AND THE VARIABLES OBSERVED

The Analysis Form (AF) defines and compiles the information to be gathered about each specific musical work. This is made following the organization of the database in five major areas: General Data, PR, Performance Aspects, Use (structural and technical), and Notation. Each variable, quantitative or qualitative, is codified to speed the filling process up[52]. The variables analyzed in each area are:

1. General Information: Title, Composer, year of composition, year of the source, duration (sec), *scordatura*.
2. PR: PR complete code line and PR *Families*, short description of how it is performed (5 words), short description on how it sounds (5 words), estimated *Use*[53] of individual PR within the work (1-5).
3. Performance: Guitar posture, Instrument used (guitar type), amplification.
4. Usage: Structural Analysis (Structural Function, Textural Function), Technical *Integration* with other TGs (Form of integration with other TGs (1-4), Estimated *Overall Use* (of percussion in general) in the work (1-5)).

[52] The AF is available in the **Attatchments**; the code for each variable is within.
[53] See "Method Overview", entry "The analysis and its tools"

5. Notation: Number of staffs, Function of staffs, Number of characters, Characters and their Functions.

We will clarify some of them, elaborating especially on two concepts in Category 2, since it was the most used in this work:

Category 2 (PRs):

PR Families: Many PRs present significant similarities between them. Sometimes the difference is just a small technical adaptation due to specificities of the body, the instrument, or other preferences of the player (for example, which finger to use). Sometimes it is due to performance inconsistencies (like not always hitting precisely in the same spot); in other cases, the difference could lie in the use of some special technical variation (like fast repetition) that does not change the basic nature of the PR. In all those situations, it makes sense to group these PRs into *Families*, which better represent their musical meaning, leaving aside technical details that would only hinder the analysis.

We perform that *change of level* by consistently eliminating the corresponding secondary descriptors in the code line from all the PRs in the analytical situation. In the following example, both PRs would belong to the same family, despite differences in guitar area, hand, finger, and technical execution:

2.1(A, besides the bridge)/A.A(a,m,i-MD)gp(trem) → 2.1/A.Agp

2.1(B)/A.A(p-ME)gp → 2.1/A.Agp

The *families* are hierarchical levels of analysis that focus on what the analyst considers more important. We have defined some privileged levels of analysis as follows:

General Family (GF), with only the main part of the primary descriptors (in the above example, that would be 2/Agp). They relate to a general but somewhat loose feel of sound and execution. It can leave important technical details aside, but, on the other hand, offers the possibility of broader generalizations.

Sound Family (SF; viewed in the example), with complete primary descriptors only. This is the most important analitic level for this research. It qualitatively

but strongly relates to sound, technique and musical function, leaving aside only specifications that tend to have little effect on the musical discourse.

Technical Family (TF), adding to the sound families the secondary descriptors for the hand (left or right) used (in the example, 2.1/A.A(MD)gp and 2.1/A.A(ME)gp). It´s behaviour is very similar to that of the SFs, but closer to technical issues.

Use, Overall Use, and *Frequency:* As explained, *Use* is a 1-5 score that estimates how much each inidivudal PR is mobilized *inside* a work. The *overall use,* another 1-5 score, is an estimation of how much percussion that work has in comparison to the other TGs. It is important to observe that both variables operate at a "within-work" level. The *Frequency,* on the other hand, deals with the reappearance of a single PR *throughout* the various works, consequently with scores from 1 to *n*, *n* representing the size of the sample (in this case, 20). The frequency is not collected in the form, because the AF is work-oriented.

In this work, we generally worked with the sum of the *Uses* of a specific PR/SF in all the works in which it appears (*total Use*), and, more rarely, with the average (*average Use*). Families *Use, Overall Use,* or *Frequency*[54] scores are calculated through the sum of the scores of the PRs that constitute them (having, therefore, no pre-established score limit).

Category 3 (Performance):

Guitar Posture: See chapter four, "Positions".

Guitar Type: steel, nylon, and sub-groups.

Amplification: Acoustic, microphone, line, others.

Category 4 (Usage):

Structural Function: The role played by the percussive resources in the musical discourse (see "Other analytical concepts" ahead).

Textural Function: The positioning of the percussion in hierarchical textures.

[54] We could attribute a "normal" *Frequency* score to the *families* by excluding within-work redundancy. This was indeed made in some calculations.

Category 5:

Function of staffs: For what the staffs are used (e.g., to differentiate pitched and unpitched sounds, hands, instrument *areas,* etc.)

Function of characters: Idem.

Figure 8 presents a general scheme of these variables:

<table>
<tr><th colspan="12">GENERAL INFORMATION</th></tr>
<tr><td colspan="2">TITLE OF THE WORK</td><td colspan="2">STYLE (FG/CG)</td><td>COMPOSER</td><td>YEAR OF COMPOSITION</td><td>MAIN SOURCE TYPE</td><td>YEAR OF MAIN REFERENCE</td><td>FURTHER NOTES</td><td>DURATION (Sec.)</td><td colspan="2">SCORDATURA</td></tr>
<tr><th colspan="12">PR</th></tr>
<tr><td colspan="3">COMPLETE CODE LINE</td><td>TECHNICAL FAMILY</td><td>SOUND FAMILY</td><td>TECHNIQUE: SHORT DESCRIPTION</td><td colspan="3">SOUND: SHORT DESCRIPTION</td><td colspan="2">ESTIMATED USE WITHIN WORK (per individual PR)</td></tr>
<tr><td colspan="9"></td><td colspan="2">Quantitative: 1-5</td></tr>
<tr><th colspan="12">PERFORMANCE</th></tr>
<tr><td colspan="4">Posture</td><td colspan="5">Guitar Type</td><td colspan="3">Amplification</td></tr>
<tr><th colspan="12">USE</th></tr>
<tr><td colspan="8">STRUCTURAL ANALYSIS</td><td colspan="4">TECHNICAL ANALYSYS
(INTEGRATION WITH OTHER TG)</td></tr>
<tr><td colspan="6">STRUCTURAL FUNCTION</td><td>TEXTURAL FUNCTION</td><td>FORM OF INTEGRATION</td><td colspan="3">ESTIMATED OVERALL PERCUSSION IN THE WORK</td></tr>
<tr><td>Contrasting</td><td>Expositive</td><td>Transformational</td><td>Cadencial</td><td>Exclamation</td><td>Other</td><td>1st-3rd layers</td><td>Qualitative: A-E</td><td colspan="3">Quantitative: 1-5</td></tr>
<tr><th colspan="12">NOTATION</th></tr>
<tr><td colspan="6">STAVES</td><td colspan="6">CHARACTERS</td></tr>
<tr><td>NUMBER OF STAVES</td><td colspan="5">STAFF FUNCTIONS</td><td>NUMBER OF CHARACTERS</td><td colspan="5">CHARACTER FUNCTIONS</td></tr>
<tr><td>Quantitative: 1-3</td><td>Differentiate instrument areas</td><td>Differentiate defined and undefined pitches</td><td>Differentiate hands</td><td>Differentiate other musical materials</td><td>Multifunction / undefined</td><td>Quantitative</td><td>Differentiate instrument areas</td><td>Differentiate defined and undefined pitches</td><td>Differentiate technique</td><td>Differentiate ponteio notes from PR</td><td>Multifunction / undefined</td></tr>
</table>

Figure 8: Analytical parameters for data collection in the Analysis Form

The AF is work-oriented, instead of PR-oriented, because that was more convenient to deal with the sample. As a consequence, only category two is PR-specific; all the other categories refer, instead, to the work as a whole.

OTHER ANALYTICAL CONCEPTS

TECHNICAL GROUPS (TG)

A *Technical Group* (TG) (FERNANDES, 2014, p. 189, and 2016, p. 211-212[55]) is a set of similar technical-musical skills with definite expressive qualities. The main technical groups of the guitar, as defined here, are the *punteado* (plucking, fingering), the *rasgueado* (strumming)[56], and the *percussive*. Each encompasses not only a specific r.h. technique, but a whole family of motor and intellectual skills associated with that, involving both hands and their eventual functions, a certain range of playing positions, and an infinite field of possibilities of sound outcomes[57]. All of that implies, of course, specific training, and suggests definite kinds of acoustic/musical works.

Guitar practice, however, does not obey this schematic distinction, presenting the TG interwoven – a phenomenon that we call *Integration* and that requires specific tools for its apprehension, as we will discuss. Moreover, the borders between TGs, as happens with all concepts, are not always clear, being sometimes merely conventional.

FORMALIZED DEFINITION OF THE TECHNICAL GROUPS

Punteado (plucking):

Characterized by the use of the C.A area of the r.h. in conjunction with the flesh in its vicinity, in plucking movements (pin) using mostly contractions of the fingers (rarely, wrist or forearm movements) applied over the strings considered in their individuality, in a specific area (5.2, rarely 5.3), while the l.h. modulates frequencies by stopping (or touching slightly) different strings at different frets/points in area 5.3, occasionally even dispensing with an associated action of the right hand (in slursp), or do nothing.

➔ 5.2_OR_5.3/C.Apin [+ 5.3/A.A(P_OR_1_OR_2_OR_3_OR_4_OR COMB_-ME)ab]

[55] In previous works, we called this concept *work lines*. We are changing the name for the sake of clarity.
[56] For definitions of *punteado* and *rasgueado,* see the Introduction.
[57] These may be infinite, but only in a certain direction, meaning that they do not cover the entire range of sound possibilities. For example, for all practical purposes there are no limits to the possible outcomes using plucking techniques, but, on the other hand, they will never be able to produce the kind of result that the strumming techniques or percussive resources do.

Rasgueado (strumming):

Characterized by the use of area C.B with the extensor muscles or C.A with the contraction muscles of the fingers in the strings (area 5.2, rarely 5.3) considered in groups and as a surface, over which the fingers slide (rg). These movements are often combined in alternation and can occur exclusively or combined with wrist or forearm movements. Despite the various possibilities, traditionally, the distinguishing sonority of this TG is that of the shock between area C.A and the strings.

➔ 5.2/C.B_OR_C.Arg [+ 5.3/A.A(P_OR_1_OR_2_OR_3_OR_4_OR COMB_-ME)ab]

Percussive:

The Percussive Technical Group is the technical-musical equivalent of the expression "percussive playing".

It is a technical group whose elementary constituent units are the percussive resources.

Excluding all that is already covered by the previous TGs, it departs from the consideration of the guitar as a *total sounding body* to, through the application of a *technique* over a *guitar part*, produce sound results whose main features are a pronounced attack, an inharmonic spectrum, or both, and that are used in predominantly timbral or rhythmic musical constructions.

It cannot be generalized in a single code line.

PR USAGE IN THE MUSICAL STRUCTURE

We propose observing the use of PRs within a work from three perspectives:

a) *Integration:* Their insertion in a context with other technical groups;
b) *Function*: their musical effects;
c) *Idiomatic aspects:* these relate more directly to execution but also influence the musical structure and discourse; we decided to focus on the former, and for that reason they will be presented in chapter 4.

Integration

The use of PRs as compositional material lies in a continuum that ranges from the occasional, ornamental, almost punctual (as occurs in numerous works, such as in the classic *Elogio de la Danza,* by Leo Brouwer) to treating the guitar exclusively as a percussion instrument, as in *Ko Tha*, by Scelsi. The most frequent is some intermediate point, in which the percussive techniques are either integrated with the others or used separately, to build contrasting sections of a piece (as in *Jongo*, by Paulo Bellinati, or, to some extent, *Gloucester*, by Henze). These balances between the percussive and the other techniques also allow for middle grounds and can evolve dynamically throughout a work.

But what does it mean to be integrated? *How* does that happen? To elaborate on that we established three parameters:

a) the relative duration of the percussive structures;

b) the proportion between percussive and non-percussive resources, within and between musical structures;

c) the forms of concatenation of technical groups (separation, alternation, overlap).

Relative Duration

The treatment of the duration of the structures in relation to their context can determine to which degree the TGs will be individually discernible and their function (e.g., to form phrase members in dialogue, create contrasting sections, or be components of larger structures), besides constituting discursive information by itself. We propose organizing this continuum of possibilities in four basic levels:

1. Submotific Micro-formal: the percussive resources form small cells that are components of motifs, together with other technical groups, or isolated events. It is characterized by a) the rapid alternation of techniques that can result in a complex global sound, in which the individuality of the percussive sound is at least partially diluted in texture, or b) by the punctual (interjective-interpolative) use of percussion (for example, opening or closing a phrase, exclamation, etc.). Figs. 9 to 12 show examples from the literature:

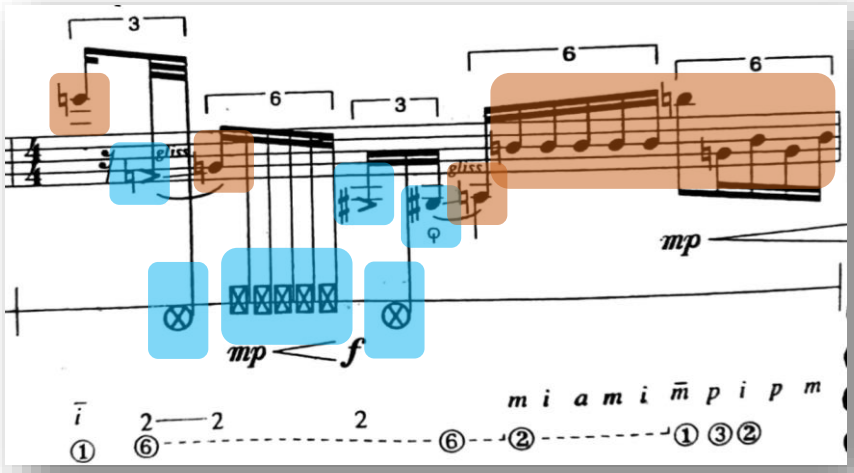


Figure 9: *Percussive Study n.1* (A. Kampela) bars. 127: percussion (blue; taps in the soundboard, percussive *hammer-ons* and pizz. Bartók) and notes (orange) interwoven.
SEE VIDEO

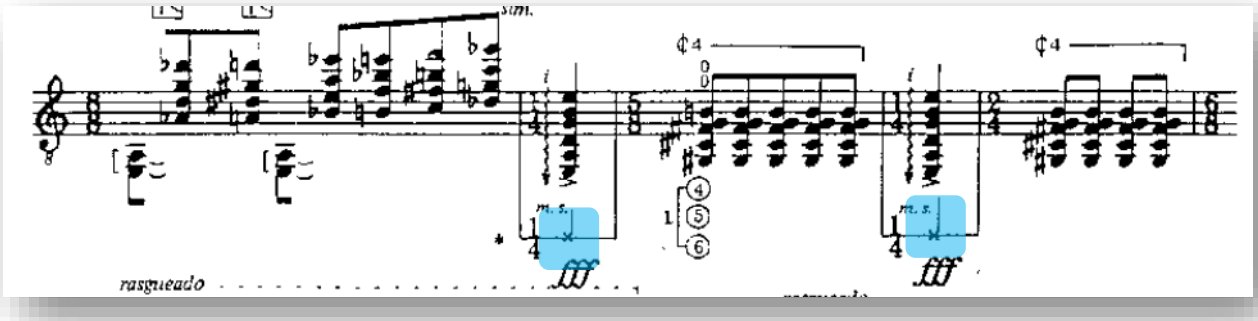


Figure 10: *Sonata op. 47, IV* (A. Ginastera): p. 13 third system: isolated percussive occurrences (taps in the soundboard), in this case in superposition with rasgueos, functioning as interpolations.
SEE VIDEO

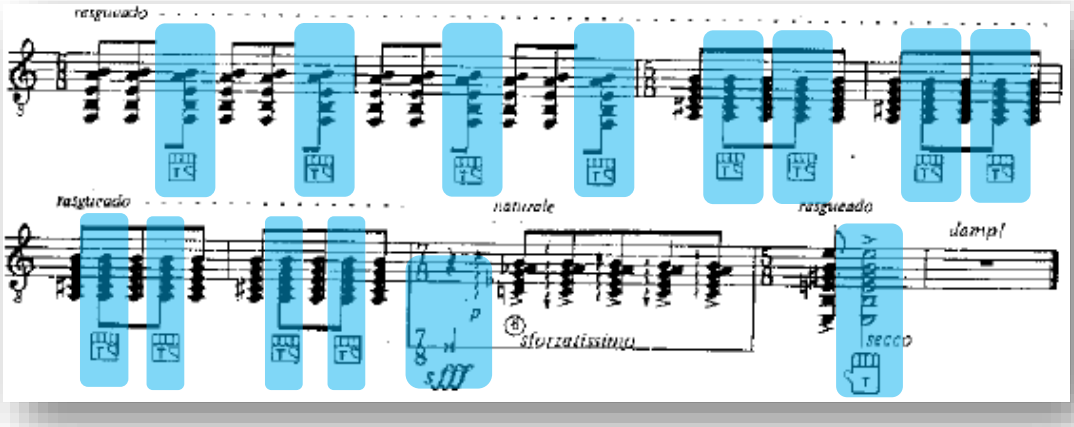


Figure 11: *Sonata op. 47, IV*, last two systems, showing the submotivic microformal integration between percussive (tamboras, indicated by the hands, and soundboard tap, the "x" in the auxiliary line) and rasgueado technical groups, inducing a textural perception.
SEE VIDEO

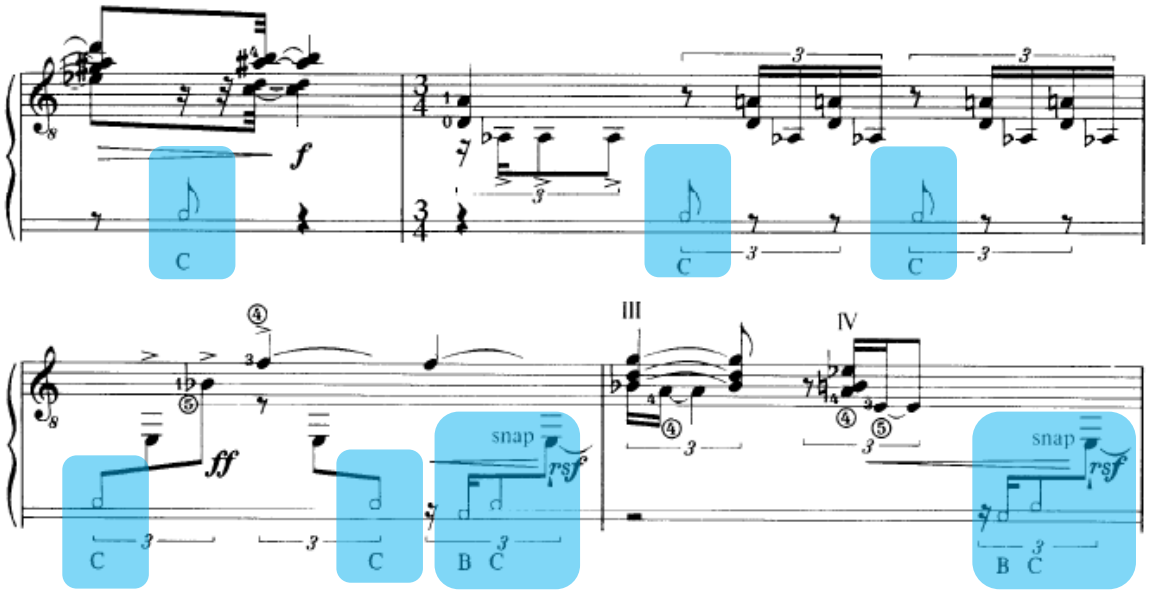


Figura 1

Figure 12: *Royal Winter Music I, Gloucester*: A predominantly exclamative discourse is punctuated by taps on the soundboard and Bartók pizzicatos ("snap").
SEE VIDEO

2. Supramotific Micro-formal: The PRs form complete motifs or larger structures, like sentence members, but do not form complete sentences, depending on other technical groups to make sense. It is mainly characterized by a) a more consolidated sound (greater identity) than at the previous level, or b) use as a contrasting element (interpolation/interjection, closing or opening larger structures, etc.) or a tool to vary or elaborate[58] motifs or phrase members. Figs. 13 and 14 show some examples:

[58] According to Grela (1985), variations are transformations of strucutures in which the original is still recognizable, like small rhythmic changes, ornaments, etc. Elaborations, on the other hand, evolve the structure beyond recognition, but only to the limit of retaining some (generally abstract) kinship with the original, for example in many retrogradations.

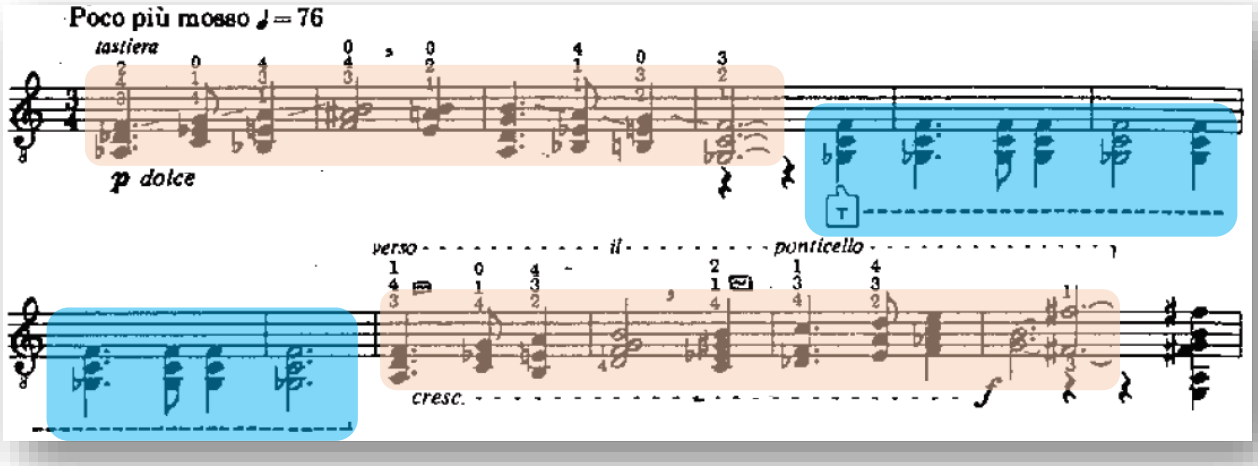


Figure 13: *Sonata op. 47*, first movement, page 2, first and second systems. Semi-phrases of the "question-answer" type are constructed from the opposition between technical groups (chords in orange vs tamboras in blue)

SEE VIDEO

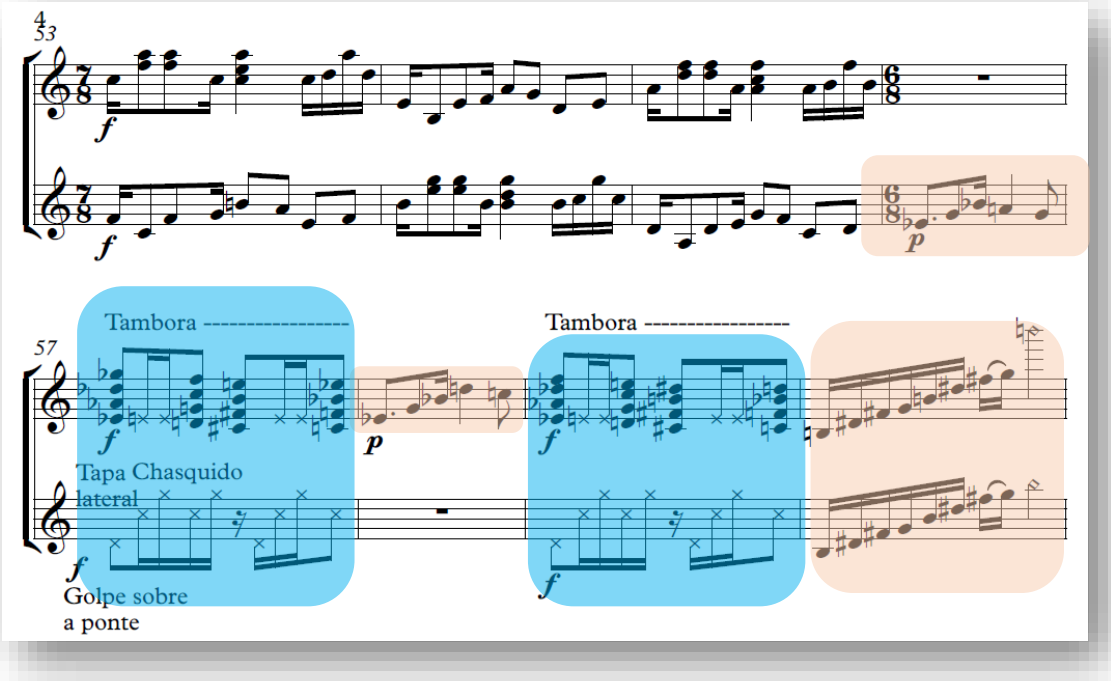


Figure 14: O Fusca Azul e a Festa Tilelê, bars 56-60: small statements from one or the other guitar prompt percussive reactions from both. The contrast is maximized by changing the number of instruments and the dynamic, to generate the rhetoric effect of a contradiction. The Instructions read as follows: slap at the sides / *chasquido* (snap) / Strike on the Bridge. The "X" in the first line of guitar 1 means *2.2(A)/A.B(p-MD)gp.*

SEE VIDEO

3. Intermediate: It is the level approximately equivalent to the musical phrase, going all the way up to the period. In it, the percussion forms statements with an autonomous sense, integrating larger sections; in other words, it conveys a complete idea but does not "exhaust the subject".

This level is mainly characterized by a) an autonomous, easily discernible identity of the PRs and percussion in general, and b) a rhetorical-expressive use, operating through contrast, reiteration, or variation of big ideas; opening or closing statements to large sections; or complete "comments" inserted during the elaboration of a macroformal section. For example:

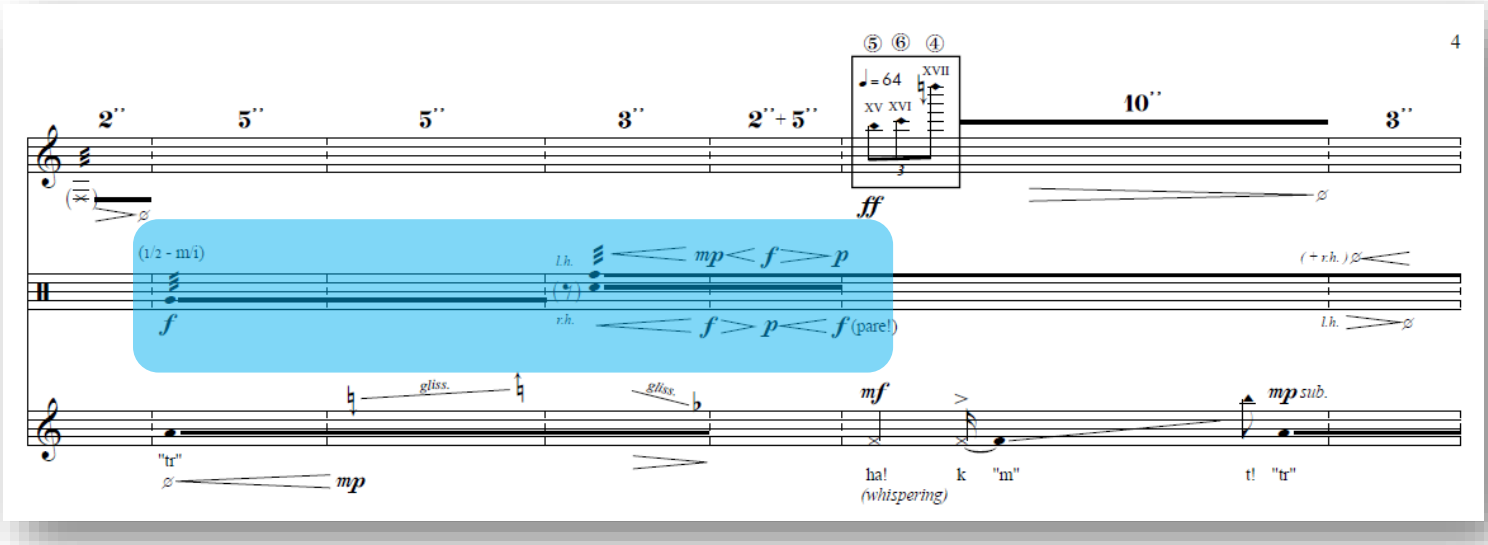


Figure 15: As Entranhas da Terra, p.4, first system: a whole percussive period reiterates previous ideas and leads to a new texture in harmonics (the first staff refers to the strings, the second to percussion in the body, and the last to the voice)

SEE VIDEO

4. Macro-formal: It is the level of large sections, of blocks that form entire parts of a work and operate with great independence within the global musical form. It is characterized by a) forming large contrasting sections, in which groups of percussive ideas, complete with their developments, are opposed to other large sections formed by other technical groups, each section maintaining their autonomy or b) a variation of "a", in which the arrival of the percussion forms a well-developed climax or anticlimax from the contrast; this usually requires a transition between the contrasting parts. As examples, we have the percussive sections in *Jongo*, by Paulo Belinatti, and *Cielo Abierto*, by Quique Sinesi, or the improvised section of the second movement of the *sonata op. 47* in some interpretations; the second part of *Glouster* (the development) could also fit the description.

Note that on all these levels, except for the first, percussion can appear pure or mixed with non-percussive elements in different proportions, as long as it is the predominant sound.

Transitional situations between technical groups will try to blur the boundaries between the structures so that the step from one to the other is not noticeable, and perhaps neither are the points of departure or arrival. In these cases, the size of the transition structure can be considered separately, observing that it cannot be analyzed as a percussive structure in its entirety. It is possible to analyze its internal sub-structures or to define (sometimes arbitrarily) a point from which the predominance of percussion delimits a percussive structure; however, depending on the case, it will be strictly impossible to determine structure sizes.

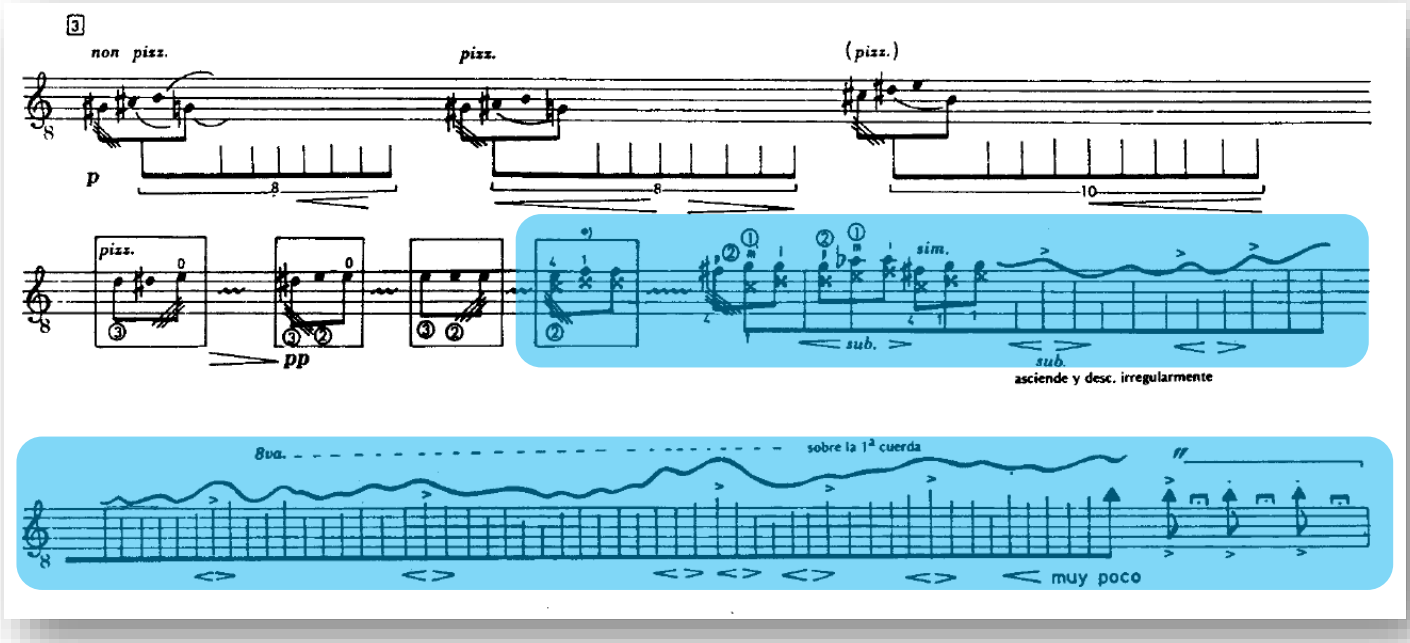


Figure 16: La Espiral Eterna, p. 3, last three systems: ordinary notes gradually lose their harmonicity through several technical transformations (pizz and then a soft touch of the l.h. (in blue)), leading to superhigh pitches (notation in graphical form). What follows is precisely a percussive section in tapping, a level-3 percussive structure.

SEE VIDEO

It is important to remember that structures built predominantly with the same TGs can also be greatly contrasting among themselves, especially within the percussive TG, which is inherently more varied. Tendentially, however, they will be more similar among themselves than compared to structures in which other TGs prevail. The TG-based structuration holds its validity especially for analyses of technique and physicality.

An interesting possibility highlighted by *Percussive Study I* is the migration between different levels as a compositional parameter. In that case, size transformations occur mostly within the limits of levels 2 and 3.

One last comment on this aspect of technical integration concerns its idiomatics. Especially in the micro-formal level (1) and with the plucking, integration can be technically sensible. The reason is the high precision required for plucking, demanding specific positions of both hand-arm complexes. The performance of many percussive resources displaces the complexes from those positions and demands time for repositioning, creating gaps. Idiomatic solutions for that problem are discussed in chapter 4.

Proportions

The proportions between percussive and non-percussive techniques within a work, group of works, or smaller intra-work sub-structures are also an important element of the musical discourse, playing a major role in defining the function of the PRs. Here, too, there is a continuum of possibilities, from which we extract two categories:

a) Proportional insertion: Percussive resources are used in a similar proportion to the others, thus forming similar structures that tend to dialogue, to contrast, to cohere, or to merge.

b) Disproportionate insertion: Percussive resources are either predominant (*abundance*) or appear only occasionally (*scarcity*). This form of use causes the minority (scarce) component to gravitate toward an interjective, interpolative function, since it interrupts the discursive flow of the major (abundant) component; it favors, therefore, discontinuity, eccentricity, dispersion.

In much CG literature, sparse disproportionate insertion predominates (*Sonata op. 47* (A. Ginastera), *La Espiral Eterna* (Brouwer), *Gloucester* (Henze), *Algo* (Donatoni), *Las Seis Cuerdas* (A. Company), *Kurze Schatten II* (Ferneyhough), etc)[59]. Some works, like *Percussive study n.1* (A. Kampela), find a balance between this and a proportional insertion, which is the point of most FG literature. The occurrence of abundant disproportions is only sporadic. It is worth

[59] Kindly remember that a complete list of the mentioned works, along with their years of composition, composers, and references, are given in the Appendix A

remembering the case of *Ko Tha*, in which the predominance of percussion is complete[60] – it does not, therefore, allow an analysis of proportions.

In the description of the four size categories, we presented, for each, two possibilities of characterization, A and B. The first (letters a) refer in general to proportional, and the second (letters b) generally to disproportionate (scarce) insertions.

The distribution of PRs within a certain work, group of works or formal unit can also be classified into *heterogeneous* or *homogeneous*, regardless of their abundance or scarcity.

Integration form

Integration form is *how* percussive and non-percussive blocks or extracts connect. The studied repertoire revealed three possibilities:

a) Separation: the percussive elements are isolated, separated by significant silences or *fermatas*.

b) Alternation: the percussive elements are juxtaposed with the others, or their separation is insignificant (most works).

- Linear Integration or Virtual overlap: This is a specific case of alternation, consisting of two textural extracts suggested by a single line that executes units or small series of clearly differentiated families of sounds, much like baroque virtual polyphony. Some cases, such as the one illustrated in Fig. 17, could also be considered to be *hoqueti*[61] when two hands are used or the lines are constructed with materials too different from one another:

[60] Depending, as always, on the interpretation that the sounds of the strings have percussive, more than harmonic or melodic, functions.
[61] Rapid Exchange of notes between different instruments.

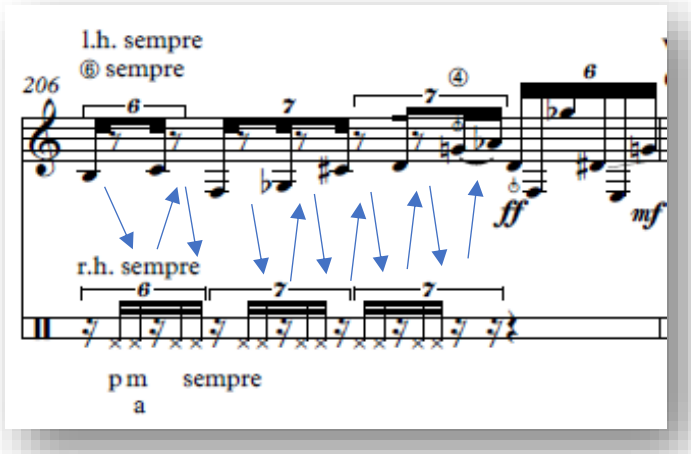


Figure 17: Laputa Variations, bar 206: a line in tapping (superior staff) suggests a counterpoint with taps on the soundboard (inferior staff), despite their being rhythmically in line, with no real overlaps.

c) Overlap: the percussive elements occur simultaneously with the other TGs. That can generate a variety of textures, such as heterphonies, counterpoints, pontillist textures, etc.

d) Transition: the elements of one technical group slowly evolve into elements of another. We see examples in *La Espiral Eterna* (fig. 16 above), *The Impossible* (introduction), and *Tellur* (pages 1 and 2, several occurrences).

CG repertoire shows a clear predominance of alternation. The overlap, when it occurs, is mostly due to the prolonged resonance of a note or chord over the PRs. The occurrence of simultaneous attacks is more common in FG, as the rhythmic patterns of the accompaniment frequently overlap notes in the melody; FG artists even developed sharp skills in using hand part E together with **rg** or **pin**. Separations also occurred sparingly, with their presence being more significant at micro-formal levels (1 and 2).

Grela (1985) also presents an interesting parameter he calls *articulatory magnitude*, which is formed through comparison and hierarchical classification of the musical impact of all articulations within an analytical situation. Counterintuitivelly, these are not so often correlated to the size of the structures being articulated. We did not use that parameter in this work, but it could be an instigating possibility for future works.

Function

We adapted the *functional* approach from Grela (1985) to understand the role of the PR in the musical discourse. It consists of defining eight possible functions for a musical structure, of any level, as summarized below:

a) Exposition: Presents musical ideas. It is predominantly stable and the only autonomous of the functions (in the sense that they do not necessarily come from, or lead to, another structure).
b) Transformation: A structure that uses elements of previous structures to generate new ones.
c) Transition: A continuous change from the characteristics of one musical structure to those of another.
d) Introduction: Presents some instability and leads to another structure, on which it depends.
e) Interpolation: Occurs when a structure interrupts another. After the second one concludes, the first one continues its development.
f) Extension: a structure prolongs another after the "main body" of the latter concludes. It is dependant on the prolonged structure.
g) Conclusion: the structure is used as a cadential resource for other structure(s).
h) Interjection: the structures interrupt the direction of the musical discourse, with an exclamative effect. That shifts the perception from the musical discourse towards the sound material itself.

These categories were used to understand the effects of the PRs on the music, focusing on those that come directly out of their percussive nature. For that, we added the category *contrast*, which covers the effect of changing TGs.

Grela also describes situations of *polyfunctionality* and *functional transition*. The first one was very common in the sample, while the second did not occur. Both results can be explained by methodological biases: we did not focus this part of the analysis on specific structures (the ones that might suffer functional transitions) but rather on the overall musical functions of the percussive TG in each work (a broad enough context to enable different functions for an abstract "percussion in general", summing up all, or at least many, features of all actual percussive structures in the work).

Not all categories were observed in the sample. The data was entered into the database and informed, in a general way, the reflections presented in this work, including the network of concepts of the model. It was not the object of a specific discussion, though.

***

CHAPTER 2

ANALYSIS

In this chapter, we discuss the results of the two analytical phases of this research: the exploratory, and the application of the PACT model.

It is important to stress that many results of the former were included in the previous chapter, as they are the foundations of the model. Ensuing updates came as results of the latter and were included in that chapter as well. Many other results and the discussion on notation were separated to be presented in a more general approach in the chapter “Percussive Playing”.

One must have in mind that the results of the exploratory analysis do not follow the model, so they use a different language to describe what was observed. That shows the evolution of the research and the reach of each methodology used.

As one can infer from the AF, a large range of information was gathered in the second analysis. Not all of it was processed; we present mainly the analyses of the information in Category 2, “PRs” (see “the Analysis Form and the variables observed”).

EXPLORATORY ANALYSIS

(*ANALYSIS OF FIVE REFERENCE WORKS OF CONTEMPORARY GUITAR LITERATURE*)

ANALYSES OF INDIVIDUAL WORKS

Giacinto Scelsi (1905–1988), Ko Tha (1967)

Percussive elements used (6 [8])[62]: Vibrate string against nail; play between the bridge and the tailpiece; striking the strings with an outstretched hand; taps on the soundboard [with fingers, with finger joints, with nails], taps on the tailpiece, *tambora*.

Notation: two 5-line staffs, the first for actions on the strings and the second for actions on the "resonance box", used in conjunction with specific characters (x, diamond-shaped notes, square brackets, etc.).

Performance Instructions: yes (1 page)

A pioneer work, *Ko Tha* was chosen for this study due to the emphasis given to percussive resources: the guitar is treated, *strictu sensu*, as a percussion instrument. Even the use of the strings (always open) has this characteristic, taking advantage of its naturally percussive sound not to create functions or hierarchies that depend on pitch: they become tuned percussion instruments. This consistent way of mobilizing the instrument's percussive capabilities bring a similar, radical change for the performer: if the guitar is now a percussion instrument, the guitarist is, for every practical purpose, a percussionist. The fact that the work is interpreted by percussionists (such as HEPFER, 2013) corroborates that. Ko Tha also informally introduces the idea of *techniques*, that is, it presents some definitions of *how* to produce each sound, thereby opening an incipient road to a mechanical-manual universe.

[62] Between parenthesis, the number of PR found after a triage to eliminate redundacies. Numbers between brackets refer to the total number of PR as described in the score, before triage.

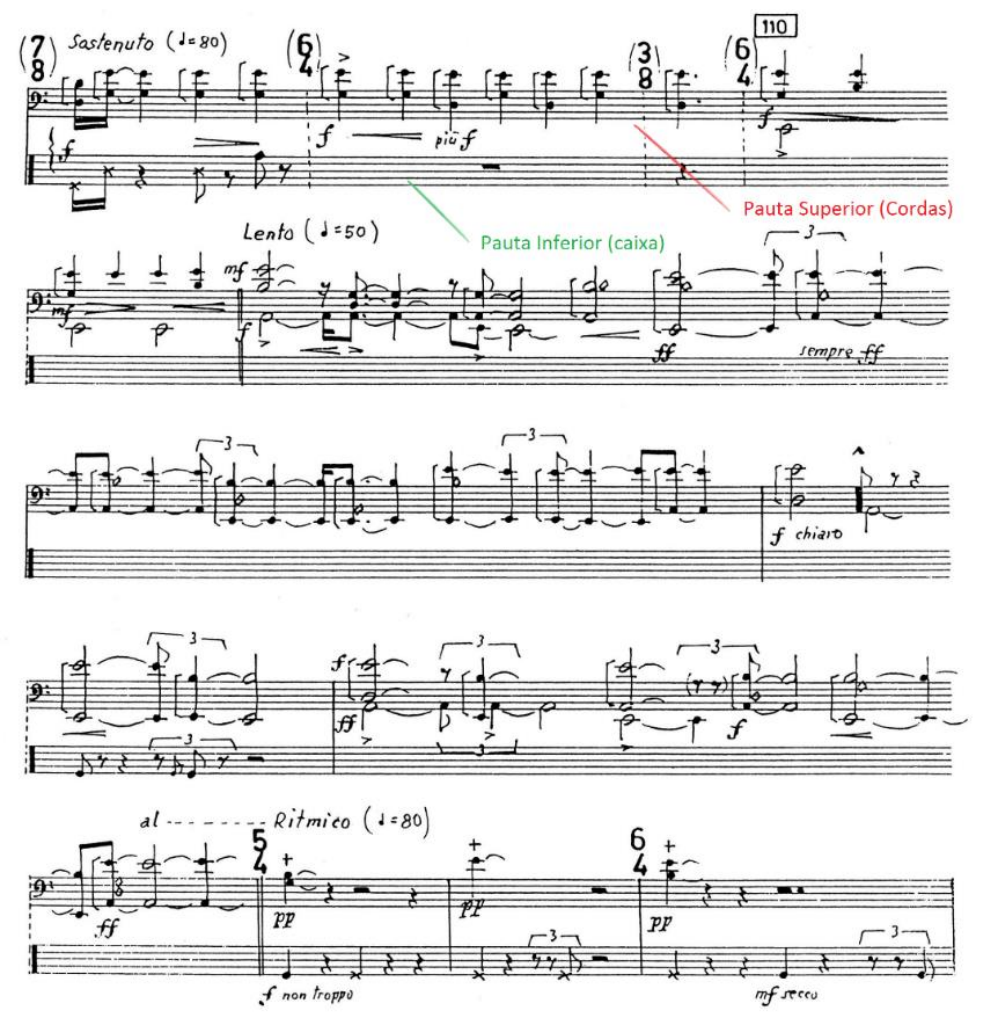


Figure 18: Aspect of the score of Ko-Tha (SCELSI, 1965, p.4), showing the use of the double staff. The indications say "lower staff (box)" and "upper staff (strings)"

Another innovation of the piece is the requirement that the instrument be played laid down on the lap. According to SCELSI (1989), this would facilitate the comfortable alternation between percussion and *rasgueo* techniques. We believe that the statement is imprecise: although this position has advantages (ergonomic access to the soundboard in the direction of gravity, for instance), it does not seem to us that the parameter "convenience of alternating" between techniques, that is, *integration*, is among them, at least not significantly. As *Percussive Study no. 1* and *Kurze Schatten II* prove, it is possible to achieve remarkable agility of change between the various techniques using the conventional position of the instrument.

The work was designed to be played on a guitar with a tailpiece and it explores both this part of the instrument and the string segments that form between it and the bridge. This construction is characteristic of guitars that use steel strings, whose greater tension requires this structural reinforcement. These strings have the advantage of being more sonorous when performing some PRs. Most interpretations use steel strings, although there are exceptions (such as CASOLI's 2008 “interventionist” interpretation).

The notation occurs on two staves, one of which is reserved for actions "on the box", while the other, in the unusual F clef, lends itself to actions on the strings.

The imprecise expression “on the box” [of resonance] refers probably to the soundboard, with its greater sound performance, and the analyzed interpretations prove this. The lap position is also a strong argument in favor of that.

To create a variety of sounds, Scelsi prefers to change the technique of sound production (with nails, alternating fingers, outstretched hand) instead of changing the soundboard area. This is unique in this sample. The interpretations, however, show that the interpreters use the sound variety of the soundboard expressively (although not always achieving clearly different sounds) or as an alternative for the use of the nails in the soundboard, which is problematic (see chapter 4).

The use of the F clef, on the one hand, can delay the guitarist's reading, although that can be quickly overcome thanks to the limited pitches (only open strings). On the other hand, there is a subtle side effect that emerges out of a context that is visually less familiar to the guitarist. We believe that helps with the recontextualization of these sounds towards the percussive aesthetic universe proposed by the work.

The use of the two staves does not correspond to the musical texture or division of labor between hands (that is expressly left at the discretion of the interpreter).

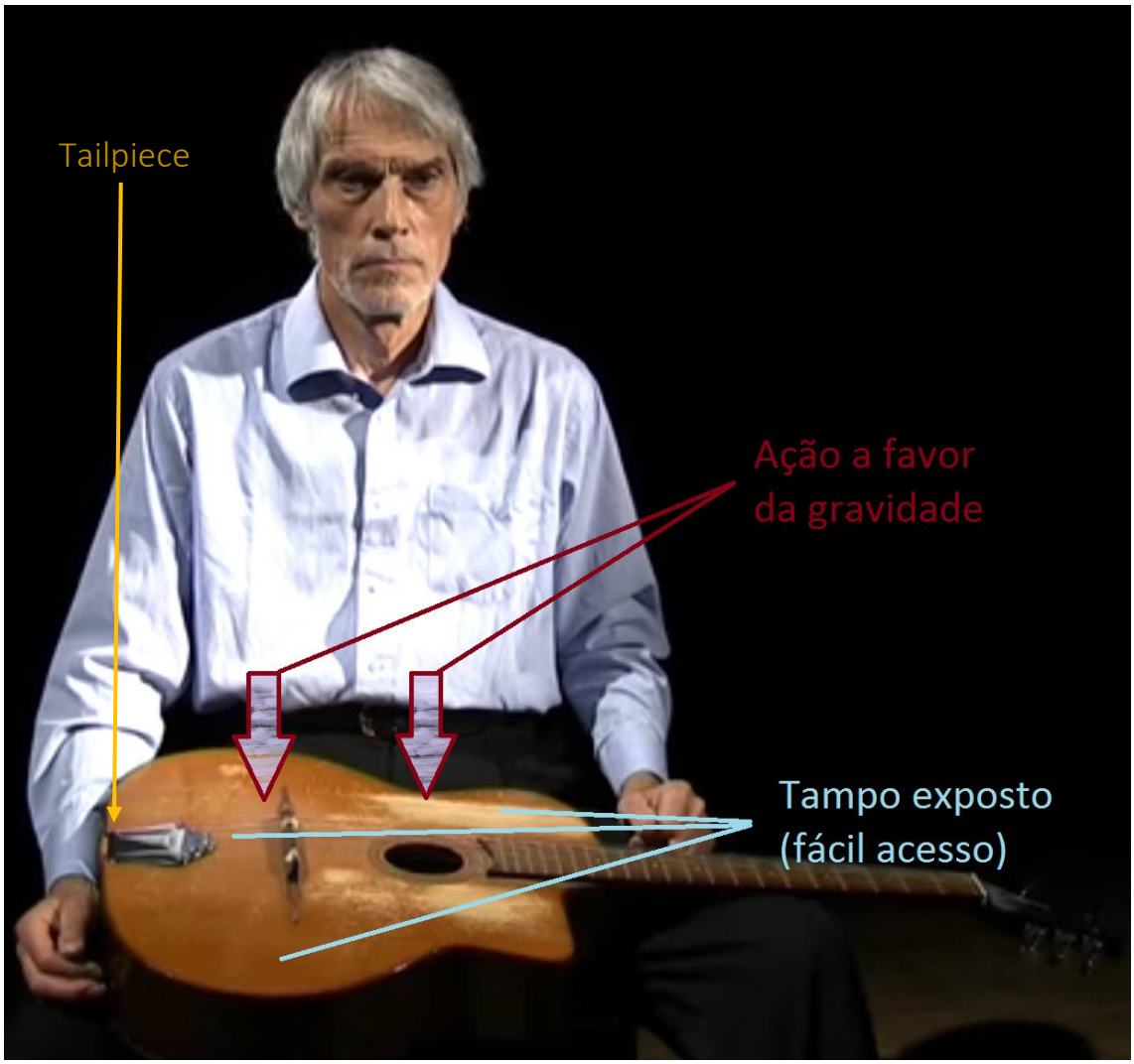


Figure 19: Bruck (2010) in Ko Tha (II), Tanz des Shiva, showing the guitar position and the tailpiece. The highlighted texts read, respectively, "in the direction of gravity" and "exposed soundboard (easy access)". Source: (FERNANDES, 2017a)

The analysis of the interpretations shows that the relatively little detail in the description of the percussive resources tends to induce the instrumentalists to creatively fill these indeterminate spaces. Bruck (2010; 2015) uses the regions of the soundboard quite freely; he also uses a variety of extratextual technical-manual resources to facilitate the execution of the work, such as the division of the right hand into three units (p + i + m, a, e) that effectively act as three different "mallets" [63]. Hepfer's version (2013) is of particular interest because he is a percussionist, a fact that shows in a lesser familiarity with plucking (which he substitutes for vertical strikes on the strings, the effect of which ends up being the same as that of a *snap*) and

[63] See "split hands" in Chapter 4.

in the fluency and energy of his performance. CASOLI (2008) opts for an even more creative interpretation, using two concert guitars (one of them *basso*) without a tailpiece and effectively contradicting several indications of the score to obtain the intended aesthetic effects – for example, replacing the actions in the string segment between the bridge and easel for interventions between the nut and the attachment of the strings to the rollers. Her interpretation evokes an aura of Indian meditation and resembles the posture of a *tabla* player.

Alberto Ginastera (1916-1983), Sonata para guitarra op. 47 (1976)

Percussive elements used (6 [8]): Strings played between the fretboard and the bridge, at the height of the soundhole and beyond; pizzicato ribatente sulla tastiera (Bartók); *tamboras* [palm, thumb and clenched fist]; knuckle tap at the soundboard; strings played at the headstock, before the nut; *son sifflè*.

Notation: Simple staff with different characters for percussive elements. Use of an occasional second staff (one line) with for taps on the soundboard. Includes explanations throughout the score.

Instructions: yes (2 pages)

The interest of this work lies in the variety of techniques used and the privileged place it occupies in the guitar repertoire, as a "portentous, meticulous, violent, and very skittish work. A transcendental writing for the guitar "in the words of Fabio Zanon (2008).

Although the various resources that can be considered percussive (s*on sifflè*, different *tamboras*, playing strings on the instrument's hand (before the nut), percussions on the soundboard, muffled notes in the super high region, pizz. r*ibatente sulla tastiera* (alla Bartók), *chasquidos* (*tamboras* with the fist)) are not homogeneously distributed in the musical text, occasionally being used only as a punctuation in the discourse (*sifflè*, percussion in the soundboard, pizz. Bartók) or localized effects (muffled super high notes), they are often sound material that will undergo successive elaborations (playing before the nut, snaps, tamboras). At other times, they appear intertwined (alternated at the microformal level) with other techniques (harmonics, *rasgueado*), building textures where the resulting sound is a sum of the contributions of each way of playing (as in the last movement, Fig. 20).

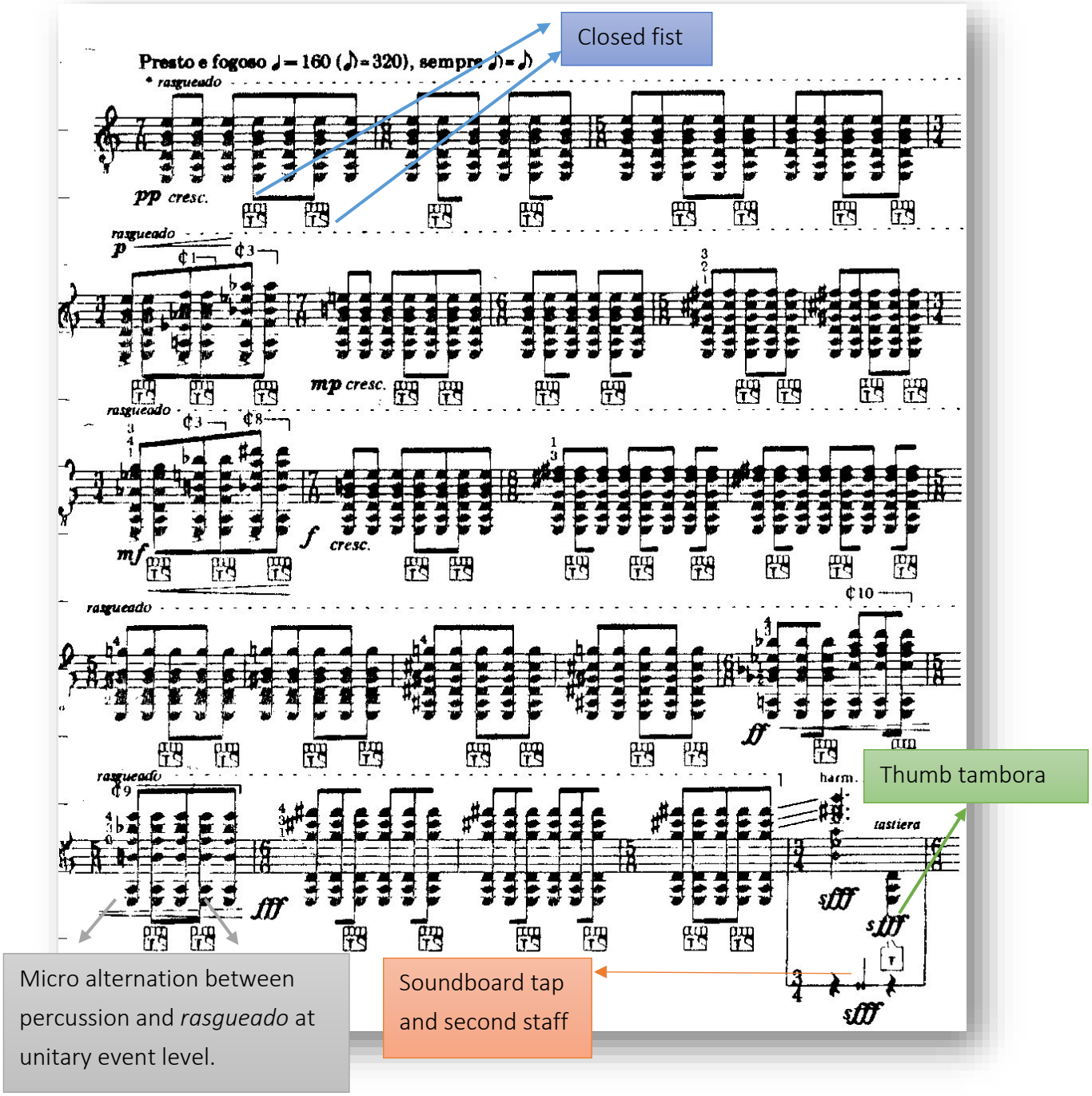


Figure 20: Aspect of Sonata op. 47, movement IV (GINASTERA, 1978, p.14), showing some percussive resources and the micro-formal concatenation of the technical groups Percussive and Rasgueado in the fourth movement.

The way of integrating percussive resources to the musical discourse in this *Sonata* varies according to the movement. In the first, the *son sifflè* and the strokes on the soundboard are used as punctuation (closing sentences), while the different *tamboras* are used as compositional resources for variation and also to build larger independent sound structures (sentences) that alternate with pluckings in a kind of dialogue:

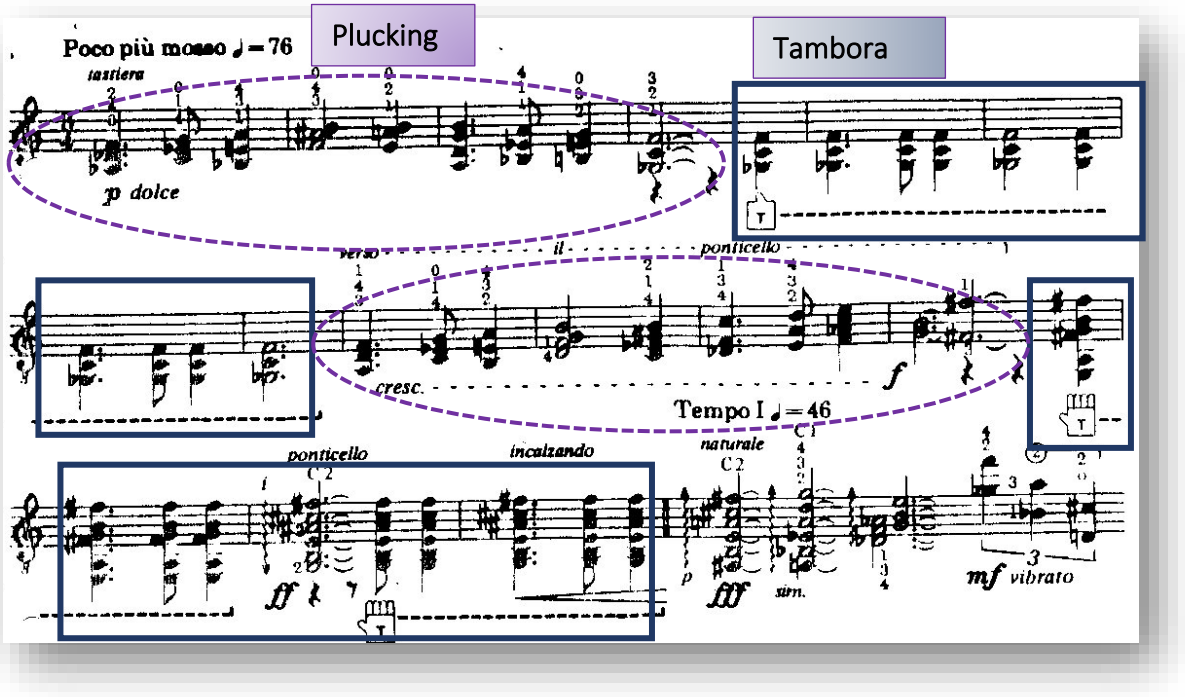


Figure 21: Sentences built upon tamboras in the first movement of *Sonata op. 47* (GINASTERA, 1978, p.2), and dialogue plucking x percussion.

At the end of the movement (Fig. 22), the taps on the soundboard will be elaborated, replacing the *tamboras* in the formation of sentence members that dialogue with plucking sounds. In this excerpt, the cadence function is usually emphasized by the interpreters through resources not specified in the score: the timbre-dynamic variation via trajectories through many different regions of the soundboard – an effect that has also a visual appeal.

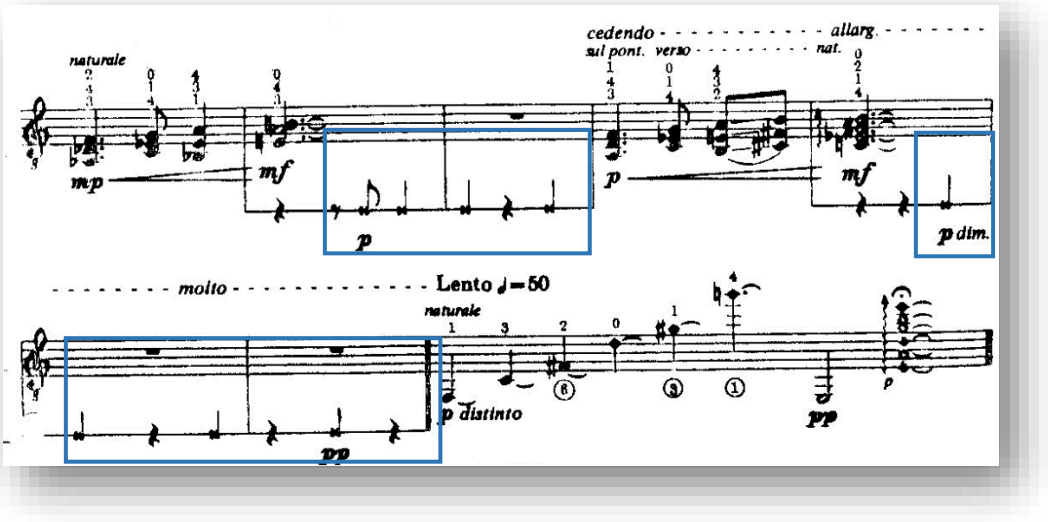


Figure 22: Strikes on the soundboard forming sentence members in dialogue with pluckings, at the end of the first movement (GINASTERA, 1978, p.2). In the second member, there is a cadential intention, and the interpretative tradition proposes more liberty. Also, note the use of the second staff.

In the second movement, as in the first, Ginastera uses percussive resources to create half-sentences in dialogue with pluckings or to form cells that will be interpolated in the musical discourse. He also uses them as punctuation or endings and even inserts a small section dedicated only to super-high sounds. It is interesting to note in these movements that, as a rule, each use of percussive techniques lasts for a certain time, usually corresponding to the formal level of the half-sentence. The third movement registers a single percussive occurrence, a punctuation with a super high note. The fourth (Fig. 20 and 23), on the other hand, presents frequent and varied percussive occurrences, introducing an extended exploration of micro-interpolations (Fig. 20).

We highlight the occasional use of plucked notes on the strings as a PR, similar to what occurs in *Ko Tha*. This happens in the IV movement, in which sometimes the V and VI strings are deployed together in extreme dynamics (*ff*), a situation whose evident musical intention is a pronounced bass attack of punctuating qualities, pitch being secondary. That occurs in the last system on page 12, in the second system on page 13, and at the end of page 14. The same occurs with the bass strings played in *rasgueado* just before the Coda, and with the open-strings chord (the so-called *guitar chord*) played together with a soundboard tap (p. 13).

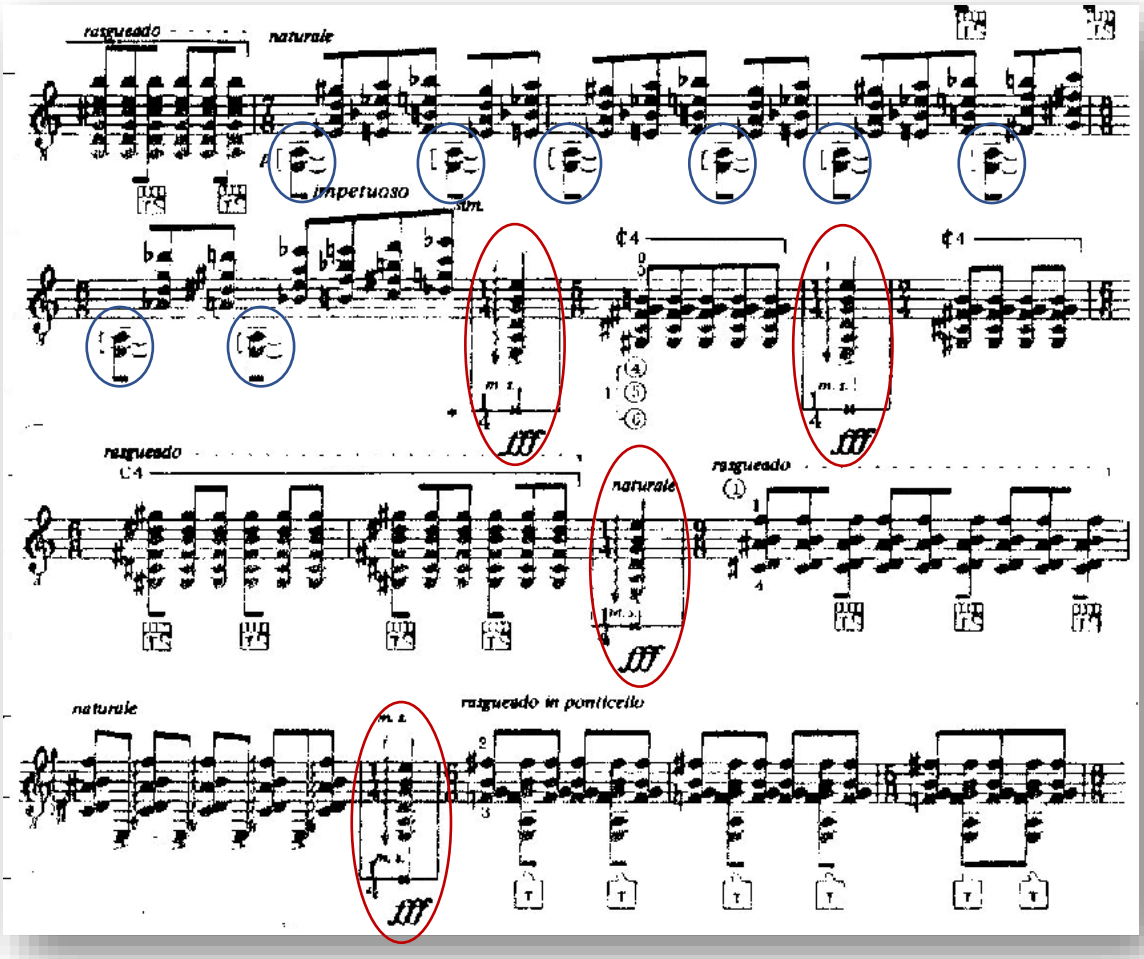


Figure 23: Occurrences of plucking (blue) and strumming (red) with percussive function in *Sonata op. 47*. The exclamative-interpolative use of the guitar chord is highlighted. The prevailing dynamics are ff

The interpretations studied showed that the *son sifflè*, the taps on the soundboard, and the *tamboras* were the resources that presented the greatest variability, both in the execution technique and in the sound result. While the soundboard area to be hit is left undetermined, the technique (strike with the joints of the fingers) is partially specified; the *son sifflè* has the same average degree of indeterminacy (nails or flesh of the fingers?), as well as the *tamboras* (how far from the bridge?). Nevertheless, the interpreters varied even the established parameters, adapting them to their technical affinities (using fingertips instead of knuckles, using only the middle or little finger in the *son sifflè*), emphasizing the explicit or implicit intentions of the musical text (as the timbre conduction in the strokes of the soundboard in cadential passages) and, perhaps, especially in the case of the *son sifflè*, concerned with the scenic impact of the gesture.

About notation, Ginastera employs a diversity of specific characters for the percussive resources it mobilizes, using a second staff of one line only for percussion on the soundboard, the resource with the least defined pitch.

The descriptions of the unconventional resources are synthetic and generally unambiguous, although the more strictly "percussive" resources (only attack, no pitch) have been left with a margin of indeterminacy. Throughout the score, however, we find detailed technical descriptions for the activation of the strings at the headstock (II mov.) and the effect of *rasgueado* with *tamboras* that muffle the strings and produce a metallic shock against the frets (snap). These instructions were strictly followed by the interpreters.

Leo Brouwer (1941), La Espiral Eterna (1971)

Percussive elements used (4): Pizz. snapping on the fingerboard (Bartók); gliss. along the strings; notes (muffled) between the fingerboard and the bridge; "hammered" notes (tapping).
Notation: Occasional use of two staves separating extracts from the texture, added to specific characters for each percussive sound.
Instructions: yes (1 page)

Espiral, like *Sonata*, is an integral part of the guitar canon and one of the best-known CG works in the repertoire. It uses the difference in resonance and spectrum between the *pizz.* sound and the "ordinary" notes to create distinctive ambiances, with pitches that alternate between being now more, then less, perceptible (ex.: Fig. 24). This leads to sonorities tending to the percussive even when the use of more strict PRs does not predominate. Also, Brouwer uses percussive sounds that he himself popularized, such as the *pizz. alla Bartók*, in addition to indeterminate pitches in the string area beyond the fretboard (super-high) and the unusual "perpendicular glissandos [sic]"[64] on the strings (which brings him closer to *Sonata*). It can be said that, in general, the work shifts the sound of the instrument from a territory of pitches, where the precision of tuning and purity of sound are paradigmatic, to a new world where inharmonicity and a percussive character are felt with more vigor, legitimized as musical and technical materials.

[64] An effect similar to a squeak, identical to the *son sifflè* in technique and sound. It is actually a *gliss* **parallel** to the strings.

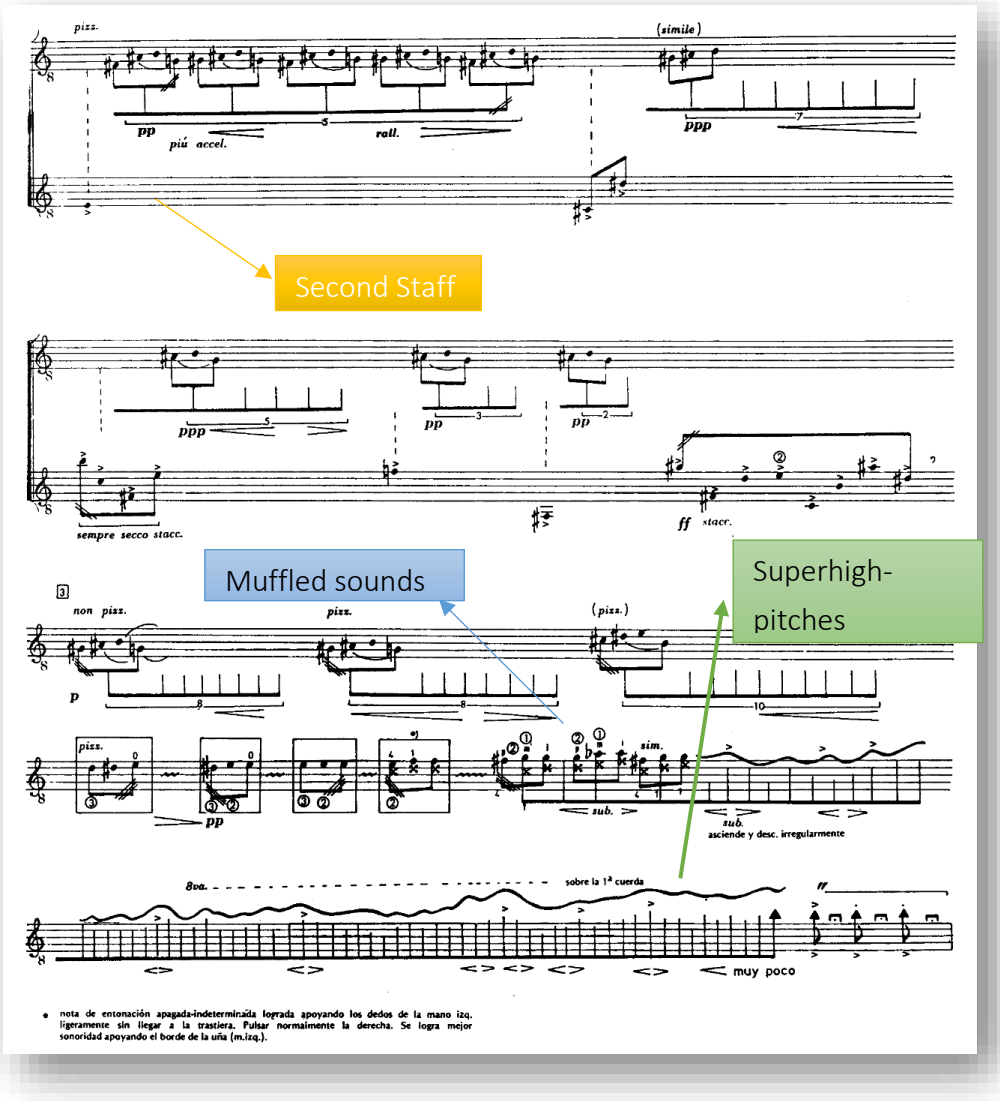


Figure 24: Aspect of the score of *La Espiral Eterna* (BROUWER, 1973), highlighting the occasional use of a second staff and some PRs.

Tapping is used in the work in a context of undetermined pitches, high density of attacks (quick notes), and little resonance of the tapped notes (Fig. 25). As the tapping attack has a prominent presence of inharmonic components, the section as a whole acquires a strong percussive character, which the interpretation may or may not emphasize:

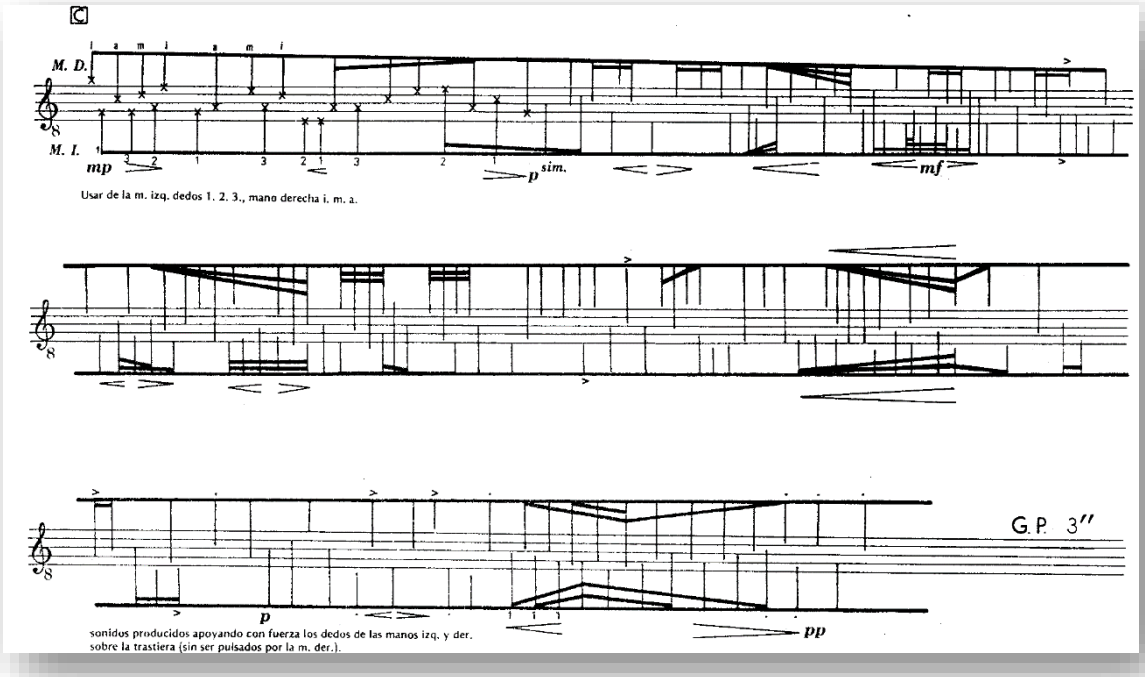


Figure 25: Tapping section in La Espiral Eterna.

The *son sifflè* (we will use Ginastera's term) is always associated with *pizz. restallando en el diapasón* (*alla Bartók*), functioning as an anacrusis. The total effect is a kind of ADSR[65] stylization of the guitar sound, in which sustain and release are performed in sequence, in clouds of notes in smooth dynamics (this pattern is varied ahead, with the elimination of the *sifflè*, replacement of the *Bartók* for hammered notes and the clouds of notes for *pizz*.).

The *Espiral's* discursiveness is quite different from the others, proposing a well-defined macro form in which sound events take place in non-linear evolution, a type of construction that favors the perception of textures (we could say "concrete"[66]). Thus, it does not make much sense to speak of sentences or periods, and the analysis of the uses of percussive resources is directed at their textural function. We have already discussed *son sifflè* and *pizz. alla Bartók* (which is also used as punctuation at the end of the work), in addition to ordinary *pizzicati* (here used percussively), which compose textures together with conventional plucking notes, alternating (with possible overlapping resonances) at a moderate pace that gives each type of technique a

[65] *Attack, Decay, Sustain, Release*: the evolution of the amplitude envelope of a sound in time.
[66] "Matérica", according to Grela (2016), that is, whose sounds are not vehicles for a discursive flow that happens outside (or between) them, but express a content in itself, physically manifested through their material instantaneous properties.

sufficient duration to be heard independently (unlike what happens in the IV movement of *Sonata* or the second movement of *Ko Tha*, for example). The tapping forms an autonomous texture (a section), while the muted and super-high-pitched sounds appear as a result of gradual textural evolution, functioning as a cadence, in the manner of a liquidation.

The notation is varied. It sporadically uses a second staff to differentiate musical extracts in the texture, regardless of technical qualities. That contrasts with *Ko Tha*, in which they separate instrument areas, and with *Sonata*, where they differentiate the inharmonic quality of the soundboard strokes.

The performance instructions are minimal, with summarized descriptions, but, throughout the score, more detailed explanations of the various resources are given as they appear. Some characters, such as tapping and muffled/super-high sounds, are not present on the instructions page.

Hans Werner Henze (1926-2012), *Royal Winter Music I: I – Gloucester (1976)*

Percussive elements used (3 [5][67]): Strokes on the soundboard, in three different regions; *tambora*; snap (*pizz. alla Bartók*).
Notation: Conventional with a second staff (two lines) for inharmonic sounds (on the soundboard); specific characters for the percussive resources.
Performance Instructions: Yes (includes drawing)[68]

A work of discursively complex and deeply rhetorical design, deriving the percussive use of the guitar directly from the dramatic text, *Gloucester* integrates a *tour de force* work in the guitar literature (total duration approx. 30 min., 6'30' for this movement): *Royal Winter Music I*, sonata in six movements based on Shakespeare characters.

Henze approached percussion on the guitar only in this opening movement, unique in the entire cycle of *Royal Winter Music* (I and II)[69]. It presents percussive features with special emphasis, associating them with the fury of Shakespeare's famous opening monologue of

[67] There are also two occurrences of tapping that we opted not to consider.
[68] We observe that the drawing can present significant variation in proportion when compared to real guitars, notably in the soundhole-bridge distance.
[69] *Royal Winter Music II* finishes a long cycle of 9 movements based on characters of Shakespeare, probably the largest work in canonic guitar repertoire.

Richard III, "*Now is the winter of our discontent*". A rhetorical use, as mentioned, accentuated by the formal feature of presenting the percussive sound of the guitar only in the development (which starts on page 9, Fig. 26) and on the coda, where the pitched sounds gradually disappear until only the screams of the bellicose Gloucester are left, portrayed with forceful blows on the soundboard.

There are five PRs: *tamboras, pizz. Bartók*, and attacks in three different regions of the soundboard, very specifically indicated in a drawing (a resource absent in the other performance instructions – *Study* uses photos). The analysis of the recordings, as well as the empirical tests carried out, show that the indications of Henze/Bream tend to produce similar sounds and that only through the deliberate effort of the interpreter can timbre and pitch nuances emerge, which is furthermore suggested by the two-lined percussive staff. Timbre variation is only noticeable through greater changes in the soundboard area. If, conversely, the objective is to find homogeneity, then the precise locations given for the taps are relativized in the other direction, brought closer to each other. Apparently, the B region (Figs. 26 and 79) is, as a rule, the highest-pitched sound produced according to the performance instructions.

Timbre criteria can be a false clue, however. *Percussive Study* will raise the question of whether the reason for the notation and certain specifications of the PRs is the sound result or technical convenience, and that gives us a hint of the objectives here. The quickest hits on the soundboard, in sixteenth notes patterns (p. 10, systems 2 and 3; p. 11, last system), use regions "B" and "C" in alternation, suggesting the agile rotational movement of the wrist, like in *Study*. This, moreover, would already imply defining how to perform these PRs (with the fingertips of *p* vs *ma*), something that had been, at first, left open (fingertips? Joints, as in *Sonata*? Which fingers? Nails, as in *Ko Tha*?).

The use of PRs occurs, at the micro formal level, through alternations that constantly contract and distend, varying from a micro-alternation in the manner of the fourth movement of *Sonata* and of *Study* (and that results in textures of composite sound with less discernible individual elements) to the formation of larger structures, up to approximately the sentence level (except for the long percussive segment that concludes the movement). However, these alternations are, as said, restricted to the development and the coda. This generates the ambiguous effect of *isolation* of the PRs at the highest macro-formal level, while they are fluidly integrated with

pluckings and strummings at the formal levels inferior to that of the periods (levels *1* and *2*, through *sparse disproportionate alternations*).

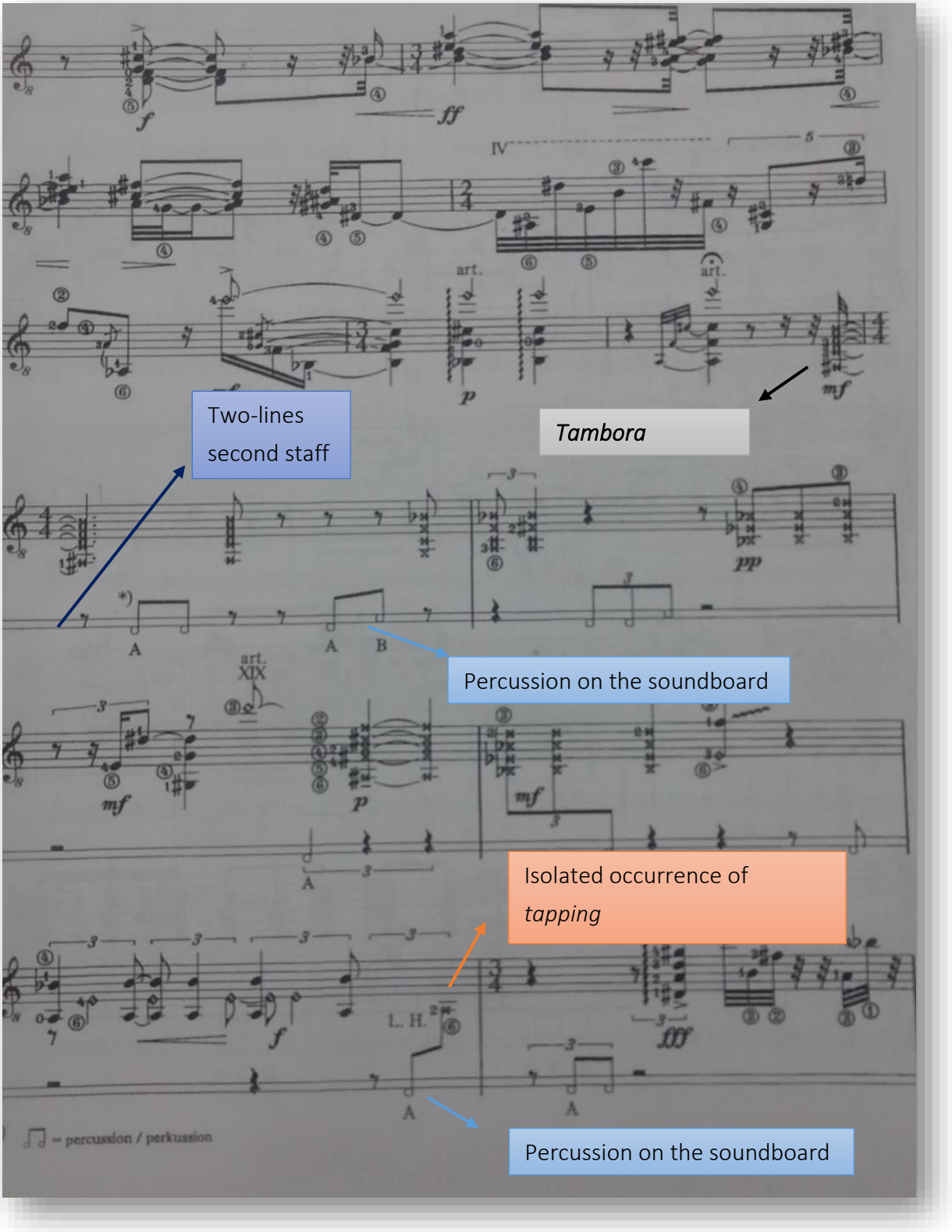


Figure 26: Aspect of *Gloucester*, highlighting the dedicated two-line staff for soundboard taps, and some PRs with their notation.

The percussion-dedicated staff is used to mark only the taps on the soundboard, exactly as it happens in *Sonata*. All other sounds, percussive or not, are noted in the upper staff and have the fact that they have well-defined pitches in common. The second staff is not used in the other movements.

The performance instructions are quite synthetic, but, despite being significantly less specific than that of *Ko-Tha*, the interpretations show a greater degree of coherence in the execution of percussive resources than those of that work. We speculate that this is due firstly to the drawing and, secondly, to the nature of the musical construction, since the greater exploration of guitar percussion in *Ko-Tha* forces the performer to dive into this universe and its various possibilities, whereas the learning process in Gloucester may be more pragmatic.

Arthur Kampela (1960), Estudo Percussivo n.1 (1989? 1995)

Percussive elements used (9, [12]): Hit the soundboard with the right thumb, over the soundhole; fingers in the "lower soundboard" (below the strings); hit the "upper soundboard" with the hand stretched between the soundhole and the bridge; striking strings against the frets with thumb or fingers between the end of the fretboard and the edge of the soundhole (both hands); slap the soundboard under the fretboard (left hand); tap with fingernails *i, m, a* on the side next to the most prominent lower curve; tap with the nail of the right thumb on the "lower soundboard" close to the most prominent edge; tapping (left hand); stretch strings I or VI out of the arm and pulse them with the right hand; *pizz. Bartók* with the right thumb.
Notation: Second staff in one line, dedicated to sounds without pitch, and using several different characters related either to the sound result or to the production technique.
Performance instructions: Yes (16 pages, including photos).

This work aims, like *Ko Tha*, at being a systematic exploration of percussive possibilities of the guitar, although it differs from it in that it proposes an integration of those possibilities with traditional TG. Although it is already a "late" repertoire, created at a time when percussive resources were already part of the vocabulary of CG (and being explored in the incipient FG), it innovates in the interaction of TG, making their coexistence organic through idiomatics (motricity, ergonomics) elevated to the category of a musical parameter; it also innovates in the variety of PRs it mobilizes.

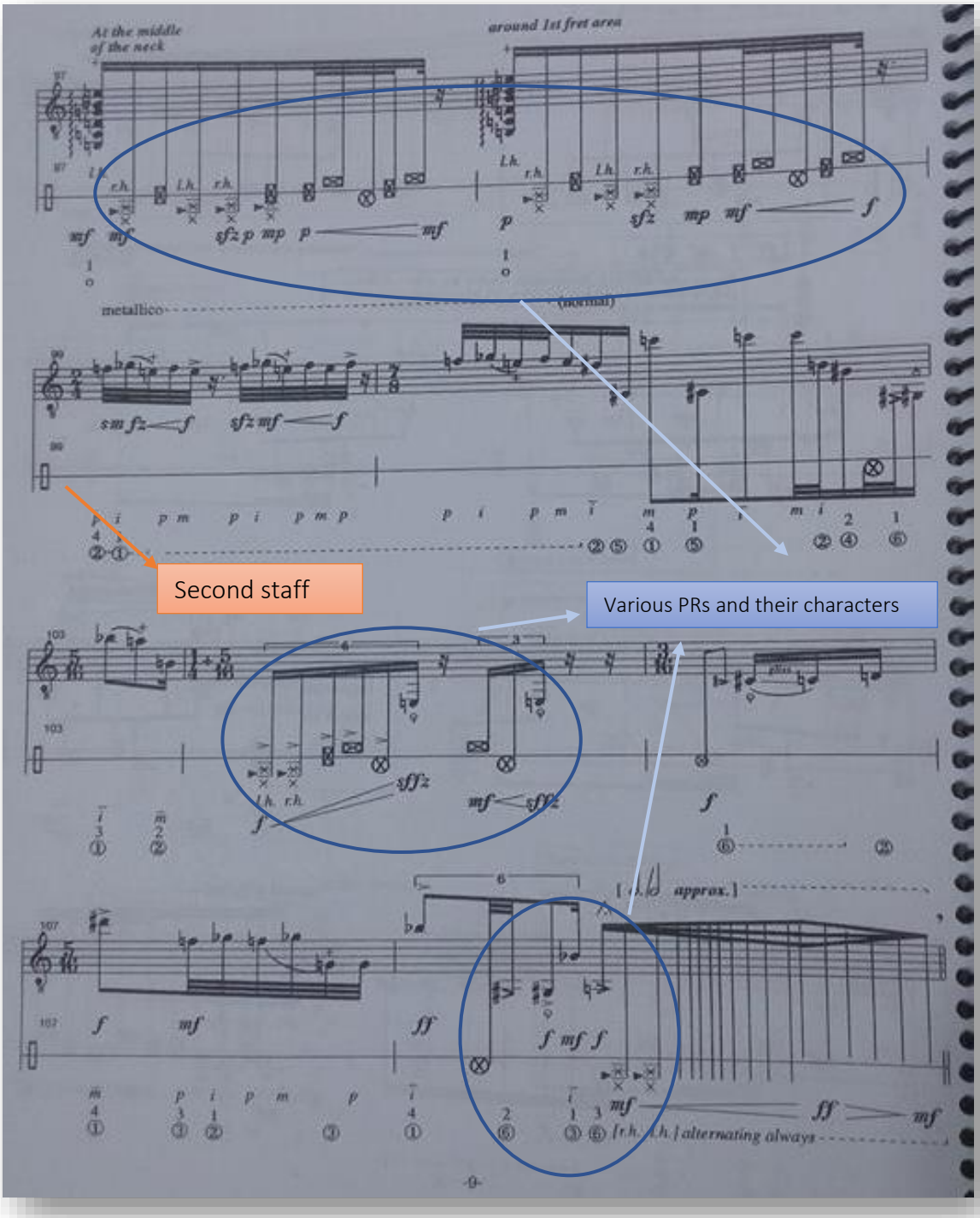


Figure 27: Aspect of the score of *Percussive Study I*, highlighting the second staff for unpitched sounds and the variety of characters that represent the PRs.

However, perhaps the great novelty here is the level of detail in the description of the PRs, specifying a series of variables that were not yet often controlled by the score, and expanding the technical and sound universe inaugurated by *Ko-Tha*. Here, the taps on the soundboard

occur with a specific part of the fingers, in better-delimited regions of the instrument, and participate in large idiomatic gestures. These are built in a way that allows for a comfortable and agile TG Integration (as was Scelsi's ambition).

This unique detailing is supported by performance instructions of notable dimensions: no less than sixteen pages, six of which are composed of text (with fifteen numbered entries for individual percussive resources and seven other observations regarding notation and performance notes) and ten of photos, that decisively expand the descriptive power of the score. All this specificity derives from Kampela's very personal idiomatic writing, which invests in the exploration of the body-instrument-movement relationship. This brings to light a renewed potential for creating highly effective technical-scenic-musical gestures, whose maximized yield, however, implies specific ways of playing that end up restraining the range of possibilities for interpretation – another factor explaining the coherence between the various performances. The descriptions do not seek to be generalizable to other musical situations: their objective is rather to detail the minutiae that will make an optimal technical and sound performance possible, focusing on that which is concretely used in the work. Naturally, some degree of indeterminacy always exists (for example in the definition of *areas* of the instrument instead of specific points, contrary to what happens in Gloucester).

The notational system that accompanies the descriptions is based on a second lower staff in a single line (Fig. 27), which houses all unpitched resources (in other words, the system differentiates sound results). It is accompanied by several characters and graphics (some shown in Fig. 27) that try to give an account of what is described in the various entries of the instruction pages. Some characters (entries of n.2, 4-6, and 11) operate together with complementary indications such as "right hand" or "lower soundboard". Others (3 and 7; 4-6, 8, and 12) have a degree of similarity unfriendly to reading.

Since the entire system of notation (instructions included) serves pragmatic objectives, it is not surprising that inconsistencies are found in its organization, as long as the goal of making the piece executable is achieved. The reflection on these inconsistencies is useful, however, and not as a criticism of the work but to extract from there principles that can support a more generalist notational system. We will return to them when discussing notation in a more general context.

Study can be placed into the poetics of the New Complexity because it mobilizes a wide variety of musical materials and procedures. We are not interested in a comprehensive aesthetic nor in a compositional analysis, but rather in the fact that it presents a wide variety of timbres (from mellow to metallic, going through *rasgueados* and all its PRs), intensities (the entire dynamic range of the guitar, from *ppp* to *fff*), pitches (chromatic totals, the entire range of the instrument) and rhythmic structures, all condensed into about five minutes of music, and this has implications for the placement of percussive resources within the musical discourse and/or textures. The result of the condensed plurality of musical materials is kaleidoscopic textures, which oscillate between different degrees of organization, covering the entire continuum from redundancy (literal repetitions of small sound structures) to entropy (pointillist textures favoring the isolated perception of events), as seen in Fig. 28.

This results, at a macro level, in a more "organic" integration between the materials; in other words, the percussive occurrences do not sound like disagreeable elements, as is sometimes the intention in *Sonata* or *Royal Winter Music I*.

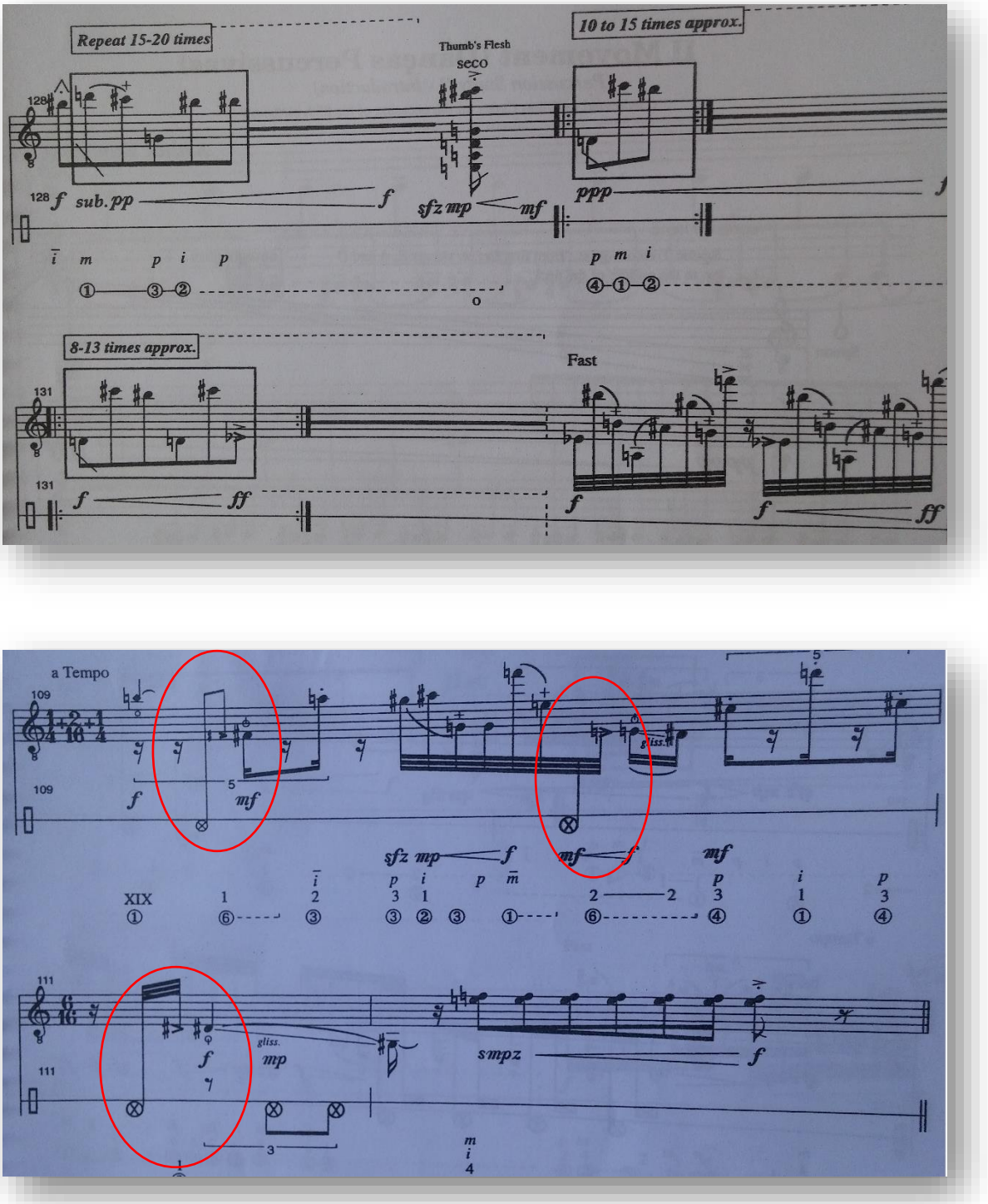


Figure 28: Comparison between structures of different levels of organizations in *Percussive Study I*: from the tendency to order (successions of variations of small structures repeated 8-15 times; above, in gray filter) to entropy (many rhythmic, intensity, timbral, technical, register, and pitch variations, concentrated in 4 measures; below, in blue filter). In red, idiomatic percussive formulas are highlighted.

This variation in the levels of organization also favors multiplicity in the size of the percussive structures that will be interwoven into the plucking, ranging from microstructures of about 3

quick elements to sequences that last 4 bars. Kampela rarely gets to alternate percussive and plucked unitary elements, and, conversely, the predominance or exclusivity of one single TG in large formal sections (as in bars 9-20, about 40 sec. of plucking, see Fig . 29) is infrequent. That means that the plucking and the percussive TGs (*rasgueados* are occasional occurrences) are distributed throughout the work. From a global point of view, this distribution tends to be *homogeneous*, but locally (for example, passages lasting less than 40 sec.) there are momentary concentrations of one or the other, which alternate in a complex discourse. Here, in the context of these localized disproportions, percussive occurrences may come to stand out from their surroundings, as occurs for example in bars 9-24 (Fig. 29), where this effect reinforces the effectiveness of the percussive cadential formula (bars . 27-28).

These disproportionate alternations can also imbue the PRs with interpolative-exclamative functions. Antiphonies or "pure" dialogues, as seen for example in the first movement of *Sonata*, do not occur, although in bars 76-81 (Fig. 30), a dialogue forms between unitary plucked cells and groups of repeated cells with plucking and percussion mixed. However, *Study* is the only work in this sample that presents real overlaps between percussive resources and plucking (Fig. 30), as seen more explicitly in bars 6, 36, 50, 76-77, 79-81, and 111; this type of integration remains rare, however.

The use of percussive idiomatic formulas is also a recurring feature of Kampela's work. The aforementioned one (bars 23-24, Fig. 29) is a variation of a highly effective sound-technical structure formed by taking advantage of the rebound movement of the thumb after tapping the soundboard to execute a *pizz*. *Bartók* on the 6th string. Kampela will use the effectiveness of this instrumental gesture to create a series of derivative formulas, generally adding snaps, *ligados,* and tapping in the interstices between one sound and the other (taking advantage of the freedom of the left hand). We recorded 43 occurrences of this particular formula (see e.g. Figs. 13, 24); there are others.

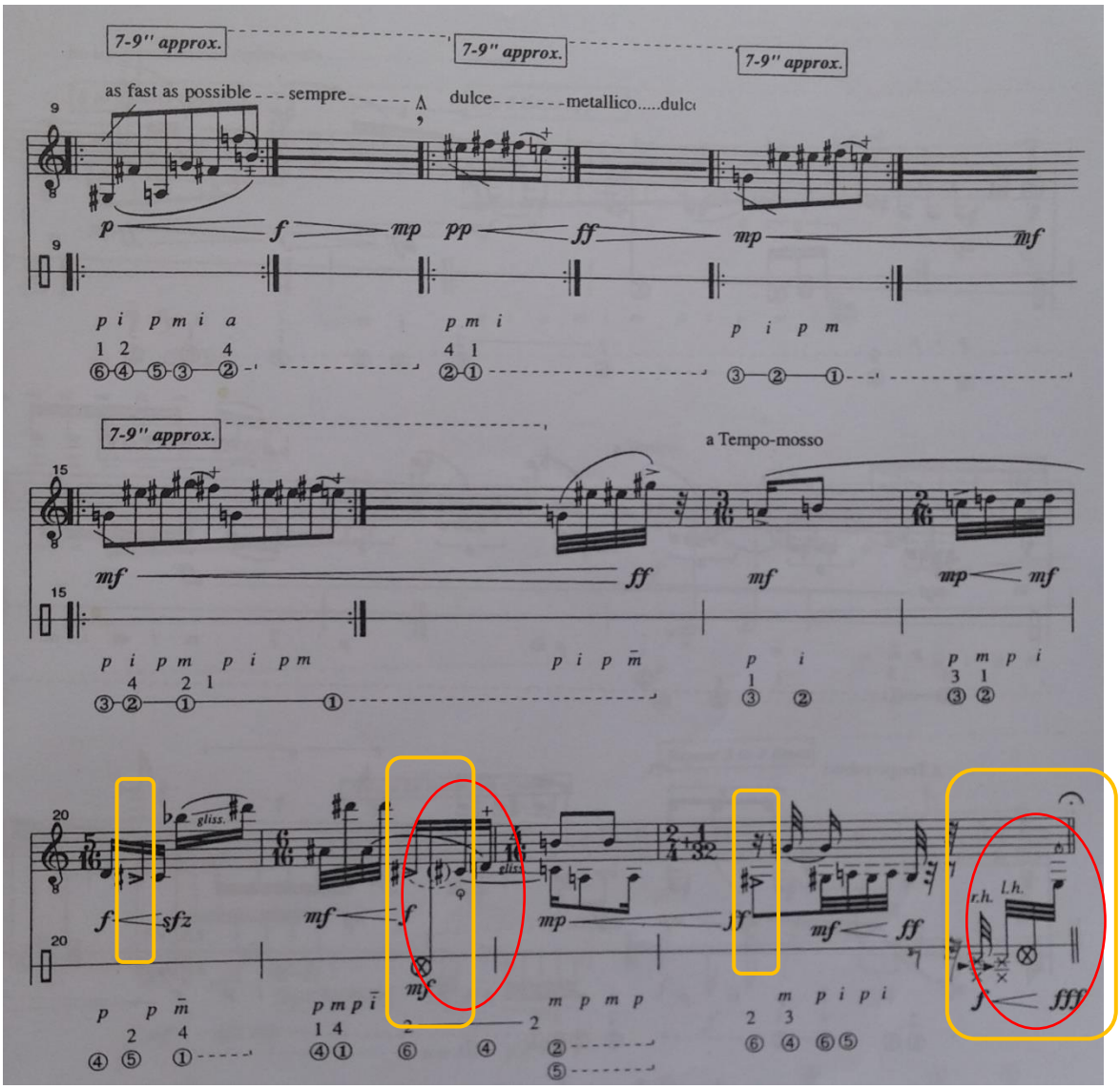


Figure 29: Percussive elements isolated within a long plucked passage. In red, the idiomatic formulae, the last of them with cadential function.

The duration of the structures, their discursive functions, their distribution throughout the piece, the idiomatic formulas, the overlaps and alternations, the proportional and disproportionate alternations, all concerns the way of using percussive resources in the work. Here, as in other instances, the abundance of resources and the way to manipulate them reflect the particular aesthetic aims of Kampela and the New Complexity.

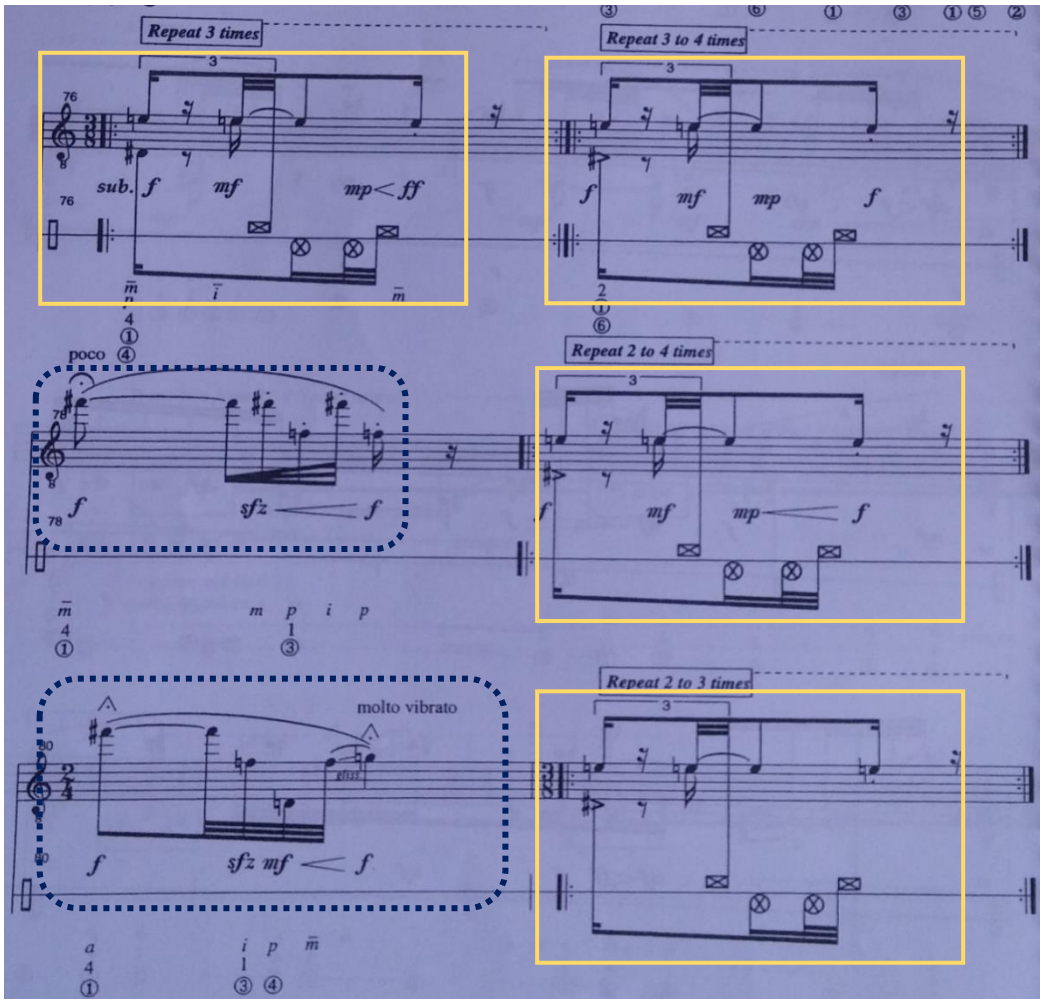


Figure 30: Explicit overlaps between percussion and pluckings (yellow) in dialogue with exclusively plucked structures

Global Analysis

Survey of the PRs extracted from the scores

Table 3 shows all the PRs found in the analyzed corpus with the occasional categories proposed by their respective scores. Note the coincidence in the division of the guitar in Strings and Body (Box) in *Ko Tha* and *Gloucester*.

Several sound results are similar (for example, the strokes on the soundboard of *Gloucester,* or the resources 1-2 or 4-6 of *Study*), but we opted here for a faithful reproduction to allow for comparison with the consolidated survey that we will present later.

Global Survey – Exploratory Analysis

PRs surveyed in all 5 works

Ko Tha	*Sonata op.47*	*La Espiral Eterna*	*Gloucester*	*Estudo Percussivo n. 1*
PRs on the "box"			**PRs on the soundboard**	
1. Fingertap on the soundboard	*1. Pizz. ribatente sulla tastiera*	*1.* Pizz Bartók	1.Tap on the soundboard A (approx. 3 cm from the bridge, opposed to the strings)	1. Right-thumb tap on the soundboard
2. Knuckle taps on the soundboard	2. Superhigh pitches	2. Longitudinal string gliss.		2. Tap on the "lower soundboard" (below the strings) with the thumb
3. Nail taps on the soundboard		3. Dampened notes		
4. Fingertap on the tailpiece	3. Palm *tambora*	4. Percussive tapping		3. Tap on the "lower soundboard" (below the strings) with *m+a*
	4. Thumb *tambora*		2. Tap on the soundboard B (superior part between soundhole and bridge)	
	5. Closed fist *tambora*			4. String snap with "p" over the soundhole
	6. Knuckles *tambora*		3. Tap on the soundboard C (superior part between soundhole and bridge)	
	7. Play in strings at the headstock			5. String snap with *m,a* over the soundhole
PRs on the strings	8. *Son sifflé*		**Others (strings)**	
1. Buzz string with nails			1. *Tambora*	6. String snap with 2,4 over the soundhole
2. Play between bridge and tailpiece			*2. Snap*	
3. Tap on the strings			*3 .Tapping* (2 occurrences)	7. Tap on the soundboard below the fretboard with 2+3+4
4.*Tamboras* on different string groups				8. Nails *i,m,a* on lower bout curve, with *p* on the near soundboard
				9. L.h. tapping
				10. Pull string to the side of the fretboard and play with the r.h.
				11. *Pizz. Bartók* with right thumb

Table 3: Survey of all PRs gathered in this corpus, by work. The classification categories come from the works themselves.

Regarding the conception of the various PRs analyzed, manifested in their description in the score, the great variability with which the composers approach them is noteworthy. Sometimes the description is quite unspecific, and at times it unravels minutiae. This difference in treatment, in a field of still few conventions, has decisive effects both from the technical point of view and from the sound result, as seen in the individual analyses of the pieces.

The very specific descriptions, on the one hand, help to understand the musical proposition of the text and guarantee the composer greater control over the final result. On the other hand, they restrict the interpreter's territory of possibilities (that can create dilemmas as he struggles to adapt that specificity to his technical preferences). Furthermore, having been created with the pragmatic objective of making the execution of that particular work viable, they end up establishing limitations that do not make sense outside it. In *Study*, as we have seen, Kampela chooses to reduce the repertoire of percussive gestures by limiting certain techniques/resources to one of the hands or a region of the guitar, being very detailed about which parts of the hand or guitar to activate and how; thus, it excludes a series of possible variations of the same resource. Precisely as it leaves those possibilities aside, the greater detailing can diminish certain flexibility of realization inherent to the resources. Reconstituting these dimensions requires a generalization effort that we hope to have undertaken with the PACT model: for example, when dealing with the "soundboard tap under the fretboard with the fingers 2-4 of the left hand" suggested in *Study*, it will be necessary to remember that it is (in principle) transportable to other parts of the soundboard, using the same technique (and with different sound results); moreover, the striking technique with the anterior part of the fingers of the left hand can be performed on the strings, on the sides, behind the neck of the guitar, etc. And all of this could be accomplished by the right hand as well. All these variations (some of which are used by Kampela, but as independent resources) can be added to the same classification category, saving memory, nomenclature, and graphic resources[70].

The non-specific descriptions, such as *Sonata's* "tap on the soundboard using the knuckles"[71], diminish the composer's control, possibly exposing him to the risk of a different result than

[70] To be precise, PACT gives us the possibility of classifying and naming that as Family **/A.Bgp** (for the technique), or **2/A.B(ma)gp**, for its uses through the soundboard.
[71] PACT: **2/Bgp**

intended, especially since this type of technique is still poorly consolidated. In the given example, the interpreter must choose the location of the soundboard to be reached, which implies significant variations in timbre, duration, height, and intensity. In *Ko-Tha¸* as we have seen, Scelsi does not even specify the soundboard, writing simply "box", referring to the guitar body; it was the interpretative tradition that established that they will be played on the soundboard. For the interpreter, it is an opportunity for creation, but it can also be a liability to reading and learning the piece if a faster preparation process is required.

Most of the descriptions seem to orbit around a middle ground, in which the PRs performed outside the strings are less specifically described. Empirically, it is observed that the interpretations, probably due to the loose formalization of such resources, tend to exhibit less consistency than they do with the plucking, even directly contradicting aspects of their description in the score. This is particularly noticeable in *Ko Tha* and *Sonata*, thanks to the plurality of resources they mobilize and relatively open descriptions. *Gloucester* is located in an intermediate place, probably because it uses only three types of strokes on the soundboard and *tamboras*; *Espiral* and, above all, *Study*, written by guitarists and therefore in a highly idiomatic and detailed writing, were less susceptible to the creative intervention of the interpreters.

Less specific descriptions (outside the strings) are, in the analyzed corpus, almost completely restricted to the soundboard. In *Gloucester*, despite the intention of determining exact points to strike, the resources necessarily admit certain flexibility, since a) the different soundboards have variable responses to percussion; b) the context of execution within the work often imposes limitations on the movement of the right hand and c) the guitar drawing establishing the percussion points does not present universal proportions (these do not exist). Furthermore, how to strike the soundboard (leaving the hand planted after the attack to muffle resonances and accentuate the percussive character? Removing it immediately to increase the reverberation? Front or side attack, or with some rubbing afterward to prolong the attack?) or with which part of the hand to do it (palm? fingertips? Knuckles? Nails?) are not specified. Something similar occurs in *Ko-Tha,* and in *Sonata*, where the part of the hand with which to tap the soundboard is determined, but which area on the soundboard to do it is not. Even in these works, the descriptions of hand techniques are very basic, leaving many variables to be determined by the interpreter – who is often not sufficiently informed of the possibilities. The

study of this *corpus* and some other works shows that under-describing is a tendency, probably fed by the absence of systematization efforts in the literature.

Percussive Study n. 1, precisely because it aims at undertaking an exploratory enterprise in the percussive universe and has been idiomatically conceived, since the composer is an excellent guitarist himself, presents greater detail of the percussive elements it mobilizes, although some margin of indeterminacy remains: for example, the thumb attack on the soundboard "(...) should generally be carried out over the mouth. There is no specific point to reach, just an indicated area (...) " (KAMPELA, 1990;1993).

It was not possible to ascertain a direct correlation between the details of the descriptions and the "fidelity" of the interpretations. Rather, it seems that it is the idiomatics of writing – we speak of *Spiral* and *Study* – that determines the interpretive constancy, as the very concept of the work revolves around the most efficient way of performing percussive or mixed technical-musical gestures.

Instrument exploration

Percussion on the soundboard exhibited greater variety than in other guitar areas and, therefore, was subdivided (Table 4). Its sound variety can be minimized or maximized according to the musical context (for example, less perceptible among the kaleidoscopic textures and high contrasts of *Study* and more evident when the listener has more time to process the sounds, such as certain passages in the first movement of *Sonata*). The same is valid for the sides – used only briefly in *Study* and extrapolated by performers in some interpretations of *Sonata* and *Gloucester* - and the back of the guitar (which was not observed in the sample).

Table 4 gathers all instrumental areas in this *corpus*, with the different resources used on each:

Instrumental areas per work Survey through scores					
WORK:	*Ko Tha*	*Sonata*	*Espiral*	*Gloucester*	*Study*
Soundboard strokes	X	X	-	X	X
Around the bridge	*	*	-	X	X
Around the soundhole	*	*	-	X	X
Around the fretboard	*	*	-	-	X
Side actions	-	-	-	-	X
Headstock actions	-	X	-	-	-
Tailpiece actions	X	-	-	-	-
String Actions	X	X	X	X	X
Pizz. Bártok	-	x	x	x	x
Tamboras	x	x	-	x	-
Dampened sounds	-	-	x	-	-
Superhigh pitches	-	x	x	-	-
String Buzz	x	-	-	-	-
Play between bridge - tailpiece	x	-	-	-	-
Son Sifflè	-	x	x	-	-
Snap	x	x	-	-	x
Tapping	-	-	x	x	x
Buzz at the fretboard sides	-	-	-	-	x
Actions on the back or arm	-	-	-	-	-

* Not specified

Table 4: Instrumental resources per Work, approached through guitar areas.

Techniques

Except for *Study*, the technical descriptions are quite basic, for example, defining the performance "with the joint", or "with alternating fingers". Detailed descriptions are the exception: for example, playing the strings at the headstock and the *tambora* with closed fist (*chasquido*), rarely with information about the presentation of the hand, its trajectory and contact area, or the precise descriptions of which fingers, and which parts of them, will strike the soundboard (that happens in *Study* only). In most cases, the technique is decisive for the sound result, as is the case with percussion on the soundboard. In some, such as the *snap*, its interference is minimal.

Elements of the technique that can be observed are the body parts (usually the hand) to be used; the kinematics (speed, acceleration, trajectory) of the movement; the characteristics of the contact (instantaneous or prolonged; punctual, linear or superficial; force applied at the moment and after the contact, etc.); the visual characteristics of the gesture. Only the first and, arguably, most important, will be addressed here, as the others could not be properly observed in the sources.

The following table (5) shows the technical survey extracted from the performance instructions of the PRs in the scores:

Techniques per Work Survey through scores						
WORK:		*Ko Tha*	*Sonata*	*Espiral*	*Gloucester*	*Study*
Technique	Details					
On the Strings		X	X	X	X	X
Tamboras or Snaps	Open hand tap	x	x	-	-	-
	Closed fist	*	x	-	-	-
	Thumb	*	x	-	x	x
	Stretched fingers	*	-	-	-	x
Rubs, scratches, pulls	Transversal (crossing, pull to the side of the fretboard)	-	-	-	-	x
	Longitudinal (*son sifflè*)	-	x	x	-	-
Dampenings	Dampened Sounds	-	-	x	-	-
	Superhigh pitches	-	x	x	-	-
Non-conventional *rasgueados*	Percussive *rasgueos* (headstock, between bridge-tailpiece, dampened strings)	x	x	-	-	-
Tapping		-	-	x	-	x
Pizz. Bartók		-	x	x	x	x
Finger/hand percussion**		X	X	-	-	X
	Anterior area of the stretched fingers, from the tip to the middle (alternate or simultaneous fingers)	x	-	-	*	x
	Knuckles	x	x	-	*	-
	Thumb	-	-	-	*	-
Nail percussion**		X	X	-	-	X
	Percussive strikes (soundboard, sides)	x	-	x	-	x
	String buzz	x	-	x	-	-

* Not specified

** Except in the strings

Table 5: Instrumental resources per work, approached through the technique employed

Table 6 summarizes the hand parts observed in this sample. They affect the timbral and dynamic qualities of a PR, as well as technical comfort:

Nails
•Tips, interior, back; Strikes, friction, pressure
Fingertips
Knuckles
Thumb
•Side (bone), laid down
Dorsal side of the hand (dampening)
Closed Wrist
Open palm
•With/without fingers

Table 6: Hand parts in the sample

Sound Result

Considering that the guitar is only one instrument, even its considerable timbre variety has limitations. Moreover, all its sounds are, to one degree or another, "filtered" by its resonance box. As we have seen, that makes the sound of many PRs similar. Even in those cases, however, when these PRs form sequences, the resulting "melodies" are slightly different from what would be obtained by the repetition of a single PR. The micro-variations result in a sensation of variety inside the musical texture, even though it is hard to discern the constituents. That means that, as an ideal rule, and despite different levels of similarity, **there are no perfect equivalencies among PRs.**

Weighted survey of the percussive elements found in the corpus

Below, we present a survey of the PR found in the five works, weighted with base on the sound results to exclude redundancies. Minimal sound variations were dismissed, while more significant ones were included as variations.

1. "Chimes"[72] (play between the bridge and the tailpiece (*Ko Tha*) and at the headstock (*Sonata*))

[72] Names in quotes are invented; in italics, are taken from the literature or are the usual ones.

Produces high pitched sounds similar to chimes, with percussive functions but with a considerable harmonic effect. Intensity and timbre controls are difficult, and care is required because of the high tension of the strings.

Figure 31: Chimes

2. ***Chasquido*** (stroke on the strings with the stretched hand (*Ko Tha*)), *tambora* with a closed fist (*Sonata*), strike strings against the frets (*Study*))

Creates a metallic effect that is very common in many popular music traditions, especially south American, being an integral part of *rasgueado* techniques. The name stems from music of the *La Plata* river area. It is effective only in the basses.

Variations: Closed fist, thumb, *m, a*. The effect of the technique over the sound result is minimal.

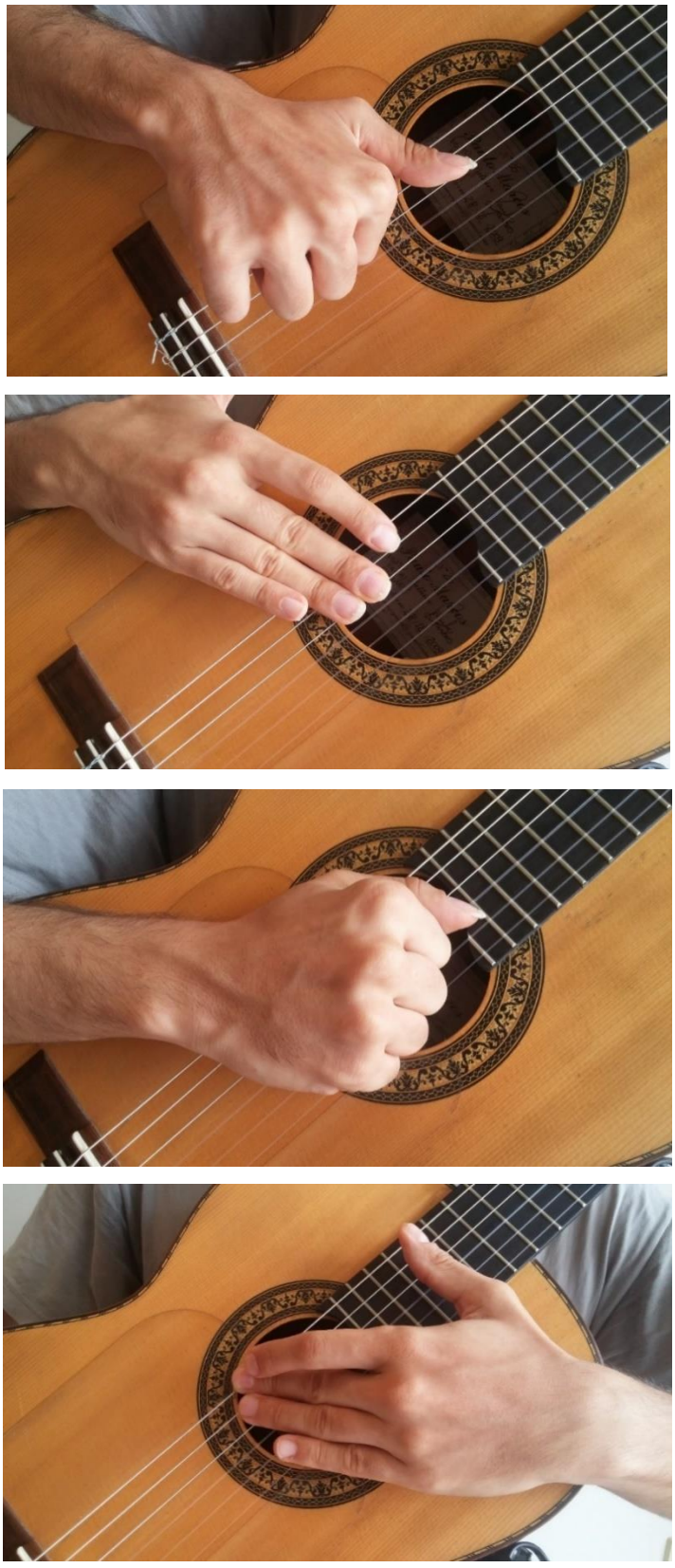


Figure 32: Different *chasquidos*

3. **Soundboard taps** (all except *Espiral*)

Accessible and effective, there is a great variety of possible soundboard taps. In this *corpus*, we observed the following:

With the nails

Require special care, as they can very easily damage the soundboard:

Figure 33: Soundboard tap with the nails.

With the Knuckles

Figure 34: Soundboard tap with the knuckles

With the fingers, close to the bridge

Figure 35: Soundboard tap with the fingers, bridge area.

Soundboard taps close to the fingerboard

Figure 36: Soundboard tap with the fingers (ma - l.h.), fretboard area.

4. Side taps (*Study*)

Has less effectiveness than the ones on the soundboard, but also present some timbral and dynamic ranges along its length (this feature was not explored in the *corpus*).

Figure 37: Finger tap at the side with the nails

5. Dampened Notes (*Espiral, Sonata*):

Very similar to *super-high notes* but executed over the fretboard. Left-hand pressure is diminished, not allowing the string to touch the surface of the frets.

Figure 38: Dampened sounds (strings do not touch the wood)

6. ***Pizz. Bartók*** (*pizz. restallando sobre el diapasón (Espiral), Snap (Gloucester), Pizz. ribatente sulla tastiera (Sonata)*)**:**

Pull and release the string so that it snaps on the fretboard. Very strong inharmonic attack followed by a long and pitched resonance. More effective on the basses.

Figure 39: *Pizzicato Bartók* (r.h. accumulates energy to release the string).

7. ***Son sifflè*** ((*Sonata*)*, gliss.* with the nails of the r.h. (*Espiral*))**:**

This element was introduced in the 1960s (Mauricio Kagel (*Sonata,* 1960), Alvaro Company (*Las Seis Cuerdas,* 1963) and George Crumb (*Songs, Drones and Refrains of Death*, 1968)) (SCHNEIDER, 2015), but BASINSKI (1993) informs us that it is an adaptation of a traditional element of Argentinian *gaucho* music, from which Ginastera would have drawn his inspiration for *Sonata.* In the *corpus*, it was used solely with the r.h.. It functions only in the bases.

Figure 40: *Son Sifflè* (positioning and rub).

8. "Superhigh notes" (*Sonata*, *Espiral*)

Expand the normal range of the guitar above the high B by playing after the last fret. Can be executed in any string, but in the *corpus* it appears only on the trebles. Pitch definition depends on the technique employed (flesh or nails). It is often associated with improvisation and indeterminacy, with a strong percussive character.

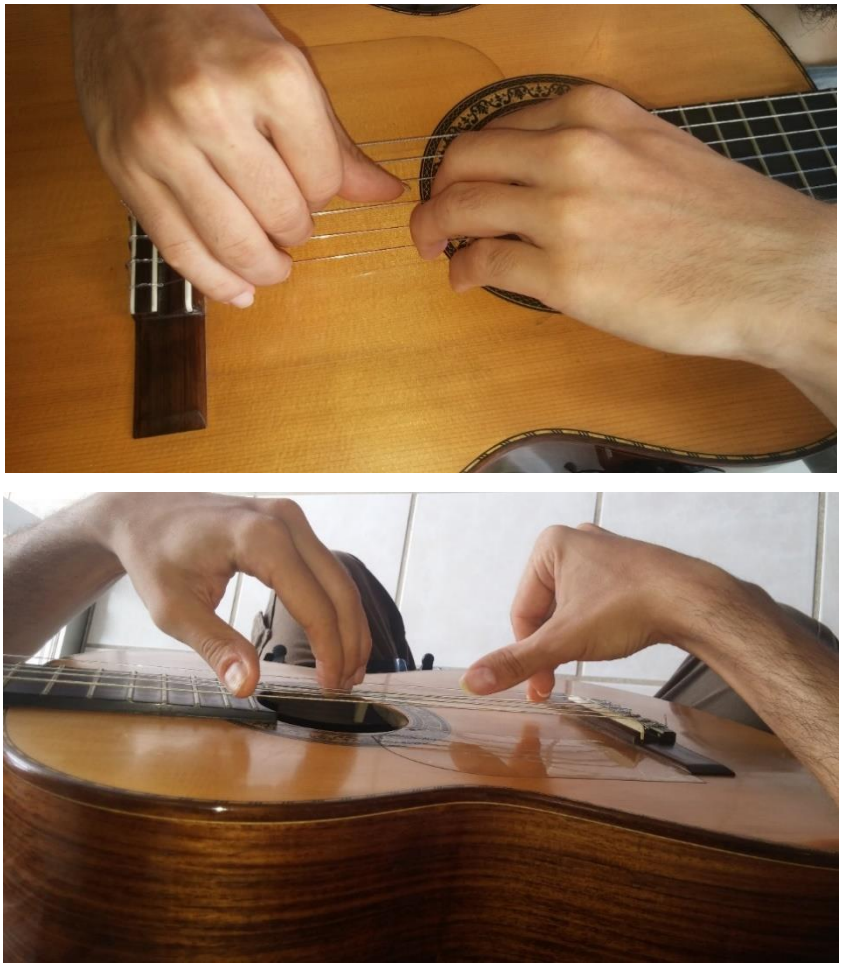


Figure 41: Superhigh notes (frontal and from above)

9. *Tamboras* (*Sonata, Gloucester, Ko Tha*)

Tambora means playing the strings by hitting them with the fingers. They have a large dynamic range (*ppp – ff*).

Variations: Stretched thumb, open hand strike, different strings at a time.

Figure 42: Tamboras

10. **"Percussive Tapping"** ("ligado" (*Study*), sounds forcefully played on the fretboard (*Espiral*)):

A very common technique that reconfigures the functional role of the hands, making both responsible for the energy of activating the string and, at the same time, modulating the pitch. That is achieved by hammering the notes over the fretboard. They can be percussive or not, according to context (in our sample, the most percussive occurrence was in *La Espiral Eterna*).

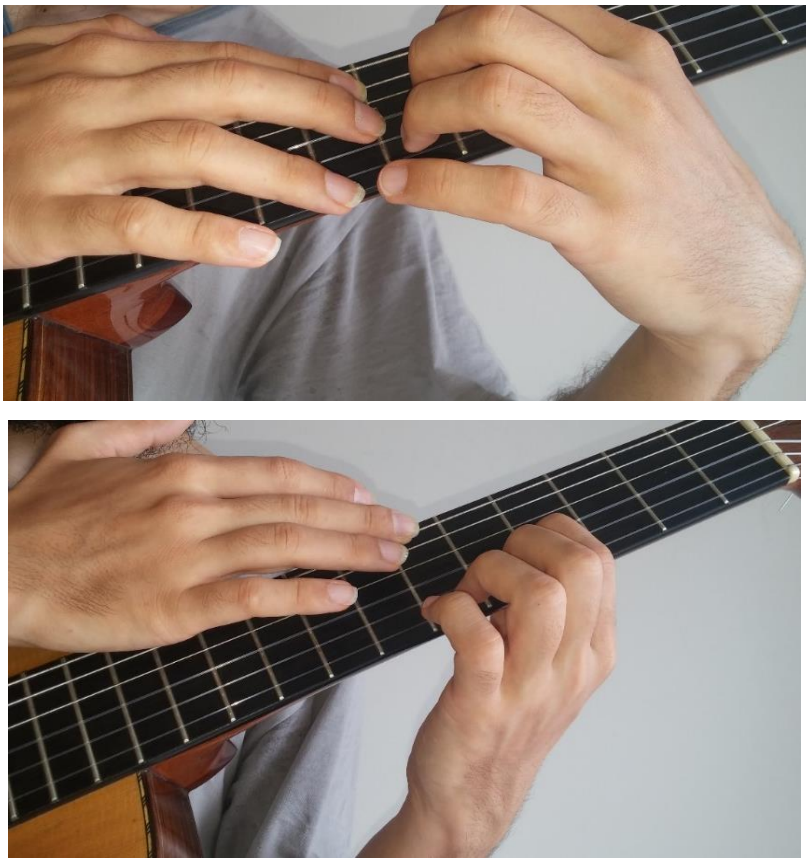


Figure 43: Tapping

11. *"Buzzing"* (*Study*)

Consists of pulling one of the external strings (I,VI) to the side of the fretboard with the l.h., and pluck it with the r.h. to produce a buzz-like sound. It seems to have been introduced in this piece.

Figure 44: "Buzzing" (frontal and from above).

12. ***String buzz*** (*Ko Tha*):

Consists of touching a vibrating string with the back of the nail, producing a buzz. It is hard to control and lasts 4 seconds at most. It is a seldom-used technique.

Figure 45: *String buzz* with the thumb and index finger.

***

SAMPLE ANALYSIS OF 20 WORKS USING THE PACT MODEL

METHODOLOGIC RECAPITULATION

To better understand the entities that constitute the percussive playing (the PRs), which ones were already mobilized in the literature, and how they function in music and technique, we dived into existing sources in CG (contemporary) and FG (Fingerstyle). For practical reasons, we prioritized works for solo guitar and hand-triggered PRs. Three analysts collected data from twenty works (ten contemporary, (1963-2011), and ten Fingerstyle (from 2006-2013)), using scores and recordings as sources. They set out from the PACT model[73] and, therefore, used two main tools: the **FH Code**, for identification and classification of the PRs, and the **Analysis Form** (AF), which delineates all the relevant variables to collect, with their respective values and codes, compiling the information source by source. All the information gathered fed a database and was then statistically analyzed. The Code itself was tested. Artistic research, in the form of improvisation, composition, and performance played a major role in the method.

Note: we used relatively simple descriptive statistics in this chapter. Therefore, considerations such as the ones about "significance" or "distributions" are stastically informed **qualitative appreciations**, rather than being rigorously determined through statistical procedures.

RESULTS

a) Test of the validity of the Code

The test showed strong coherence in results between analysts: the overall score was **92% agreement**. There was a difference between traditions: **83.33% for FG** and **99.2% for CG**.

The results were consistent with those of a pilot comparison between analysis of only three works (15% of the sample) by three analysts.

According to Stemler (2004), "a typical guideline found in the literature for evaluating the quality of interrater reliability based upon consensus estimates is that they should be 70% or greater". Our results are, therefore, safely within the upper margin of acceptable results.

[73] It is good to remember that the model is strongly tributary of the previous exploratory analysis.

B) PR statistical analysis

PR, sound Families

We found **228 different PRs** in the sample. Many are variations of similar PRs; therefore, when approaching the sample through the *Sound Families* (SFs) level[74] , we reduced the number of elements to **100**. Figure 46 shows the number of SF in each work:

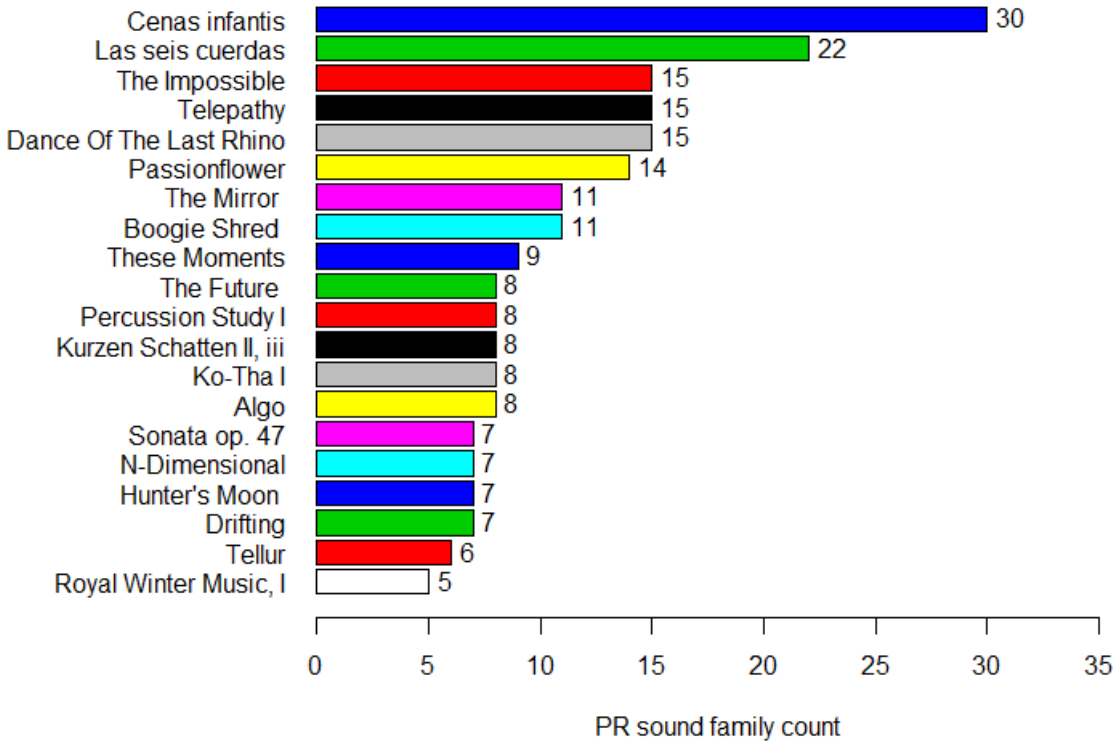


Figure 46: Number of SFs per work (colors are only to improve reading).

The sample exhibited **14 composite PRs (CPRs)** in total, comprising **6.1%** of the total, each having an individual frequency (in relation to the total of 228 RP) of **0.44%.** None of them could be grouped into Families.

FG used **47** different SFs; CG used **70**[75]. Therefore, we have 17 SFs present in both traditions, an intersection that represents 36.2% of the total for FG and 24.3% for CG.

Frequency, *use,* occurrence, distribution, and grouping:

[74] Without any secondary descriptors; therefore: *Guitar area.sub-area/Body part.sub-part action.*
[75] These numbers differ from the sum of the average per work because they exclude the repetition of SF between works – but there are still PRs that happen in both styles.

As mentioned, we measured the occurrence of PRs or Families in the sample through *Frequency* (in how many works the PRs appeared; for SFs, the sum of the Frequency of the PRs that constitute them) and total *Use* (a sum of all the individual *use* scores for a particular PR or SF).

All analyses of data-distribution, whether for PRs, SFs, or even TFs[76], considering frequency or *Use,* exhibited a similar "power-law-like" distribution[77] pattern with some breaks. Figure 47 shows the distribution of SFs according to their Use, highlighting some discontinuities in the curve and its long tail:

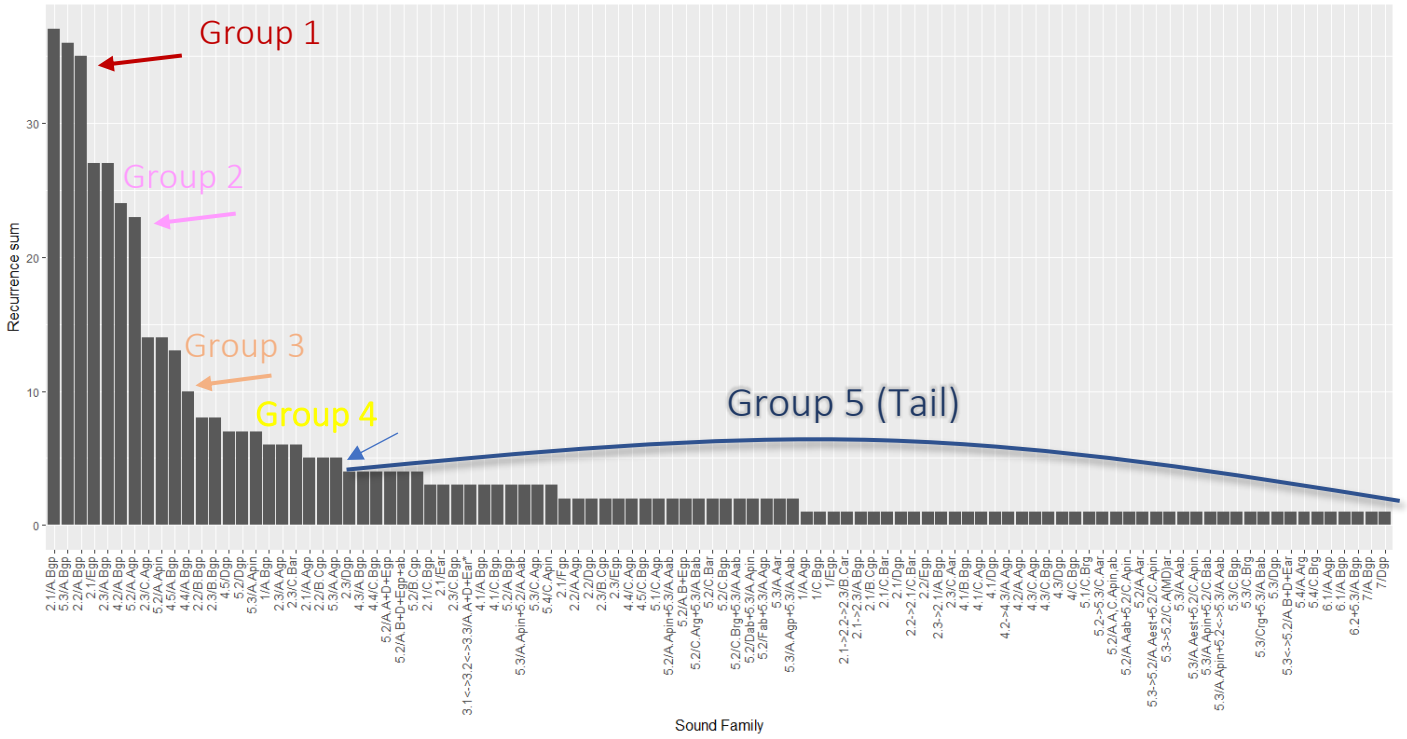


Figure 47: Sum of the Use of the Sound Families and the discontinuity-points used for grouping

Realizing that the data did not follow a smooth decreasing exponential-like curve profile, we were able to organize the SFs in groups, according to their *Use* scores. That was especially effective in the upper score-ranges, as shown by the arrows in Fig. 47.

[76] *Technical families*, which we will not be discussing here.

[77] A power-law can be expressed by the formula $y = ax^k$, where *a* and *k* are constants. That specific function has several interesting properties, the large low-valued tail being one of them, and occurs in a vast number of natural and social phenomena (in fact, the first such relation was used by Italian Vilfredo Pareto to describe land distribution in Italy at the end of the XIX century). It is sometimes referred to as the *80/20 law,* because of the famous statement "80% of the results can be explained by 20% of the causes", which is, despite possible variations in the proportion 80/20, another important feature (and one that we will explore here).

Table 7 brings a detailed description of the data relating to each group down to the beginning of group 5:

Group	Sound Family	Total *Use*	%	Variation to the last value (%)	Average % per SF	Total SFs per group	% of total *use* in the group
GROUP 1	2.1/A.Bgp	37	7,97%		7,76%	3	23,28%
	5.3/A.Bgp	36	7,76%	3%			
	2.2/A.Bgp	35	7,54%	3%			
GROUP 2	2.1/Egp	27	5,82%	23%	5,44%	4	21,77%
	2.3/A.Bgp	27	5,82%	0%			
	4.2/A.Bgp	24	5,17%	11%			
	5.2/A.Agp	23	4,96%	4%			
GROUP 3	2.3/C.Agp	14	3,02%	39%	2,75%	4	10,99%
	5.2/A.Apin	14	3,02%	0%			
	4.5/A.Bgp	13	2,80%	7%			
	4.4/A.Bgp	10	2,16%	23%			
GROUP 4	2.2/B.Bgp	8	1,72%	20%	1,37%	11	15,09%
	2.3/B.Bgp	8	1,72%	0%			
	4.5/Dgp	7	1,51%	13%			
	5.2/Dgp	7	1,51%	0%			
	5.3/A.Apin	7	1,51%	0%			
	1/A.Bgp	6	1,29%	14%			
	2.3/A.Agp	6	1,29%	0%			
	2.3/C.Bar	6	1,29%	0%			
	2.1/A.Agp	5	1,08%	17%			
	2.2/B.Cgp	5	1,08%	0%			
	5.3/A.Agp	5	1,08%	0%			
GROUP 5	2.3/Dgp	4	0,86%	20%	0,37%	78	28,88%
	4.3/A.Bgp	4	0,86%	0%			
	4.4/C.Bgp	4	0,86%	0%			
	5.2/A.A+D+Egp	4	0,86%	0%			
	5.2/A.B+D+Egp+ab	4	0,86%	0%			
	5.2/B.Cgp	4	0,86%	0%			
	2.1/C.Bgp	3	0,65%	25%			

Table 7: Groups I-IV, the beginning of Group V, and the SFs that they comprise with their respective Use scores, also showing averages and Group statistics. In red, variation scores fit for separating the groups (>19%).

We established a threshold of 20% variation between two adjacent SFs as criteria for dividing the groups. In the case of Group 3, we avoided two successive divisions and decided to include SF **4.4/A.Bgp** because of its similarity with the preceding SF and its differences to the following, which open Group 4 and are also similar. We left group 5 as the tail of our distribution, beginning with score value 4 (the next 20% score jump in the distribution) and going all the way to the long line of SFs with score 1. Table 7shows the resulting groups.

PRs disaggregation

The following charts explore, one by one, some of the constituent vectors of the PRs: guitar area, technique, and their subdivisions and secondary descriptors.

Percussive playing is concentrated in three **areas of the guitar**: soundboard (2), strings (5), and the sides (4). Areas 2 and 5 greatly prevail, the former approx. 34% higher than the latter. Area 4 appears with approximately half the score of area 5. The mobilization of the other areas is but an eventuality, as shown in Figure 48:

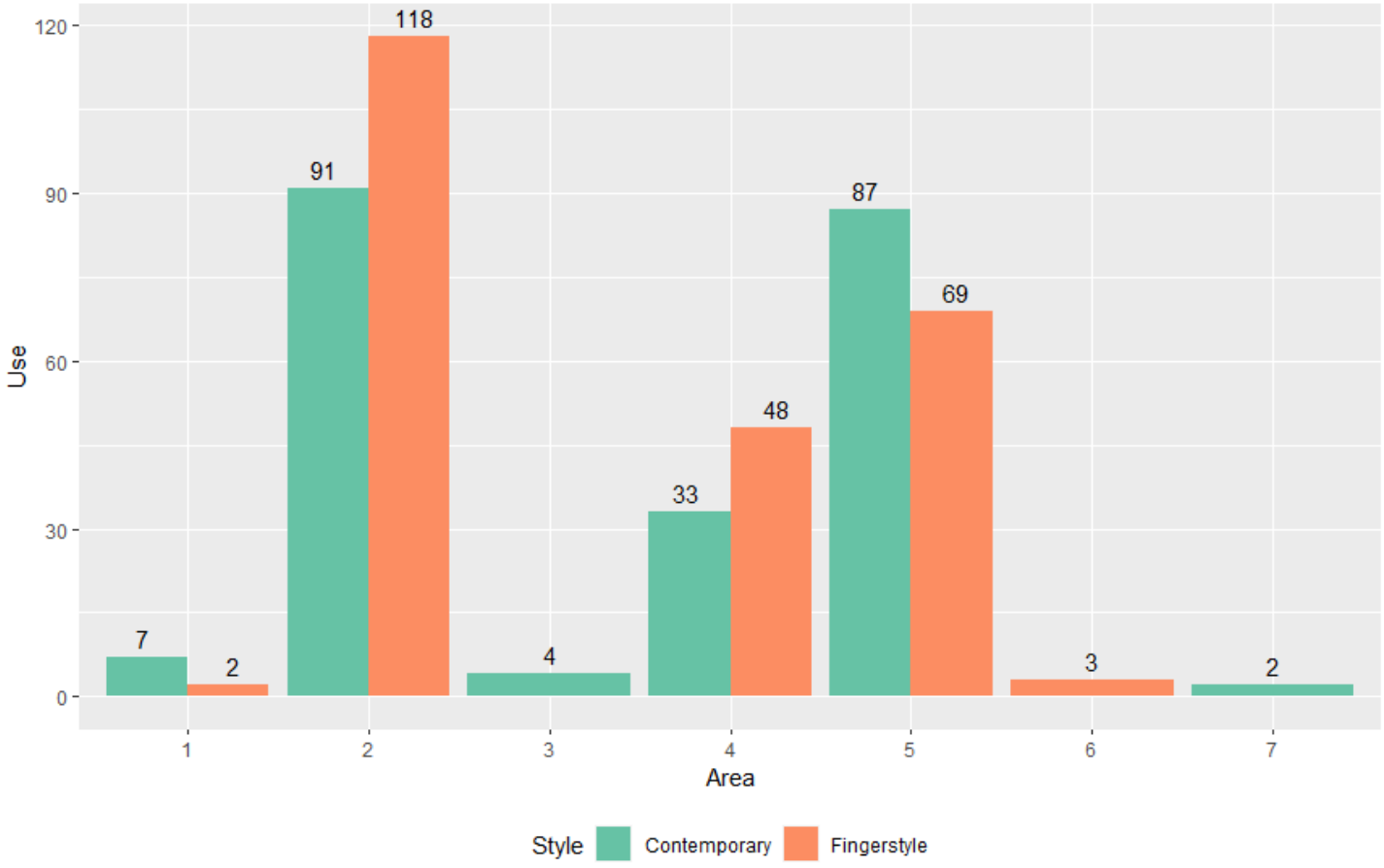


Figure 48: *Use* of guitar areas

As for the **body parts**, the concentration is even higher: the flesh of the fingers (A) alone responds for about 60% of all percussion in the guitar. The nails (C) participate also in a significant number of PRs (*circa* 19%), while the use of the elbow (F) is only residual, as we see in Figure 49:

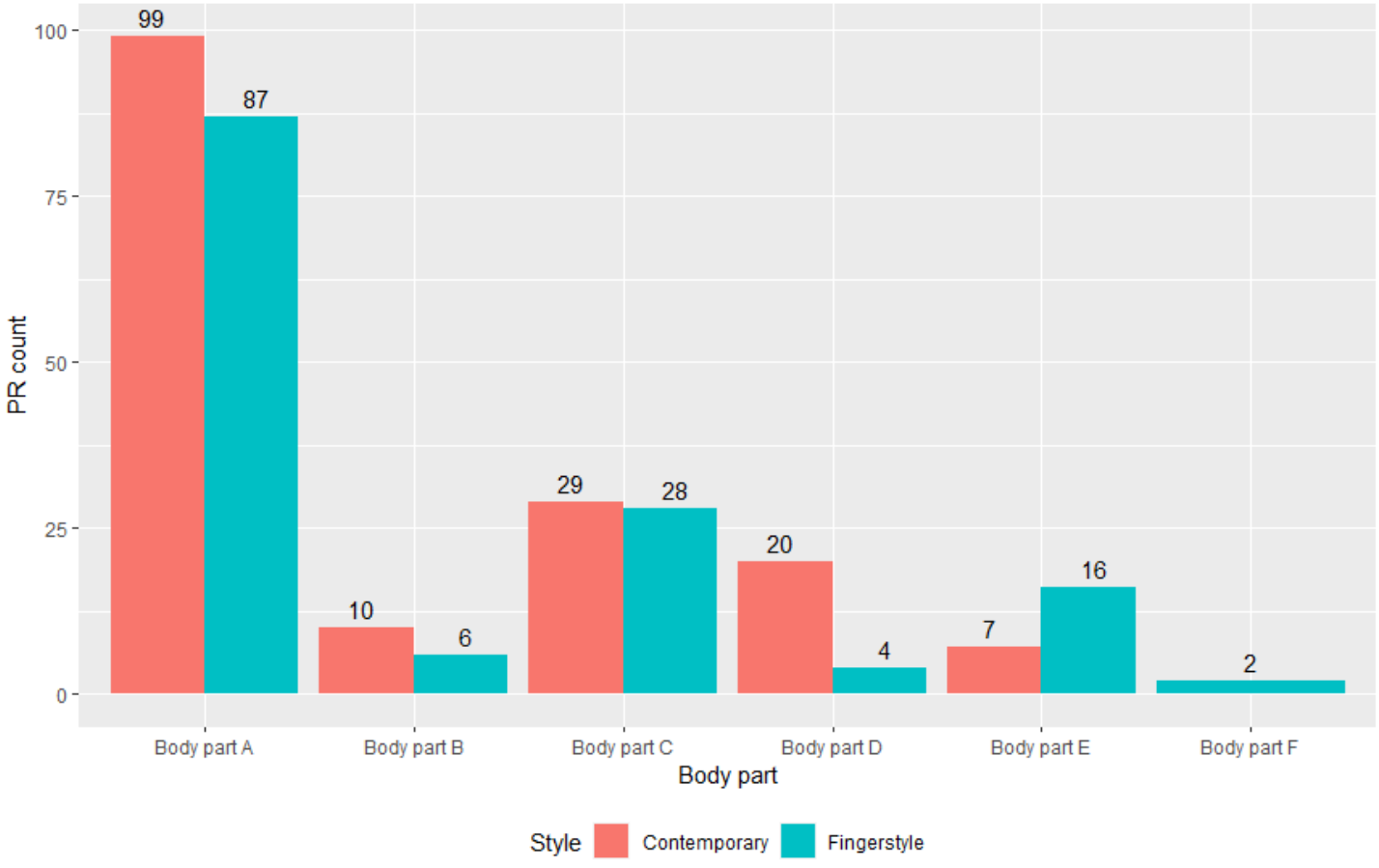


Figure 49: PR Count per body parts

As expected, taps (*golpes,* GP) are predominant when it comes to **actions**, but data shows that this prevalence is dramatic, reaching approx. **77%** of the total actions. Sliding/rubbing (AR), plucking (PIN), and dumping (AB) all participate with scores of 8% or less, but the scores of strumming (RG) and especially pulling (EST) are all but negligible, as shown in Figure 50:

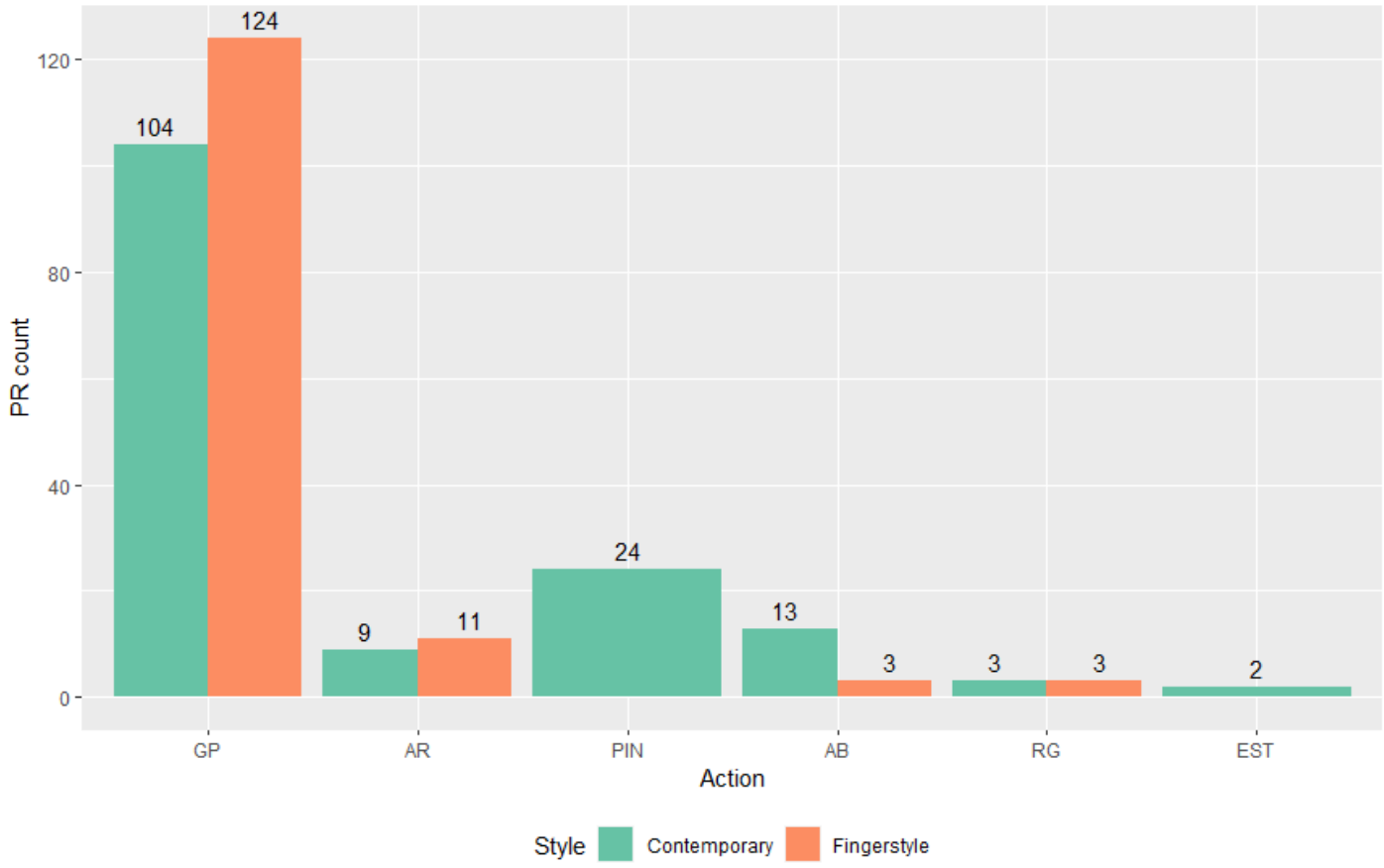


Figure 50: PR Count per actions

Figure 51 shows the interaction between **Guitar Areas and Body Parts**. The prevalence of areas 2, 5, and 4, and body part A, is still clear. The chart also shows that, predictably, the most mobilized areas favor a higher diversity of techniques. Body part A is present in all areas, but interestingly, body part D is also very dispersed trough the guitar body (except in area 6). Contribution of other body parts is especially significant in area 2, in which their sum almost reaches the score of body part A:

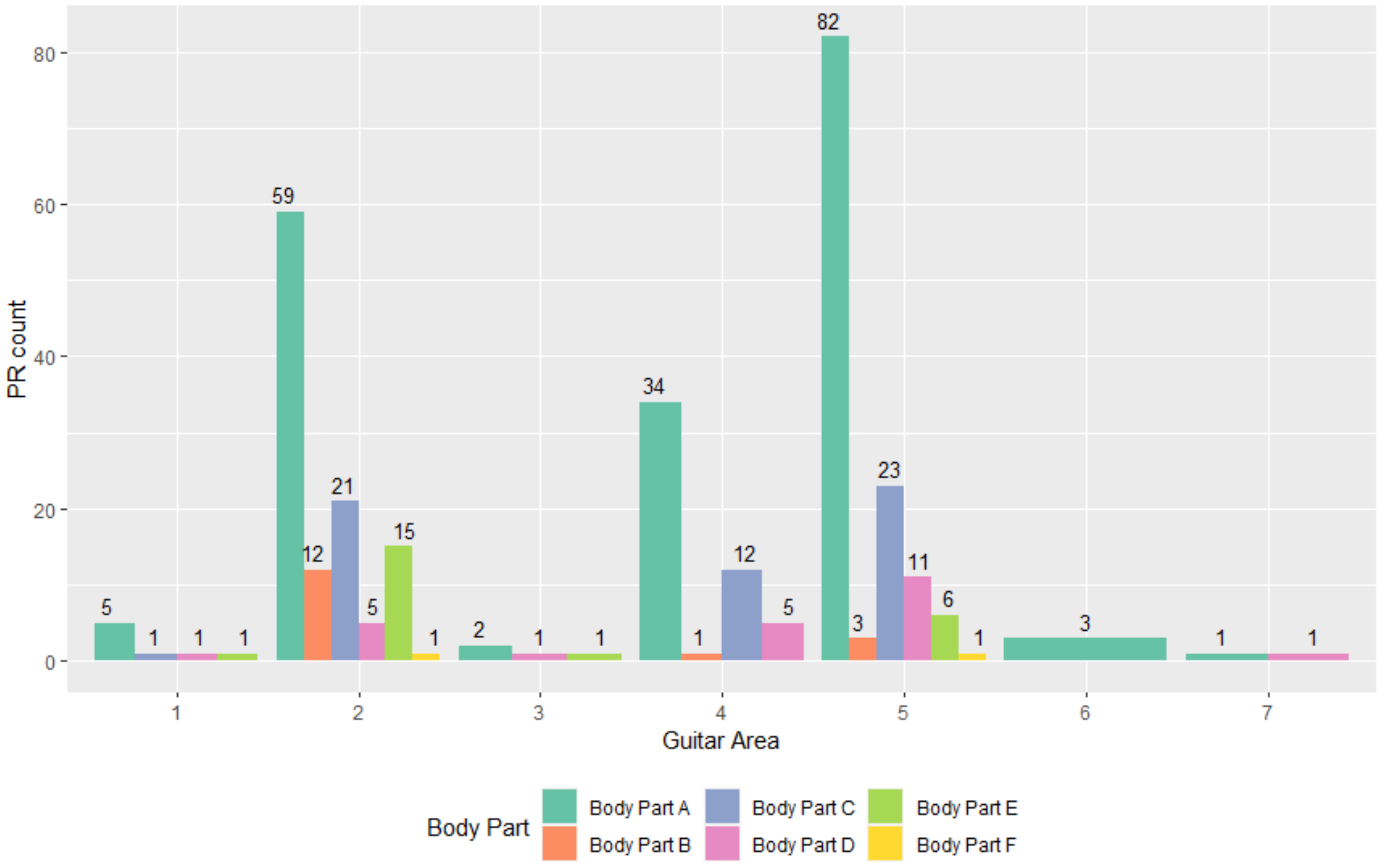


Figure 51: PR count of Body Parts per Guitar Area

The disaggregation of the previous chart in **area subdivisions** is shown in Figure 52. It specifies that areas 2.1, 2.3, and 5.2 are particularly "colorful", that is, interact with more body parts and more often. The first two have more than 50% of their scores distributed among body parts other than A; specifically, itis worth noting the strong presence of body parts E (2.1) and C (2.3). Areas 4.1, 4.2, and 4.4 display similar behaviours, but with less variety. In area 5.2, part A is dominant, but the contribution of other parts is still significant (40%). On the other hand, body part A still strongly dominates areas 2.2 and 5.3, both with high overall scores.

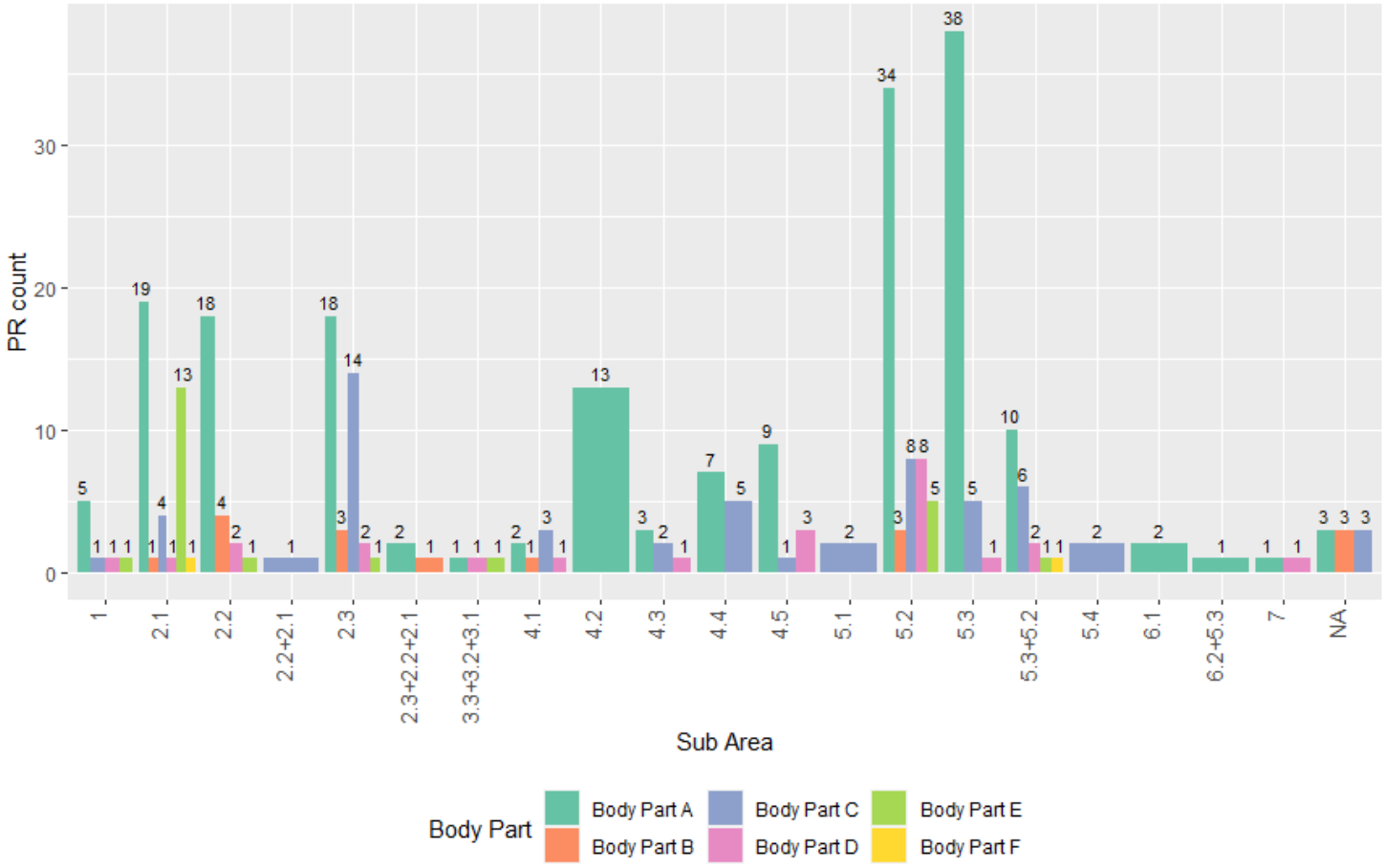


Figure 52: PR Count of Body Parts per subdivided guitar areas

In Figure 53, we can see the PR scores for **Actions in each guitar area**. GP predominates in all of them except for the very low-scored area 3. While that is especially true for area 4 (100%), in area 5 there are important contributions from other actions. It is interesting to notice that only this area mobilizes any significant diversity of actions.

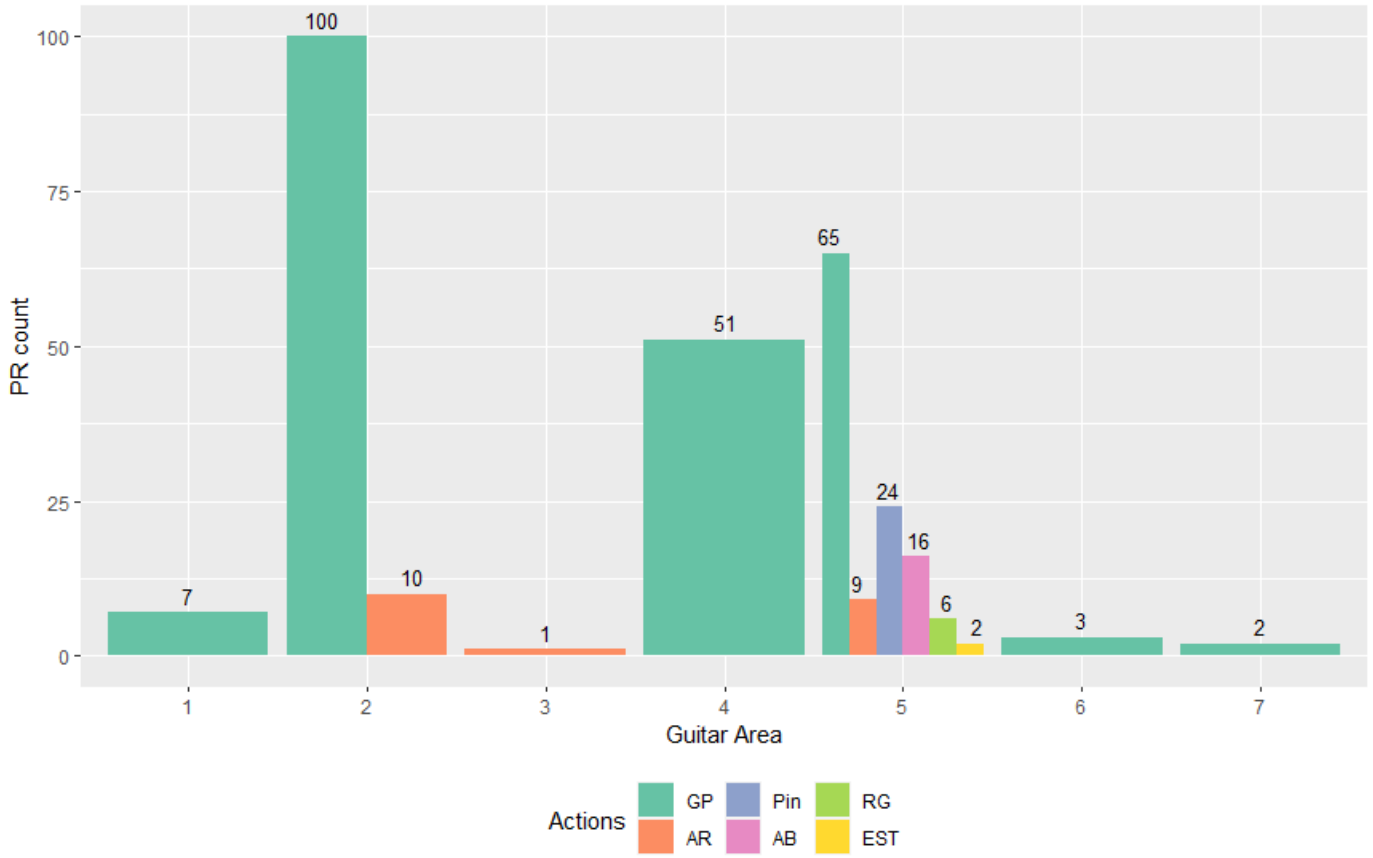


Figure 53: PR Count of actions per guitar area

Hand Use

Table 8 shows the distribution of activity between hands in each tradition, considering *PR Count* and *Use*. The prevalence of the right hand is unequivocal: for each event with the left hand, we have an average of 3.6 with the right hand (considering *use*). There is no expressive difference between PR Count and Use in general, but when we separate by style we observe that there is an increase in left-hand Use scores, not too relevant for CG (6%) but perhaps important for FG (13%). We can see that CG tends to use the left hand between 57%-66% more than FG.

Style	Hand	Freq.	Relative Freq. /Style	Relative Freq. /Total
PR COUNT				
Contemporary	Right hand	115	72.78%	0.38
	Left hand	43	27.22%	0.14
Fingerstyle	Right hand	122	83.56%	0.40
	Left hand	24	16.44%	0.08
TOTAL:	R.H. - 77,96% x 22,04% - L.H.			
USE				
Contemporary	Right hand	173	71.19%	0.36
	Left hand	70	28.81%	0.14
Fingerstyle	Right hand	199	81.56%	0.41
	Left hand	45	18.44%	0.09
TOTAL:	R.H. - 76,39% x 23,61% - L.H.			

Table 8: Hand activation by PR Count and Use

DISCUSSION

FH Code validity Test

The observable style-related discrepancy in precision is probably due to the different nature of the sources. Four factors generate inconsistency in video analysis: the generally larger amount of information to deal with, the imprecision of some recordings (insufficient video resolution or bad camera angles), PRs executed at the border between guitar areas, and differences in the anatomy of the instruments (relating to the figures used as bases for the Code). On the other hand, score instructions, however unspecific, generally do not produce conflicting interpretations.

We believe the results show an overall strong analytic situation, and in the closing remarks, we present some ideas to further diminish the error margin in FG.

Statistics

The use of *Families* was able to cut in approximately half the number of entities we had to work with, which is good for artistic purposes but still insufficient, as it still leaves us with 100 ***sound families***. Nevertheless, their distribution is very heterogeneous, the vast majority (78%) being responsible for only 28.88% of total percussive *use*.

For the consolidation of percussive guitar *praxis*, it is perhaps more useful to focus on the most common phenomena. For that, we should choose the optimal grouping, which we can measure through the **average use per element (UE)**.

A first possibility would be grouping the 11 SFs inhabiting SF Groups 1-3, which account for only **11%** of the total but approx. **57%** of total use, **5.18% UE**.

To increase the covered use, we could consider a second solution, the ulterior inclusion of Group 4, which would result in **22 elements (22% of the total)**, encompassing now **72%** of all percussion on the sample, **3.72% UE**.

However, this inclusion must be qualified: to begin with, an analysis of the nature of the high-scored SF (groups 1-4) shows that some are still sufficiently similar between them, and similar even to some less used SFs, to justify being further grouped. Thus, 2.1/A.Bgp, 2.2/A.Bgp and 2.3/A.Bgp all belong to the bigger **2/A.Bgp** family, a single entity that describes different finger strikes on the soundboard. This entity alone is responsible for **21.33%** of total percussive use. We can also group SF 4.2/A.Bgp, 4.4/A.Bgp and 4.5/A.Bgp together into the **4/A.Bgp** family, describing taps with the flesh of the fingers on the sides. Surprisingly, its score goes up to **10.13%** of total use, making it the second most frequent entity in the sample, and ahead of families played in area 5. Producing chords with a strike on the strings, the classical *tambora*, brings SF 5.2/A.Bgp, 5.2/Dgp, and 5.2/A.B+D+E together. Despite their individually low scores, together they reach 3.23% use. Moreover, they are closely linked to **5.2/A.Agp,** a similar movement used to produce *snaps* and *slaps,* which is individually very significative (4,96%). The resulting **5.2/gp** family adds up to **8,19%** use. Special care should be taken with SF **2.1/Egp**. Besides its relatively high *use* score (5,82%, group 2), this right-hand-only SF presents a particularity: while it is not used at all in CG, it comprises around 11% of total use in FG, being the most widely used SF in that tradition. Its general family, **2/Egp**, including strikes in areas 2.2 and 2.3 as well, presents a slightly higher score: **6.47%.** Similarly, all strikes with the knuckles on the soundboard (General Family **2/Bgp**[78]) account for considerable **5.17%.** We are left with 2 still significant elements from group 3: **5.2/A.Apin** and **2.3/C.Agp**, with scores of **3,02%** each. After this last grouping, the remaining not-grouped elements in Group 4 all have scores of only 1,51% or lower that do justify their presence in the main group. All these operations

[78] Interestingly, most of the time, this family is requested precisely with this level of specificity in the scores.

leave us with a reduced number of **eight elements** with high descriptive power (**65.09% of total *Use***) of percussive guitar, **8.14% UE.**

Despite having a good UE relation, the first grouping (Groups 1-3) covers only 57% of Use. The second grouping offers a broader coverage (72%), but the UE relation (3.72%) is poor. The final grouping has an intermediary Use coverage (around 65%) but offers a much better UE (8.14%), and was, therefore, chosen as our optimal grouping. Achieving a **96.4%** reduction in the original number of elements (228), this *Main Group* comprises the following **eight entities**:

Family	Use	Short Description
2/A.Bgp	21,33%	Strikes on the soundboard with the flesh of the fingers, low to mid-range, woodblock-like sound
4/A.Bgp	10,13%	Strikes on the side with the flesh of the fingers, mid to high-range, woodblock-like sound
5.2/gp	8,19%	Slaps on the strings. They include: *Snap*, a strike with the fingers at the strings so that they hit the frets, producing a metallic high-end sound; slaps; *tamboras*.
5.3/A.Bgp	7,76%	Strikes on the fretboard area of the strings with the flesh of the fingers (mostly tap-Harmonics and percussive bass lines, plus eventual *snaps*).
2/Egp	6,47%	Strikes with the fleshy area of the wrist on the soundboard, with kick drum function.
2/Bgp	5,17%	Strikes with the knuckles on the soundboard. Similar to 2/A.Bgp but with a slightly higher technical cost and a more focused woodblock-like sound.
5.2/A.Apin	3,02%	*Pizz. Bartók*
2.3/C.Agp	3,02%	Strikes with the nails of the right hand on the higher-pitched area of the soundboard.

Table 9: Main Group

Discussion on individual figures

The predominance of certain guitar areas, body parts, and actions was, to an extent, expected, but some values were surprising.

The highest valued in our sample, Area 2 is the most traditional for percussion on the guitar. That is so because of its extended easily accessible area, loud sound response, and tonal variety. Next come the strings, also not surprising considering the original function of the instrument and the technique guitarists already possess. The use of the sides (area 4) is usually some kind of tonal variation for area 2, but it can also be used for technical relief. Area 3, while presenting good overall sound performance, suffers from reduced accessibility. Areas 6 and 7 exhibit low sound power and variety, and access problems: area 7 is overall poorly accessible and both are difficult to reach with the right hand, the main percussive agent. The particularly low use of the

bridge (area 1) was not expected, given its power and distinct tonal color. A possible explanation is that, because of its size and shape, it requires greater technical precision and offers little room for actions other than striking.

The fingers (A.A and A.B) are the most used body parts, because of their familiarity to guitarists, and because they tend to project themselves ahead when a strike with the hand is intended: they offer a more focused sound than the whole hand and more technical precision. The low exploration of the remaining body parts can be partially explained by the lack of technical expertise from the guitarists, who are used to employing only the fingers in playing, but also by characteristics of the body parts themselves: their muffled or unfocused sound (E and D), their hardness and the consequent fear of damaging the instrument (B), and their clumsiness (F).

The extreme predominance of action GP occurs for several reasons. To begin with, it is the easiest way to produce sounds of a percussive nature[79]. The fact that the other actions have a higher technical cost and tend to produce more subtle sounds also helps to explain their low usage. Moreover, some actions are auxiliary, not producing sounds by themselves (AB, EST). A fourth factor is that percussive guitar is largely influenced by traditional guitar technique, and the code was accordingly developed with some string-focused descriptors (PIN, RG, EST; sometimes even AR and AB), with reduced usage elsewhere. Fifth, PIN and RG are still rarely used to produce strictly percussive sounds – the literature seems reluctant to abandon traditional syntaxes, even in CG. Considering technique as a whole (body parts and actions), only in area 2 do we observe a real diversity: despite the apparent variety in the strings (area 5), area 2 is associated with the bigger share of different body parts and actions. In the strings, the different body parts (especially B, D, and E) produce little real sound effect and the diversity of actions come in part from the structure of the code; all of that derives from the training of musicians – technique, theory and traditional tonal-modal syntax. Finally, a hypothesis for the relatively big dispersion of area D through the guitar is an anatomic one: as it occupies the biggest area of the hand, it tends to participate more.

[79] The *golpe* (2/A.Bgp, see chapter 4), essentially a not too elaborated strike (generally associated with area 2), is the most traditional percussive element in guitar playing.

Hand Use

The positioning of the right hand just above the soundboard makes it perfect for interacting with this most resonating part of the instrument. The left hand has more limited access to it; the areas within its best range (4.5, 6, and 7) are of diminished sound potential. That makes the prevalent use of the r.h. predictable, but the proportion (3.6/1) is still surprising: informal enquires among expert players showed that the average expectation for the distribution of action between hands was approx. 1.5 (r.h.)/1 (l.h.). We believe that is a consequence of the mentioned inclination of the literature towards traditional melodic and harmonic concepts, prioritizing the definite pitches produced on the strings. That requires, of course, pitch manipulation, for which the left hand is mostly responsible. That also explains the higher left-hand score in CG, since this tradition characterizes itself partly by syntax innovations, while FG is 100% tonal-modal.

The approx. 13% increase in Left-Hand scores for FG when Use instead of PR Count is accounted for seems to indicate that when the less frequent left-hand movements are requested, they are on average more used than their right-hand counterparts are. A possible explanation is that, considering FG musical characteristics, the left hand participates only in carefully developed sequences of idiomatic movements (generally forming some kind of repetitive pattern).

Style prediction through PR analysis

The coincidence of SFs between styles is relatively small. Besides, data shows that some especially important PRs are Style-specific (for example, 2.1/Egp for FG and 5.2/A.Apin for CG). This strongly suggests that each tradition could be accurately predicted by the PRs it uses. It also raises the question of whether that would remain valid for other guitar musical genres.

Unexplored potential

If assessing the more frequent phenomena is useful for the didactics of percussive playing, for artistic purposes it is sometimes also – if not more – important to focus on the peculiar, the extraordinary. With that in mind, and briefly deviating from our mainly descriptive purposes in this analysis, we would like to present some directions for the further exploration of the percussive capabilities of the instrument:

- Guitar Areas: **Area 1** offers a very accessible technical position, a large dynamic range, and a very distinct tone. It is not capable of interacting with many different hand parts and actions, but it could be an effective technical and tonal alternative for 2.1/Egp and area 2 in general. **Area 3** is normally difficult to reach, but artistic research[80] showed that its use is possible and facilitated using ergonomic supports of various kinds; it offers relatively high sound power and tone variety. **Area 6** is of little dynamic range, but it offers some distinct tone colors and is more accessible to the left hand[81]. Finally, **area 7** can be useful as an alternative in technical "emergencies" and particular dispositions of the hands; it further broadens, albeit discreetly, the timbral range of the instrument.
- Body Parts: we would like to stress the potential of **hand parts B and D**. Despite claims by respectable experts such as Jon Gomm, artistic research has shown that, at least for the classical guitar[82], area B can be safely applied, even in area 2, without damaging the instrument. It offers tone variety and a more focused sound. Area D has potential for more elaborate techniques, using its natural concavity to form inner air spaces that boost the attacks.
- Actions and syntax: A more favorable balance between percussion and melody/harmony, as seen, for example, in *Ko Tha*, could elicit a diversity of hand actions, resulting in tonal, dynamic, and durational variety, and at the same time freeing the left hand. As of now, such developments are incipient.
- Composite and simultaneous PRs: both allow for tonal diversification and manipulation of other musical parameters (such as duration, intensity, etc.). So far, they are only rarely used with these purposes in the literature.
- Amplification: it has been used in the literature to overcome problems of low sound power, especially with the jazzy effect of scratching the soundboard with the nails (2/C.Bar) or hand area E[83]. It is conceivable that they could also empower guitar areas 6-7, hand parts other

[80] Namely, the pieces *As Entranhas da Terra* and Cenas Infantis. Some literature, like Arthur Kampela's *Motets* for two guitars, also has extensively explored this area.
[81] See, for example, Thiago Colombo's interesting solutions in *La Toqueteada* (described in Chapter 4 under "Thiago's Slap"), or the more extensive exploration made by Thiago Diniz in "*Escutorium*" (see chapter 3).
[82] The more extensive tests, over 10 years, were made in a traditional classical guitar with a spruce soundboard. Many luthiers seem to believe that even a double top guitar can stand a strike with D part; the more focused B part exerts a more intense pressure in the impact point and is, as of yet, still unadvisable in guitars with double tops and lattice designs, despite promising early tests with a nomex double-top soundboard – for an extended discussion on the matter, see chapter 4.
[83] We are thankful to Mr. Aleksander Misko, Mr. Mike Dawes and Mr. Petteri Sariola for their inputs on this aspect of percussive playing.

than E and actions (for example, evidencing the difference in muffled or open percussive sounds (action AB)).

CONCLUSION

Our diagnosis is that this analysis established and successfully tested concepts and methods (PACT model) for differentiating percussive techniques and analyzing the repertoire. That made it possible to scan a larger extract of percussive guitar literature than otherwise, showing a broad diversity of possibilities and nuance, but at the same time suggesting that percussive playing is highly concentrated in relatively few types of occurrences. We identified these occurrences through sequential grouping operations, considering statistic data and the technical nature of the PRs involved – in that respect, artistic practice was fundamental. We also disaggregated the data for the areas of the instrument, parts of the hand, player actions, and left/right hands, showing strong prevalences that describe percussive playing and hint at a possible conservative functionality of the hands in the literature, while also offering some possible explanations. In this process, it became clear that not only discursive (syntactical) differences characterize the two music genres analyzed, but also which PR they mobilize (technical, morphological differences), and in which frequency (statistical difference). Finally, we offered some insights into possible directions for further musical developments.

We would like to stress that the fact that we can describe 65.09% of percussive playing with only eight entities could have significant implications for didactics, institutionalization, and dissemination of percussive playing. That does not mean that we should dismiss PRs with a low occurrence, however. They have the power of totally re-orienting the flavor of a musical piece and at the same time convey freshness and originality. Moreover, nuance remains an important feature in the percussive guitar, easing technical stress, enlarging tonal variety, and ascribing individuality to the performances; this irremediably links this practice with exploration and creativity, warning us to make sensible use of statistical reductionisms.

As future perspectives, we can signal the development of pedagogic material based on hard evidence; the further development of the database (sample expansion, quality of data collection); refinement of criteria and concepts through in-depth case studies; direct application of the results in artistic practice and research; subsides for notational systems and guitar construction; and cluster analysis to combine a broader range of variables into unified

results. More immediately, we intend to present the results of the analysis of the other variables collected in the AF soon.

***

CHAPTER 3

CREATIVE PRACTICES

In this chapter, I will report the artistic products generated in the context of this research. A comprehensive overview is provided, with basic information about each item. The main content of the chapter, however, is to be found on the scores and recordings themselves. That notwithstanding, I have selected a few of them for an in-depth inquire that illustrates the many artistic processes carried out.

I have worked in an authentic *tocautorial* way, like a "deprofessionalized" composer and interpreter, merging those practices not only in myself but in *themselves* as well. I used the input of the analytical research to conduct a "mongrel" practice, similar to what happens in improvisation – where it is hard to separate composition from performance – but in a different, more time-dilated[84] way.

The many practices I and my partners conducted can be summarized in five categories: Performance, Adaptation/transcription, Composition, Collaboration, and Improvisation.

The products related to this chapter are many scores (compositions and transcriptions), performances, and recordings. The recordings comprise a four-year timespan including many different situations, but I would like to highlight the two recitals created exclusively for the research, *Final Concert* (2020) of my doctoral degree and *Isto não é um violão*[85] (2017).

All the recordings are made available in the text via links (blue underlined text).

[84] Improvisation occurs in real-time, and that is not a defining characteristic of my *tocautoria.*
[85] That is not a guitar

PERFORMANCE:

I have extensively practiced percussive playing, and most of that practice could be categorized here, since I performed the compositions and improvisations, etc. For the sake of organization, however, I will discuss in this entry only with pieces from the repertoire, that is, the ones that were not created, transcribed or adapted in the research, and will leave improvisation for a specific topic as well.

Table 9 shows a complete list of the more representative percussive works played over the course of the research, including compositions, transcriptions, and adaptations:

Rock Study n. 7 (Bill Douglas/Michael Udow) ***(2017)***	*(Arthur Kampela)* ***(2017)***
Sonata op. 47 *(Alberto Ginastera)* ***(2016/2017)***	***Drifting*** *(Andy Mckee)* ***(2018)***
Escutorium *(Thiago Diniz)* ***(2017)***	***Eclusas*** *(Silvio Ferraz)* ***(2018)***
Quantos violonistas são necessários para desconcertar um piano? *(Cristiano Braga, Matthias Koole, and Stanley Levi)* ***(2017)***	***Hunter's Moon*** *(Andy Mckee)* ***(2019)***
As Entranhas da Terra *(Stanley Levi)* ***(2017)***	***Boogie Shred*** *(Mike Dawes)* ***(2020)***
Comunhão *(Stanley Levi)* ***(2017)***	***Ko-Tha: 3 dances of Shiva (II Movement)*** *(Giacinto Scelsi)* ***(2020)***
Percussive Study I	***Percussive Study II*** *(Arthur Kampela)* ***(2020)***

Table 10: Selection of significant percussive works from the repertoire played in the research, with their year of performance.

SONATA OP. 47 (A. GINASTERA)

This work presents significant use of PR in all movements except the third. I tried to consciously apply an informed approach to them, testing several timbres for the *tamboras* and soundboard taps of the

first movement. In the second movement, besides again employing several timbres for the tappings on the wood, I expanded the improvisation in *super-high notes* to create a whole new percussive section in the piece (see "Improvisation" ahead). I could find no space (or need) to extrapolate the score in the last movement.

PERCUSSIVE STUDY I (A. KAMPELA)

This piece presents many challenges: the rapid alternation of TG, the technical virtuosity, the fragmented textures, the complex musical discourse. None is as challenging as the rhythmic writing, however. That aspect is abundantly discussed in the corresponding literature, so I will only comment that it required extended preparation time and a minute approach. Those conditions fulfilled, the rhythm is executable with a relatively high degree of exactitude (considering normal musical standards). It was necessary, however, to submit my percussive technique to an adaptation process to reach the required level of precision. TG Integration is normally idiomatic and does not interfere with rhythm, but for occasional passages (in which adaptations such as changing the suggested fingerings were used).

I opted for an interpretation that highlighted the strong contrasts, enlarging some pauses to create a dramatic effect and taking timbre and dynamics to the limits of the instrument (and mine). I also pursued taking advantage of the few opportunities for a less frantic musical result, such as the end of the first page, as the piece rarely allows long sustained notes and gives the listener no rest.

Technical demands are much higher for the TG *punteado* than for the percussion.

KO-THA: 3 DANCES OF SHIVA - II MOVEMENT (G. SCELSI)

This work revealed itself much more difficult than expected. That was so partly due to my choice of a detailed timbral and technical exploration, which resulted in many sequences of movements and deployment of body parts with which I was not familiar, and whose motor memorization was surprisingly difficult. The piece was studied during different periods, with pauses of some months between them. Coming back to it was always difficult, mostly because of the mentioned problems. After a while, the idea of **using the FH Code** to help to memorize my own interpretation appeared almost spontaneously. It enabled notating the movements of arm-hand-fingers very specifically (Fig. 54), eliminating the mnemonic problems between and within study periods.

As this piece is almost exclusively percussive and therefore constitutes a major process of acquiring a specific technique for that on the guitar, I expressly proposed myself to learn it only with optimal movements, physically idiomatic, even when I had some other skills ready that could handle the situations at hand. That, however, proved to come at a high cost, worsening the problem of memorization as it required a bigger number of different movements.

Differently from *Percussive Studies*, this piece presents no major difficulties with rhythmic reading, but in agogic and, especially, in its complex networks of accents, dynamic levels, *crescendi,* and *decrescendi.*

It took me a long time to be able to play long sections of the movement, delaying the process of acquiring an overall feeling. Because of the 2019-2020 pandemic, I was not able to play this piece live. Playing in concerts is what generally helps me achieving a definite level of performance in any piece, and so far recording videos has been a poor replacement for it. Nevertheless, I could feel a sensible evolution in my percussive technique, mental ability to memorize percussive patterns, and hearing of PRs, thanks to the process of learning *Ko-Tha.*

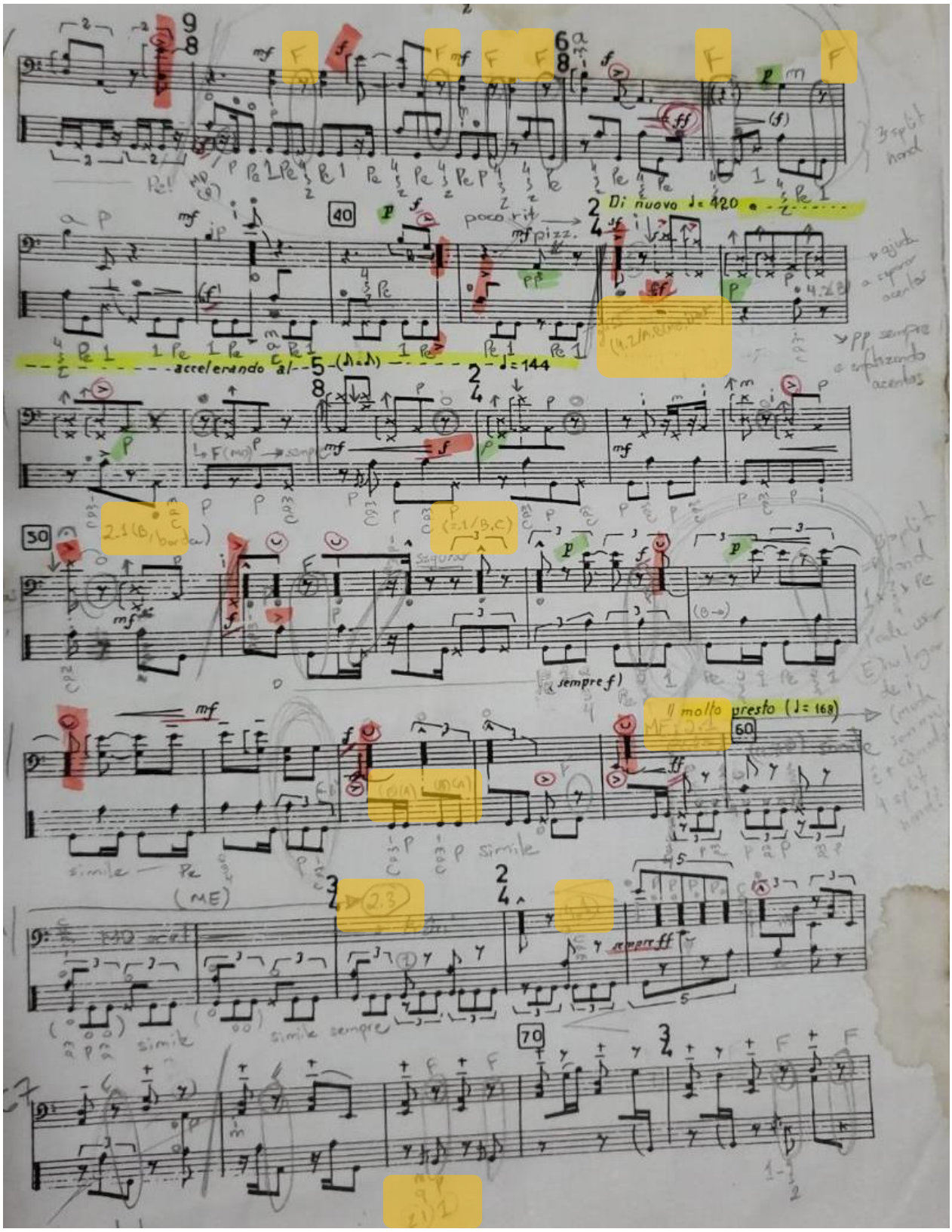


Figure 54: First page of Ko-tha, showing fingerings and elements of the preparation process. At some points, it is possible to see elements of the FH Code used as *auxiliary characters*.

PERCUSSIVE STUDY II (A. KAMPELA)

Despite their apparent similarities, this piece has a different character from the first study. The repetitive patterns are concentrated in the opening section and completely absent from the long middle section, where the intricate rhythmic writing lies. New PRs (dampened strings, string rubbing) are introduced, along with the use of objects (pencil, spoon) that reiterate the percussive character of the work. Its most striking feature is, without a doubt, the use of a spoon to create different percussive resources and a wah-wah effect[86].

It is very difficult to build a cohesive interpretation of the three parts that constitute the piece because they are very different in sound and conception. The first is mainly a *moto perpetuo* focusing the note A introduced by an impressive spoon glissando; the second, a pointillist texture with hands technique only; and the third, a mostly improvised section with extensive use of the objects. That fact is shown in the notation, as seen in Fig. 55.

The greatest challenge in this piece is, however, the rhythmic notation of the second part. While *Study I* is very demanding in that aspect, *Study II* takes it to a whole new level of complexity that constantly caresses the borders of the humanly possible – sometimes crossing them. A qualitative study of four different interpretations (AV-RIO, 2015; MINDER, 2016, VISION FUGITIVE, 2017, and PETERSELZAR, 2011 – this one from the composer himself) showed a great diversity of conceptions and no smaller deviations from the written rhythm, whose nuances were generally disregarded in favor of fluency and speed. That raises the following questions: a) How better to approach those rhythmic situations? b) How important is precision? c) Can any fair approximation of the score be obtained without thoroughly decoding the rhythmic structures, at least to hear how they sound, even if only at a basic level? We opted for an extremely careful approach to rhythm, something that was very time-demanding and took months to decipher and – loosely – incorporate. That task is yet not complete, and I ask myself if it is worthwhile pursuing it at that level of rigor, considering the exceptional costs. The interpretations available on *Youtube* seem to point at a negative answer, prioritizing "organic", gestural, virtuosic approaches.

[86] These, however, considering our focus, are of no immediate concern for this research.

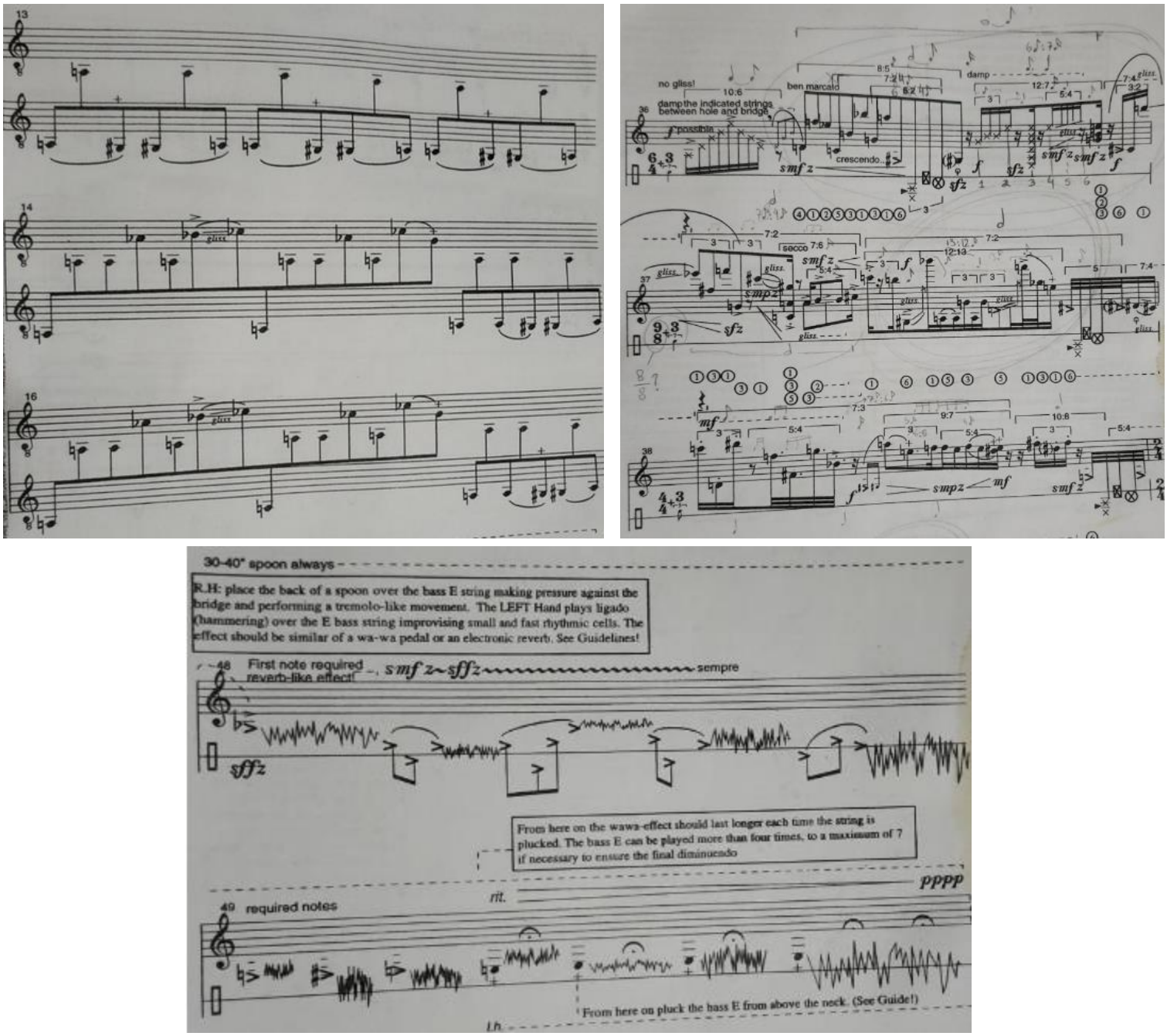


Figure 55: Aspect of the first, second, and third parts of the *Percussive Study II*, respectively.

The novelties in percussion are the use of objects – not our focus here – and the dampened chords and notes. Kampela requests dampenings with the l.h., with the right thumb, with *c*, and with body part **E**, going so far as using the last two together to selectively and independently dampen different strings. Dampened elements use both plucking and *strumming.* These PRs appear in the second part but are concentrated in the third. There, despite not being written in complex rhythmic structures,

they are also very demanding because of their high technical complexity. The other percussion requested is similar to that of *Study I* and presents no big challenge thanks to its idiomatic conception.

General Performance Issues

One major problem for the performance of some percussive pieces more prone to taking the hands away from the *standard playing position* is the instability of the guitar. That causes discomfort and errors, as I could experience in many performances. To help to correct that, fixating devices, such as the one we present in chapter 4 are proving useful, but so far they immobilize only the main body of the guitar – it is still necessary to find a solution for the neck-headstock.

Another problem, which I experienced with FG and *As Entranhas da Terra*, is the use of different tunings. Both *Drifting* and *Boogie Shred* use a suspended D tuning (D A D G A D), while *Hunter's Moon* uses a very low tunning (C G D F Bb D) and *As Entranhas da Terra* uses a low tunning in the basses and a microtonal tuning in the trebles (Fig 56).

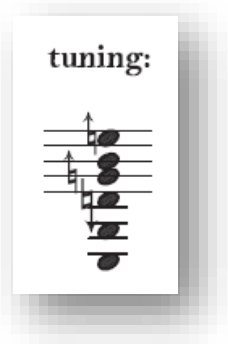


Figure 56: *As Entrnhas da Terra,* performance instructions: tuning

It was difficult to conciliate the study in the daily routine working with up to three different tunings at a time, as retuning takes time and makes the strings unstable. That is problematic, especially for shorter study sessions, and time-consuming also in the long run. I also had the impression that the lifespan of the strings was somehow reduced by the constant retuning. In live performances, that can become a great annoyance. The solutions I found were:

a) To retune in a way that made the strings more immediately stable afterward: that involves taking the string further on (lower or higher) in the direction needed for a retune, and then bringing it carefully back until reaching the desired pitch. In other words, reaching the tuning from the opposite direction.

b) To retune quickly: I counted how many turns were needed for each string in each new tunning, and trained myself to do that quickly.
c) To divert the attention of the audience during retunes: I trained myself to divide my concentration between the tunning and small comments to the audience, creating a bond and at the same time alleviating the interval without music.
d) In the daily work, a smart routine that allocated the various sessions according to the tunning was indispensable.
e) Finding the most convenient order of pieces in a concert, grouping similar tunings together. That was, however, not always possible, due to aesthetical concerns.
f) Using more than one guitar, when that was a possibility – that is certainly the most comfortable option at home, and not always so practical for concerts if one has to take various guitars with him or her.

ADAPTATIONS AND TRANSCRIPTION:

I focused on three kinds of adaptation:

From steel guitar to nylon: *Ko-Tha* (see "Performance"), *Drifting*, *Hunter´s Moon*, *Boogie Shred*.

From other instruments/situations: *Rock Etude n.7*

From existing repertoire: *Um dia na vida do Sr. K, III: 15h*

The adaptation from the steel to the nylon guitar did not present any unsolvable problems. Most musical situations are immediately portable. The biggest issues lie in tapping the trebles – a serious problem, as there is where most melodies occur –, tap harmonics – they sound softer in the nylon guitar and especially dull in the trebles –, scratching PRs that require a scratchpad (such as in *Boogie Shred* (Dawes) or *Passionflower* (Gomm)), and the occasional change in guitar area to adapt to the guitar position. The problem with tapping was solved by improving my technique (precision, strength) to the point of finding an acceptable balance – it also involved moderating the musical events around the melody, especially the percussion. The tap harmonics had a similar solution, but they still sound less explosive – that prompts a change of character that should inform the rest of the interpretation, but has no other consequences. The scratchings were obtained by letting the varnish of my guitar get

rough over time, and using a larger area of the hand (body parts D or E); the effect is feeble but still noticeable. The adaptation for guitar position involved bringing some PRs from 4.5(B) to 4.4(B) to facilitate the reach of the r.h. – that is only possible with the use of an ergonomic support, since with normal footstool position that area is blocked by the left leg.

It should be noted that it is not possible to achieve the same sound result with different string materials or instruments. Therefore, a new concept of sound (timbre, articulation, intensity, balance) is necessary for the performance with nylon. Any adaptation is, therefore, partly a new piece. From this perspective, some characteristics should no longer be understood as problems, but idiosyncrasies. Others remain challenging (such as some pull-offs and r.h. tapping *glissandos*, which sound only vestigially). Certainly, a composition process that took place on nylon guitars would avoid some of these situations.

I made several interventions in all three FG pieces. The most radical of them concern what I felt were unbalanced redundancies in the form – generally repetitions of the main theme. *Drifting* and *Hunter´s Moon* (Andy Mckee) both present climaxes constructed over *rasgueado* full chords; in *Drifting*, I filled them with percussion and *arpeggio* formulas derived from Villa-Lobo's *Study I*; in *Hunter´s Moon,* I added singing, creating a new melody for that. In *Boogie Shred* the climax is constructed in tappings; what I did was add some little harmonic complexity to it, to highlight some distancing from the prevailing Dm chord. In late presentations of the themes, I either sang along (*Drifting*), used different PRs, lower dynamics, and some *gliss.* (*Hunter´s Moon*), or created more radical variations (*Boogie Shred*). Several other small variations were made, such as the closing section of *Drifting* (with more harmonic movement and the introduction of a Phrygian color), the creation of quick melodic conductions, PR changes, rhythmic variations, etc.

In *Ko-Tha* (G. Scelsi)*,* the fact that Scelsi had a steel guitar with a tailpiece in mind also created problems. I replaced the actions in the string segments between bridge and tailpiece actions in area 5.4, obtaining results that resembled the original. The taps in the tailpiece depend greatly on the kind of tailpiece. I choose to transpose them to area 4.1(B), which has a timbre different enough from the soundboard and that enabled good accents and some resonance. The strings were a problem in the opening of the movement, in which the string-taps do not sound so effectively as in steel. That required technical precision and demands more effort in execution.

Rock Study 7 (Douglas/Udow) is a study for rhythm that I adapted to the percussive guitar. I tried two versions: the first explored the timbral aspect of the instrument (version A); despite being satisfied with the results, all the timbric activity took the focus away from the rhythm, so I developed a second adaptation (version B), with less timbre and more rhythmic precision.

Finally, in *Um dia na vida do Sr. K III:15h,* a composition of mine from 2011 that I updated in 2019, I employed the FG technique of using body part **E** (kick drums) combined with notes to emulate an orchestral bass drum reinforcing an interpolated bass note, adding drama to the second movement. The procedure was effective and exemplifies how the existing repertoire can benefit from percussive playing.

COMPOSITION:

I composed 4 works specifically for this research:

1) *As Entranhas da Terra (2017),* for percussive guitar and voice (1 guitarrist). 14 min.
2) *Comunhão (2017),* for percussive guitar and soprano. 4 min.
3) *Malambo Mulambo (2017),* for percussive guitar, tenor saxophone, percussion, and voices (3 performers). 6 min.
4) *A Japanese Saga: Laputa Variations (2020),* for percussive guitar. Circa 15 min.

Total music time: circa 40 min.

Through composition, I learned about notation, musical uses of the percussive resources, and explored the percussive potential of the instrument. All the compositions were informed by the results of the systematic research and performance of other percussive works.

COMUNHÃO

for percussive guitar and high voice

This work was composed based on the structure and harmony of the work *Nevoeiro*, for *viola caipira* solo, by composer André Carvalho from Minas Gerais. The initial idea was to create a second part for a duo, inserting percussive resources and changing the redundancy-variation balance observed in the work in the direction of more variety. This led to the writing of a more complex solo work, but it still did not fulfill my desire for more variation of the sound structures. That is why a third layer was inserted, a high-voice (tenor/soprano) melody. That arose the need for lyrics, which were created

from subjective evocations the original work suggested to me. It is interesting that, unlike the other musical situations with texts, this work was inspired by (derived from) music, and only then did a text emerge out of it. The opposite path was taken in *Escutorium*, *Malambo Mulambo*, and *As Entranhas da Terra*.

The final result, structurally similar to the original composition for *viola* (with some minor modifications in quadrature), turned out to be autonomous enough to be an independent piece without the original part of the *viola* (the original trio version, for guitar, viola, and singer, was not yet premiered). I found the result quite satisfactory, and I envision further exploring the potential of the percussive guitar in the accompaniment of chamber songs.

As is characteristic of my less complex compositional processes, a preliminary version of the work was created quickly, but details were constantly being modified in the following months, mainly through the performance of the work. They aimed at adapting the work to better fit the original concept, correcting details of harmonic and melodic conduction, and better adapting it to my technical idiosyncrasies.

The learning process of this work was slow, taking place over 4 to 5 months, partly because it resulted in continuous reformulations of the composition. Some parts of greater virtuosity (c. 31-40 and 56-59) demanded many hours of study and time to mature, but the greatest challenge of the work was undoubtedly the c. 48-55, in which melodies are performed with the left hand only, while the right performs a percussive rhythmic ostinato. This demands both coordination and independence between hands, in addition to an accurate l.h. tapping technique. Strategies used to overcome these challenges included improvised technical exercises, slow study, and study with separate hands. The execution of the vocal line was also tried, with some success, but I ended up opting, for the concerts, for professional singers (counter-tenor and, later, soprano).

I consider the “polishing” lent to the composition over time by the performance to be essential for the aesthetic achievements of the work, and that is part of the *tocautorial* processes that accompanied it since its conception.

AS ENTRANHAS DA TERRA

for percussive guitar and voice – 1 performer

This work was originally conceived as a soundtrack for a clown play, but its design was adapted to result in an autonomous solo play.

The key elements in its concept were the images of mines (thematic of the theatrical spectacle), but also the need for the percussive use of the guitar and the idea of *total performance*. That meant tensioning the limits of the "concert" format (relative autonomy of the sound structures in the formation of meaning, sound produced by the instrument) to arrive, scenically, at a *presentification* that encompasses the performer and his circumstance (performance, costume, voice). Based on these premises, I resorted to literature texts that gave me narrative, ambience, and textual support for the use of the voice. I used texts from the *Mistborn* series, by Brandon Sanderson; *The Lord of the Rings*, by J.R.R Tolkien; and *Las Venas Abiertas de América Latina*, by Eduardo Galeano.

The work evolved out of a general structure based on different nonlinear and coordinated trajectories for the various musical parameters (pitches, speeds, and timbres) and materials (such as interjective eruptions, tremolos, harmonics, and fry). Fig. 53 shows some of the initial sketches. A game of contrasts was designed between these parameters and materials with the objective of both creating the tension that represented the loneliness of the depths and of illustrating the contradiction between the riches hidden in the earth and the human misery that their search summons. Thus, PRs and bass notes (it was necessary to resort to scordatura (Fig. 52) to obtain notes down to low C) were contrasted with harmonics and high-pitched *squeaks*; high-pitched sounds with inharmonic (percussive) sounds; and two different harmonic domains were created (chromatic regions separated by a quarter-tone, which required microtonal tuning).

Some compositional materials, such as the low tuning of the 5th and 6th strings, the use of fry in the voice, and the use of dark PRs were employed to achieve the grim sound quality evoked by the immensity of the mountains and their dark hidden interiors.

I also tried to make the most of the squeak's inherently dramatic sound, which was used in the coda. Working with subtle variations in intensity and timbre of the PRs was also a relevant feature of the piece: I tried to create contexts in which it was possible to demonstrate the small differences in sound

between nearby guitar regions, such as 2.1 and 2.2, or to create percussive sequences with an almost melodic character exploring different parts of the guitar and the hand.

I also used scenic elements, such as declamating dramatic texts, screams, and changes in the guitar's position.

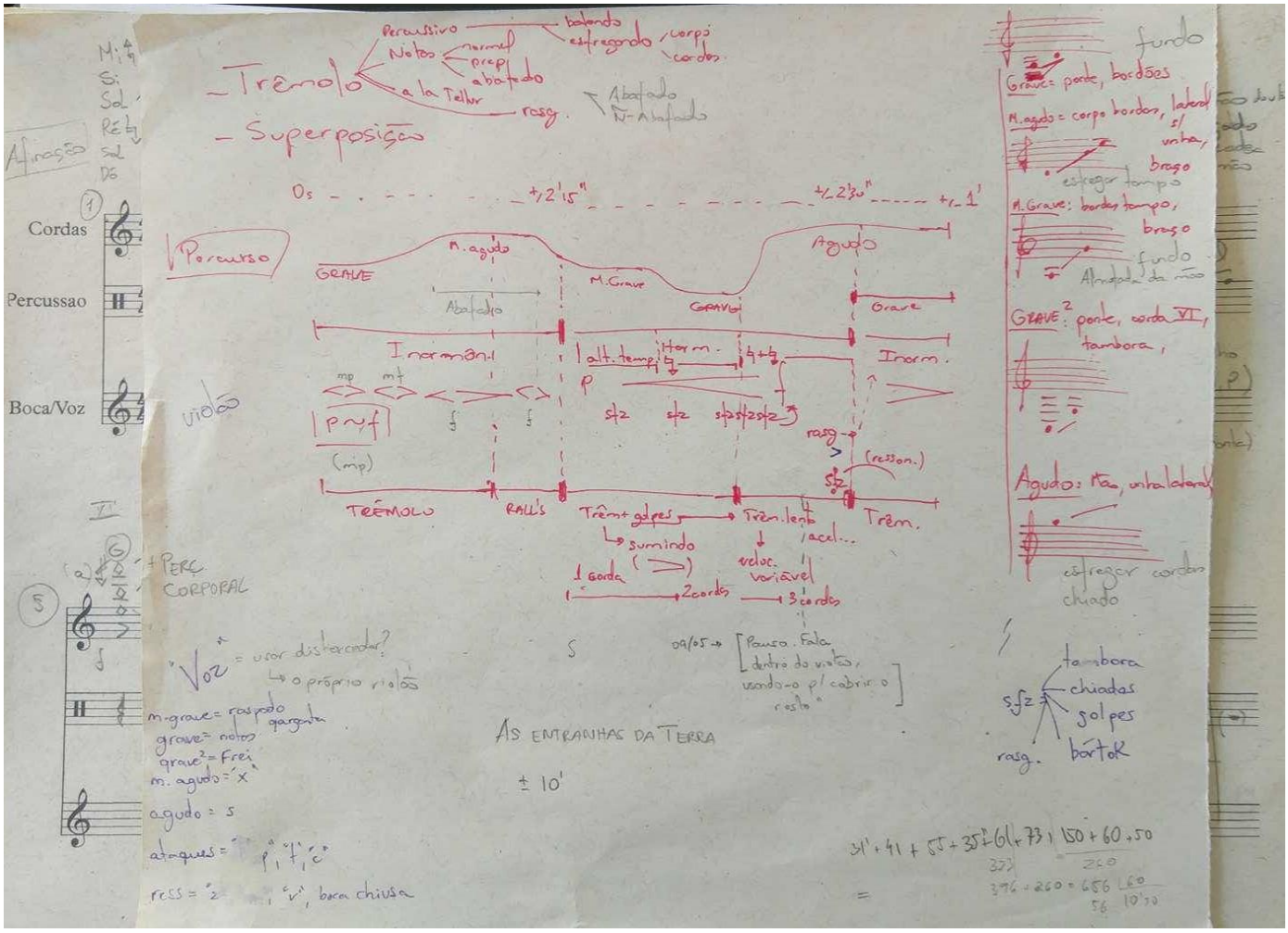


Figure 57: Sketch for the structural plan of As Entranhas da Terra

All of this was at the service of a rhetorical conception of music, of an imagetic nature, which portrayed human affections and the natural scenarios of the mines as if in an exhibition, with reinforcements and clashes.

Despite the systematic planning, the creative process was paralyzed for several weeks, due to my inability to compose music that met so many requirements. This difficult creative moment was only overcome with the help of free improvisation and some relaxation of the self-imposed bonds. That happened when it seemed impossible to carry out the work – and the deadlines were dangerously

approaching[87]. Despite this, I suspect that the reflection and the various frustrated attempts of the initial period have materialized, in various ways, in the final result.

I now observe that the improvisations (on guitar and paper) that were gradually solidified in the final form of the piece already contained several automatisms of a certain "contemporary language", such as irregular rhythmic patterns and a particular balance between variation and redundancy, that did not necessarily evolve from the "compositional blueprint".

Despite retaining several elements of the initial plan, the final result turned out to be significantly different from it. It was not less satisfactory because of that, however. The incorporation of the work in the play was difficult (due to the logistical conditions of the show's debut, not very docile to the detailed labor that the musical piece would require). However, it worked perfectly well as a concert piece: despite all the mishaps, the lonely caves, the dread of Morgoth Balrogs, Kelsier's despair at Hathsin and the martyrdom of Galeano's indigenous workers all ended up reflected in music – so as in the anguish of the compositional process itself.

Performance

The learning process of this work was relatively short – around 3 months – considering its duration and complexity, but it required a high work intensity. Despite being rarefied in terms of "traditional" virtuosity (for example, fast passages), the piece demands a deep and prolonged, exhaustive concentration, and refinement in the dynamic and motor control that I had not yet seen in the percussive guitar literature. The timbre and dynamic variations of the PRs, and their great number, are obstacles to be overcome. But it is the use of the voice and the independence between it and each hand that constituted the biggest challenge. Independent dynamics, rhythm, and agogics for each of these three components of performance are requested for example in measures 6-8 (Fig. 58), end of measure 15 (p. 3, see Fig. 59), and the entire roll section (p. 3 and 4). Controlling tempo and proportion of time in bars with graphical notation and/or indications in seconds is another difficulty of the piece, as they must be followed rigorously.

[87] It is also important to note that there was a difference in the availability of time and energy for the composition between the two periods mentioned, with better conditions in the second.

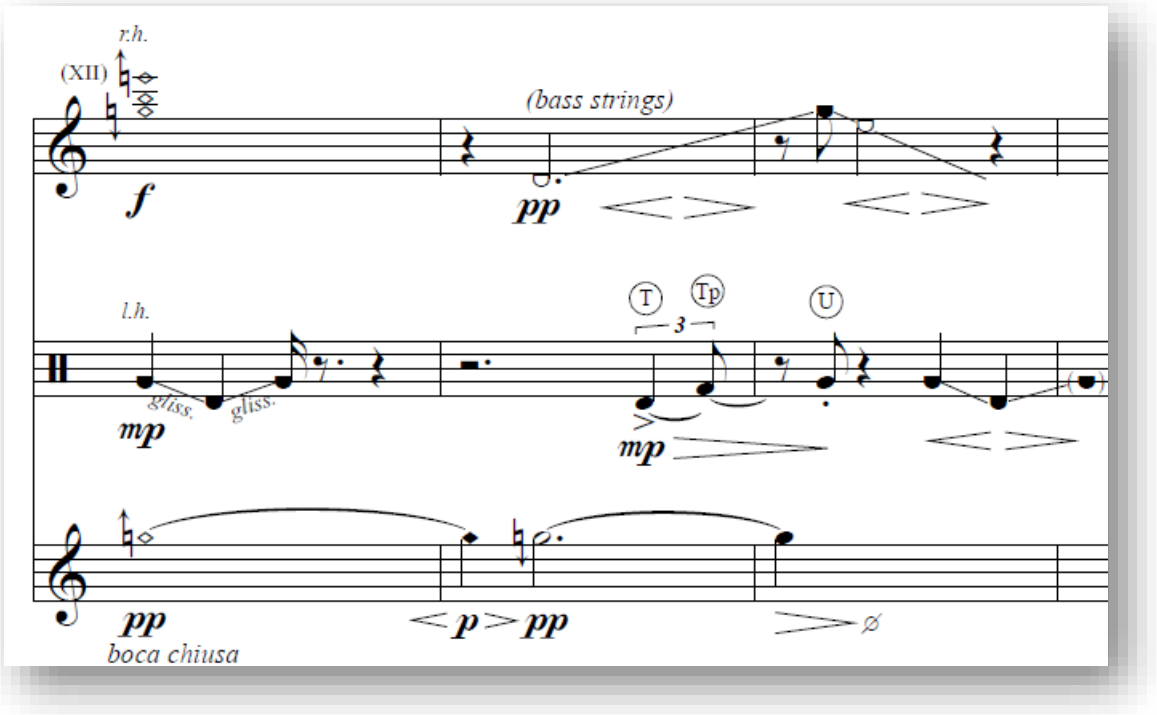


Figure 58: *As Entranhas da Terra,* bars 6-8

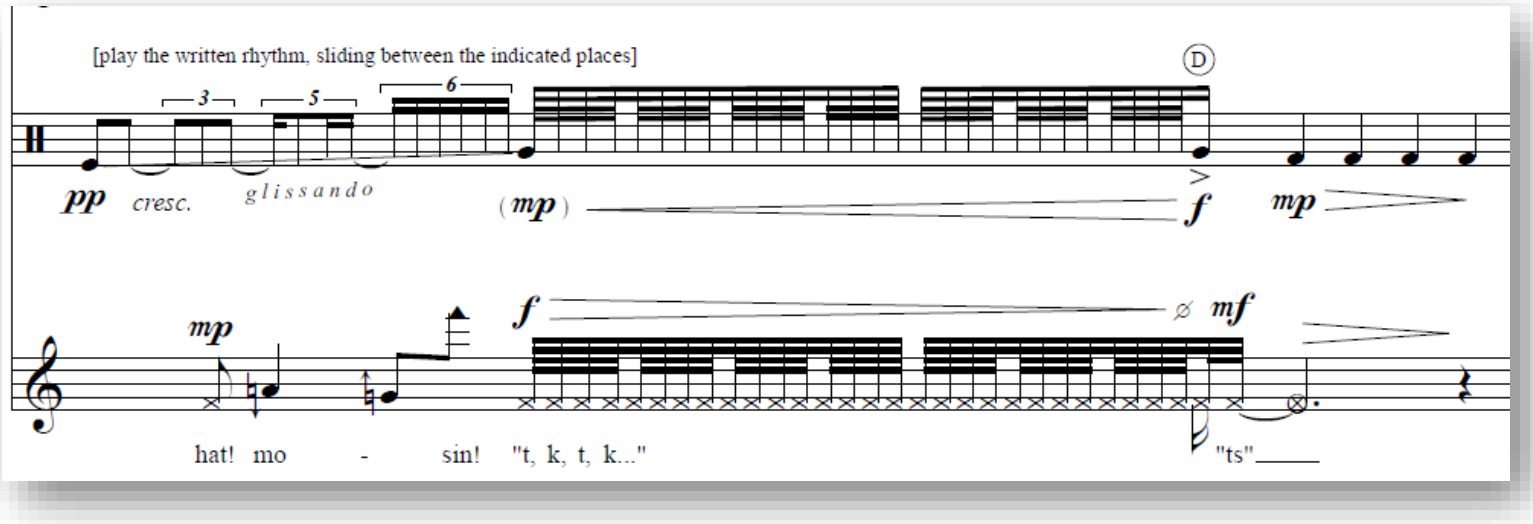


Figure 59: *As Entranhas da Terra,* bars 15 (final part). Observe rhythmic and dynamic Independence between layers.

To overcome these challenges, I used several study methods, exemplified in Table 11:

PROBLEMS	SOLUTIONS
Prolonged concentration	Exercises to "incorporate the character", meditation, focus on the overall structure (narrative line), several *da capo* performances in sequence.
Memorization and PR variety	Mental study; photographic memorization of the score; study of the connections between sections
Timbral and dynamic control of the PR	Study of isolated PRs
Independency/coordination (r.h., l.h., voice)	Study of individual layers; study by parameter (only rhythm, only dynamics, only timbre); progressive combination of the isolated elements.
Muscular resistance: rolls, tremolos, trills	Daily resistance exercises, in repetitions until exhaustion was reached, inserted in several moments during the day.
Time control (Tempo, durations, proportions)	Study with a metronome; internalization of the proportion between related parts (through isolation, comparison, and repetition); study of the tempo changes; exercises in counting mentally.

Table 11: Problems and solutions in the performance of *As Entranhas da Terra*

MALAMBO MULAMBO

for percussive guitar, saxophone, multiple percussion, marimba, and voices – 3 performers

Written for guitar, marimba, multiple percussion, saxophone, and voices, this work was also conceived as a soundtrack. I took the opportunity to compose something that used percussive resources related to the gaucho culture of South America, from where the malambo dance comes from, such as *chasquidos* and soundboard taps. Excerpts from the classic epic poem *Martín Fierro*, an ode to the culture of the Pampean gauchos of the Platense region, were used. The octosyllabic verses and pastoral character of the text by Argentinian poet José Hernández influenced the rustic, angular quadrature of the piece.

It was a first experiment in combining guitar PRs with *strictu sensu* percussion, and the results were quite interesting: the combination proved to be balanced, showing that the PRs used have projection, intensity, and timbre quality not too distant from that of similar percussive instruments (wood blocks, keys, plate, etc.).

This performance was prepared for the sole purpose of being recorded (live performances were discarded). Under the circumstances, it had a very quick preparation time (2 weeks). Rehearsals were few, objective, and focused exclusively on the recording: the goal was the uninterrupted execution section by section, with the recording cuts in mind (the execution of the capo was not studied, only sketched to create a sense of the global narrative path).

The recording resented the hurried preparation and was only possible at a slower pace than intended, with some prejudice to the energetic character of the Malambo dance that it sought to evoke.

The guitar part was relatively simple, with only a few difficult passages. Even so, it would require more time to mature, and small corrections had to be made when editing.

At the end of the process, some electronic effects (distortions, granulator) were added to better achieve the desired result. The participation of the audio technician was decisive for the final result.

A JAPANESE SAGA: LAPUTA VARIATIONS

for percussive guitar

This piece was inspired by the music of Joe Hisashi and the filmography of Hayao Miyazaki, especially the film *Laputa: Castle in the Sky.* Several themes, chords, and motifs were freely employed to build the composition, but the focus remained on the main melody of the central theme.

The exposition and the first tonal variations were spontaneously created. The need to add percussion – until then a foreign element – created a dramatic cleavage in the piece that would greatly increase its size, due to the need of making sense of the disparaging materials. To make sense of that, we created a non-tonal and percussive, mysterious, introduction, from which the main theme emerges. It is then followed by several modal and tonal variations. Expanded tonality introduces atonality and percussion, and progressively so, until the 10^{th} variation, which serves as a coda, re-exposition, and beginning of the second part as well. From this point on, all the variations will be repeated in their original order, but as "remembrances", encrusted in a new hostile environment in which interpolated new elements of an aggressive, radically atonal, and percussive nature, inspired by *Percussive Studies,* interrupt their flow. That greatly unstabilizes the whole section, putting the discrepancies of the materials in evidence. When the process is finished, the introduction returns, enframing the whole

"theme and variations" + "deformed theme and variations" structure, and leading to an extended Coda. In this, percussion dominates, despite a fragmented tonality of A minor (the main tonality of the piece) that futilely tries to impose itself, but is already too mischaracterized from the long developments to have enough strength left. A final surge of antagonizing forces (atonality/fragmented A minor) dissipates what is left of the energy of the initial materials, that slowly decompose into silences and distant chords, always more distant, always more silent…

Besides trying to integrate the very different materials provided by *punteado* and *percussive* TGs in their full expressivity, I used this opportunity to experiment on a more radical TG Integration, using what I learned from the *Percussive Studies* and FG pieces. The result includes a lot of complex hand techniques, in both alternations and simultaneities. In particular, I employed a lot of dampened and *slap* sounds, with the express goal of improving my technique on those PRs – composition being used as a platform for performance study (a *tocautorial* feature).

The expected duration is about 14 minutes.

COLLABORATIONS

I had the chance of working together with several artists during the development of the research. Their ideas greatly improved the quality of the work and impacted my thoughts on performance, composition, and notation, besides adding new PRs to my repertoire and works to the percussive literature of the guitar.

The processes were all very different, in intensity, duration, and degree of my participation in the conception of the pieces. They went from simple commissions to working together in the development of the work; were synchronous or diachronic (Fernandes,2013); involved a great intervention or minor suggestions. In all cases, I specified that the work should be substantially percussive and suggested the composition means for achieving that.

The works created collaboratively were: *Escutorium, ou a hermenêutica das relações livres num mundo pós-líquido* (Thiago Diniz, 2017), *Eclusas* (Silvio Ferraz, 2018), *Seringal* (Ramiro Mansilla Pons, 2020), *Escambo* (Sergio Freire, 2020), and *Vril* (Roberto Victorio, 2020).

ESCUTORIUM, OU A HERMENÊUTICA DAS RELAÇÕES LIVRES NUM MUNDO PÓS-LÍQUIDO (T. DINIZ)

for guitar and quadriphonic tape

This work, like others created in the context of the research, has a strong affinity with a literary text. Based on *O instinto sexual a partir do escritório: um olhar analítico*[88] (Stanley Levi, 2016), composer-partner Thiago Diniz, who is also a guitarist and cellist, conceived a mixed work (with tape, in stereo and quadrophonic versions) that treats the guitar almost strictly as a percussion instrument, much like *Ko-Tha.* It does so with a level of detail and systematization that was unmatched in the literature up until that point, and that, curiously, exhibited many similarities with the approach of the FH Code then in development. This systematic approach led to the creation of an equally organized and complex notational system, in which a new *dimension* of information (the type of character used in the head of rhythmic figures) multiplies the density of information the system can uphold. Diniz's system makes it possible to extrapolate 45 different PRs, although he did not use them all. Most importantly, the notational system is relatively parsimonious, considering its reach. And he was able to condense all that information in performance instructions of a single-page length.

Regarding the electronic part, Diniz used only sounds of offices and two recordings of declamations of the poem (male and female).

Finally, a work was conceived whose discursive arc is a compromise between his (the work´s) inner sound laws and the narrative of the poem.

Although the composition was exclusively in charge of Diniz, we can characterize the work regime as collaborative because, as an interpreter, I participated since the genesis of the work (either with the text, or discussing ideas, making demonstrations) until the recording of the "official" version, which incorporates several extra-score elements derived from my interpretation.

Its preparation took place in two phases: a relatively tranquil study, dispersed over the several weeks that the composition process required, and a concentrated study, from one to three hours a day, during the ten days preceding the premiere. The process proved to be successful, giving me time to build the physical resistance and technique the work required and to mature the interpretation. It

[88] *Sexual instinct from the office: an analytical approach*, from the original in Portuguese.

was also advantageous to put the necessary energy in the end, considering the high difficulty of the work. It is important to note that it would have been impossible to maintain an intensive routine longer, due to the great physical wear the piece causes (see below).

The challenges faced were: a) the complex notation system, which includes two staves (distinguishing hands) and a fourth *dimensio* (5 noteheads formats), and that took me weeks to be familiarized with; b) the great diversity of PRs mobilized (at least 20 out of a total of 45 possible); c) physical resistance, both for the execution of prolonged rolls and for the study process in general (the position of the right arm caused severe pain during the intensive study); d) memorization of the work; e) the adjustment between the performance and the tape, especially dynamically and temporally; f) independence/coordination of hands; g) some particularly difficult passages and PRs.

PROBLEMS	SOLUTIONS
Familiarization with the notational system	It required a thorough initial exam away from the instrument and occurred naturally over time – some two to three weeks.
Memorization (including the technical fluidity to perform several different PRs)	Mental study; photographic memorization of the score; study of the connections between parts. Memorization part by part (at the beginning: measure per measure), with insistent execution of longer passages at slower tempos to have reaction time.
Muscular resistance: rolls, right arm position	A daily routine of resistance-building: short-duration repetitive efforts until exhaustion several times a day; frequently resting the right arm.
Rhythmic and temporal adjustment between PRs and tape	Play with a video-score that included a visual metronome. Using the feedback of external listeners. Constant adjustment of the tape levels based on the performance.
Independency and coordination	Studying the hands individually; bringing them together in simplified executions.
Difficult PRs and passages	Slow repetition with progressive advancement of tempo; systematic study, dividing the piece into equal parts and scheduling their minute study in the week, with a pre-defined number of accurate repetitions to be reached every time. Insertion of these passages on broader segments of music with a controlled tempo.

Table 12: Problems and solutions in the performance of *Escutorium*

ECLUSAS (S. FERRAZ)

for solo percussive guitar

This work was commissioned by Roberto Victorio to be premiered in his Contemporary Music Biennial of Mato Grosso 2018 (oct/2018). Despite some early brief e-mail exchanges, in which I and the composer defined the major guidelines for the work (its percussive character), there were no other communications or collaborations during the compositional phase of the work. The collaboration took part in the long process of adapting the piece for performance. The composer reported difficulties writing for the instrument: "writing for the guitar is damn hard!"[89], allegedly writing a piece for percussion instead: "As I don't play the guitar, I wrote a piece for percussion"[90]. Despite the claim, however, the piece still explores a lot of plucking and even the percussion is adapted to the specificities of the guitar. Not, however, in a total idiomatic fashion. It was necessary to reinterpret some passages and find creative solutions for others, sometimes changing the original text a bit, and thus concreting the collaboration: I employed small *slides* to more effectively executing the *gliss.,* bestowing on the piece a new sonority that I tried to balance by bringing it in two different moments, at the beginning and again at the end; I performed the *tamboras* with only one finger, which brought a bit more harmonicity to the chords (and thus justifying the difficult motions of the left hand); I created a technique for the "longitudinal scratch with a percussive attack"; and I defined the areas for the taps. It was, therefore, a predominantly *diachronic collaboration* (FERNANDES, 2013), which happens in differed time, I this case through the mediation of the score

As for its preparation, the piece had a notation and performance instructions that were not sufficiently clear. It was also technically difficult – the central idea of the *tamboras*, for example, submit the left hand to significant stress to be executed with a good sound and harmonicity. They are especially challenging when performed after the 12th fret or through longer lengths of string. But it was the understanding of its fragmented discourse that was the greatest challenge. That resulted in difficult memorization and the need for quick, kaleidoscopic technical adjustments. The mental counting of elements in rapid succession, many repetitions, or chronometric time was also an issue to overcome.

[89] "(...) é difícil toda vida escrever pra violão" [T.A.]
[90] "Como não toco violão, escrevi uma peça para percussão." [T.A.]

The strategies used to deal with those problems were similar to the ones used for other pieces but requiring a little more intervention in the musical text.

SERINGAL (R. MANSILLA PONS)

for solo percussive guitar

Argentinian composer Ramiro Mansilla Pons composed this piece in a special kind of collaboration. He studied some material produced by the research and let himself be inspired by the piece *As Entranhas da Terra*. *Seringal* has many affinities with it, for example, the use of tremolos on the wood and the strings, sometimes along with harmonics, the recurring "opening" gesture, and the overlap of textural layers. The piece also recovers passages from the book *As Veias da América Latina* to inform its title.

After the conclusion of a first draft, initial readings showed some notations and performance issues, which were then corrected.

The piece was not difficult to prepare, considering my previous experience with *As Entranhas da Terra*. Performance issues were restricted to establishing good proportions in tempo, as it uses graphic notation, and giving refinement and homogeneity to several percussive techniques; those include several rolls and the fine adjustment of *tamboras* that use specific strings and require dampening.

For the premiere, which happened in the aforementioned *Final Concert*, I used a new prototype of percussive guitar with 9 strings, which prompted several small adaptations that were discussed with the composer.

ESCAMBO (S. FREIRE)

for solo percussive guitar

Sergio Freire conceived a work in which the fretboard is divided into two parts, each assigned mainly to one hand. These hand-fretboard part complexes function autonomously but their potential is enhanced by their collaboration, and that is what is described by its title. The composer so describes the piece:

> The piece aims to explore the effects of a self-imposed division – placing a *capotasto* in the middle of the instrument – on the micro-environment of

> playing and making music with a nylon guitar. What to do with this large number of frets on the left, traditionally useless? And what to do with the other side, which no longer has the entire fretboard of the instrument, keeping only its most difficult region to press? On the one hand, a short non-resonant fretboard with percussive microtonal sounds, on the other a small harp with six tempered strings, and the possibility of playing some harmonic sounds.
>
> The initial purpose of a contrasting contrapuntal exploration of these two regions, mediated by the percussion on the soundboard by both hands, gave way to a series of collaborations arising from the limitations experienced by each side. Here the *escambo* (barter) begins, this kind of exchange that provides mutual and direct advantages for each of those involved: musical phrases alternating notes between the two sides; expansion of the equal-tempered tuning by means of microtones; sharing of an ostinato and of the elements that decorate it; help of the right hand for a more fluent left side; realization of very fast rhythms; exploration of the whole body of the instrument in energetic rhythmic phrases.
>
> The final result is clearly percussive, although the main sonic characteristics of the guitar are not completely lost. And as often happens in the contemporary repertoire for percussion, there is a non-hierarchical mixture of elements from different musical traditions (GARCIA, 2020).

He opted for a notation in two staves. They differentiate the fretboard parts, not the hands, but these categories get mixed. The notation in real pitches complicates the reading because a) it inhibits the automatism of reading an octave lower and b) the real pitch of the backtones does not give the guitarist any immediate information about fingering or where to find the note in the fretboard. The score is unambiguous – he writes the string and frets to be stopped – but slower to read. As for the taps in the wood, he defines 4 guitar areas – 2.1, 2.2, 2.3, and 4.5 – and notates them similarly for each hand, using the traditional "x" notehead. It is a practical notation, albeit a bit non-systematic, in that it uses the staves now to differentiate hands, not fingerboard parts (that is, the staves behave differently according to the kind of character notated).

The extended exploration of the *backtones* demands a trustable left-hand technique that has to be developed. It also presents problems in balancing the different sounds and extracting a general more fulfilling sonority from the whole piece. *Escambo* also presents some extended virtuosic passages with creative solutions for TG integration that, however, are still challenging.

The expected duration is about 5 minutes.

VRIL (R. VICTORIO)

for solo percussive guitar

Roberto Victorio describes this piece as a "mixture of *Ahnk* and *Miraj*"[91], two previous works of his that make limited use of PRs.

In this new *tour de force*, Victorio adds to the traditional elements of his radically idiomatic guitar writing a total of 8 PRs: taps on the soundboard and sides, **rg** in area **5.4**, *tamboras*, l.h. snaps, r.h. slaps, tap harmonics, and longitudinal string rubs[92]. They are used "to potentialize the eruptive intention of the piece that emerges out of the confrontation between the metric and proportional writing" (VICTORIO, 2020). Despite using mostly plucking, the piece has an overall markedly percussive character.

The music is challenging, as the metrics are completely irregular and the flow is very energetic: there are many fast gestures and passages in thirty-second or even sixty-fourth notes. Reading is not much of a problem if the player is familiarized with Victorio's writing.

The duration is thought to be about 6 minutes.

IMPROVISATION:

The PRs are particularly docile to improvisation, since they lack a harmonic dimension to be considered: the work with frequencies is "reduced" to a less specific concern, more related to timbre and register. This leaves all the responsibility for the musical discourse on rhythm, intensity, and timbre.

I used improvisation as autonomous parts of concerts in *Solo* and *Brücken* (*between pieces*), as a section of the 2nd movement of *Sonata* (*within the piece*), and as *actual pieces* (*Quantos violonistas são necessários para desconcertar um piano?*).

Improvisation played an important role in the compositional processes, either to generate materials or to freely organize them. Occasionally, spontaneous improvisations can end up becoming the seeds of complete works.

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[91] *Miraj* was composed for me in the year 2015; *Ahnk* was dedicated to Gilson Antunes and is from 2011.

[92] He also employs a percussive tongue slap in addition to PRs, which perfectly exemplifies category three of the technical expasions proposed by Braga (2020), as seen Chapter 1, p. 61.

Improvisation was also used as a systematic instrumental exploration (addressing the various parts of the guitar in a controlled manner) or unsystematic (free). It seems to foster intuition in ways that are different from other approaches and more conducive to the emergence of new ideas and unusual resources.

Finally, improvisation was a great ally in the study of percussive techniques, helping to maintain interest in the face of the inevitable accumulation of repetitions necessary to consolidate the technique.

SOLO

for percussive guitar

This solo was designed to take advantage of the ease to produce percussive sounds to incite the active participation of the public in the collective creation of a concert. With that in mind, the public received several provocative suggestions for possible percussive actions related to their immediate surroundings in the concert hall. The concert (*Contrasts,* 2016) starts with a video, and an improvisation starts in the middle of the audience, in a cross-fade of sounds and lights. The recording presented here originates in one of those situations (Belo Horizonte, oct/2016)[93].

It is musically structured based on a *chacarera*[94] rhythm, as the preceding video also derives electroacoustic music from that dance. The idea was to use exclusively percussion, with no harmonic functionality or explicit melodies.

Sonata op. 47

This improvisation was incrusted in the second movement and used the improvised passage with super-high pitches written in the score as a transition. It was based on traditional rhythms of Argentinian folklore (*chacarera, zamba,* and *gato*), and aimed at further exploring the timbre potential of the instrument, with the use of the sides, tap harmonics, area 1, among other improvised features. Its duration stood around 90 seconds, greatly expanding the otherwise short second movement and thus increasing its weight and complexity in the overall form.

[93] In this occasion specifically, there was a subsequent solo in which the public was directly invited to take part, which happened with great participation from all present.
[94] Argentinian fast folk dance.

QUANTOS VIOLONISTAS SÃO NECESSÁRIOS PARA DESCONCERTAR UM PIANO

for three guitarists on a piano

This was a collective improvisation reflecting on the technique of the two instruments, and the intrinsic "program" of each. As they carry more or less explicit intentions – for example, playing the strings of a guitar –, they tend to develop the technique in a certain direction. What happens, however, when you defy that program? Percussive playing consists precisely of such a question, as do many explorations in extended techniques and the poetics of artists such as Helmut Lachenmann. Arthur Kampela has eloquently proposed one possible solution with his *Exoskeleton*, in which the guitar technique is transposed to the viola.

With that in mind, we proposed going a step further and trying that on a more distant instrument, the piano, and with several musicians at a time. The guitar technique is employed percussively in several parts of the piano and even enacted some regular notes, but it also induced the search for the similarities of that instrument with the guitar: the strings. Some basic musical trajectories and timbres were loosely pre-defined to create a more effective musical discourse. Each player had definite functions.

Over time, the music evolved to include the use of preparations and even an accompanying guitar. The recorded version presented here reflects that stage of evolution of the piece and was played with two guitarists only.

BRÜCKEN

for two percussive guitars

This is the name of a concert structured over 3 improvised performances with two percussive guitars, among which solo guitar pieces of the canonic repertoire were played. These improvisations were used to open and close the concert, and to separate each guitarist's solo performance. They were based on previously determined narrative arches (defining progression from and to percussive sounds, dynamics, density, etc.) and were conceived to last approx.. 5, 5, and 7 minutes, respectively. They included some simple extra-instrumental objects, such as pencils.

EXPLORATION OF NEW OR UNCOMMON PR

Squeak: I used the squeak extensively in *Cenas Infantis* and *As Entranhas da Terra*, with the novelty of using it in the back of the guitar.

Güiro in area 1: Although not new, this PR is rarely seen in the literature. It consists of plucking or strumming the strings between the saddle and the fixating channel in the bridge, resulting in an attacked sound with almost no resonance, and the sounds unintuitively clearer on the basses – the trebles are so tight that we cannot hear their super-high pitches. It resembles, in a way, the sound of playing in area 5.4, but even brighter, attacked, and less resonant. Its location incites the vibration of the strings if they are not dampened. I used it in *Cenas Infantis* and improvisations.

Extensive use of area 6: In *Cenas Infantis, As Entranhas da Terra, Laputa Variations,* and *Escutorium*, we have made extensive use of area 6, which, as seen in chapter two, is otherwise very seldom mobilized in the literature. As a side effect, that also induces a larger participation of the l.h. in overall percussive actions.

Extensive use of area 3: I used the back of the guitar extensively in *Cenas Infantis* and *As Entranhas da Terra*, especially but not exclusively to produce *squeaks*.

Extensive use of body part B: Also neglected in the literature, this body part greatly enhances the timbral palette of percussive playing. I have used it extensively, for various purposes, in several situations, such as in *As Entranhas da Terra*, *Comunhão, Escutorium, Laputa Variations* and improvisations.

A CASE STUDY: ANDY MCKEE´S *DRIFTING*

An experience report on the construction of the interpretation

INTRODUCTION

Drifting is a canonical work of the FG tradition, having appeared on the internet in 2006. It has contributed significantly to the explosion of this style since then and is considered by many to be its foundational stone (DAWES, 2017; STRICAGNOLI, 2020; MISKO, 2019). The American composer is an internet celebrity and curiously has very few works exploring percussive guitar.

The work uses the classic open D tuning (D - A - D - G - A - D), which has the advantages of offering several notes of the D tonality (Major or Minor) and reducing the tension of the strings, facilitating the performance. The formal structure is relatively simple: there are three main musical ideas, A, B, and C, all expressed in periods of eight measures divided into two sentences of four. They are repeated 3 times, in that order, with an additional repetition of A as an ending. This entire structure is framed by an introduction section, repeated as a conclusion (8c. + 8c.). In total, there are 12 periods of 8 c. (96c.):

Introduction, ABC (x3), A, Conclusion

In the third repetition of ABC, A is varied (A'), creating a formal tension that strengthens the conclusive/re-expository effect of the literal, final repetition of A. In textural terms, the work uses percussive resources in the Introduction/Conclusion and as foreground material and accompaniment (to a cantabile melody) in A. These accompaniments take advantage of some long notes in the melody resting on open strings to free the left hand to participate in the accompanying rhythmic ostinato, a simple "beat" in the four downbeats of a 4/4 with occasional flourishes. B and C do not exhibit percussive features. Pluckings and *rasgueados* also appear in A, B, and C, with a predominance of the former (in A' one major variation method is emphasizing the *rasgueado*).

The predominant texture is the accompanied melody. The harmony is simple, focusing on a Doric E using chords i, III, and IV, and alternating that with passages in D Major (section B). The rhythm is rich in syncopations. The original version is played on a folk guitar with steel strings and fanned frets, which is supported by the right leg, and recorded with pickup and microphone.

PREPARATION PROCESS

As a personal challenge and a way to overcome certain deficiencies, I decided **to learn the work "by ear"**. More precisely, by ear and eye, using videos on *Youtube*. This is the common practice in FG. Although there are both video lessons and scores available for some works (as is the case with this one), the videos of the artists themselves are the reference sources, as discussed in chapter two.

The process was easier than expected, certainly due to the simplicity of the piece: the various parts are repeated with little or no variation, and the total duration is relatively short (approx. 4 minutes). Moreover, intrasectional musical gestures also have a high degree of redundancy, such as a melodic construction relying heavily on open treble strings, melodic/harmonic repetitions, ostinatos, and other patterns. I also sought to formulate an interpretation that would prioritize nuances inherent to the instrument (idiomatic).

The learning process was visual to a large extent. Since the PRs vary widely from guitar to guitar, the exact location of the PRs and the hand technique employed are difficult to determine with audio only. The videos were fundamental in determining exactly where and how to execute the various PRs.

I prioritized working with a metronome, but that was impractical at the beginning, while learning by ear, since the understanding of sound structures is often accompanied, or obtained through, the performance of passages, which are practiced “in loco” (along with the videos). After I was able to play from memory, I started studying it in sections of 4 bars, repeated a defined number of times, and in pre-determined tempos.

It is interesting that, doing it that way, technical and musical developments go hand by hand, so that when one finishes memorizing the piece, the interpretation/performance is almost done as well. The interpretation develops differently than when learning from a new score, since the audiovisual reference already has an embedded one. This greatly speeds up the process of understanding the musical discourse. Although I chose to make interpretive interferences in my performance, a big part of the final result was already in Mckee’s interpretation, and most of that was probably not even conscious.

Another key factor in learning music was prior **familiarity with PRs and hand techniques, knowledge of the guitar body, and mental organization of percussive playing**. In previous experiences, it was necessary to learn from scratch how to play percussively; here, the hands were already trained for most of the resources used and were not confused during performance, nor did the PRs compromise a significant portion of my concentration with simply remembering what to do. The same is true for the guitar body, whose parts and respective sound possibilities I already knew, which facilitated the trajectory of the hands. The mental organization of the PRs, which arose from their systematization (FERNANDES, 2018a; SOUSA AND FERNANDES, 2018), bestowed identity to each PR, enabling their instant differentiation, enhancing overall agility, and allowing for more specific sound expectations to guide the study.

The learning process was extended over time and not very intensive. This also contributed to the gradual maturation of the performance and the good results achieved. It lasted approximately 6 weeks, the first two dedicated to decoding (memorizing and understanding what and how to play) and the rest to improving performance. The process was not linear: there were long pauses between the different video learning sections. These were dedicated to improve what had already been learned, but there were also interruptions. The general feeling was that of a smooth and pleasant process, with a motivating sense of self-realization. I think that the reproduction of these factors in the future can be a great increase in my professional and artistic life. It involves measuring expectations and challenges so that the relation between effort and pleasure is more favorable.

PROBLEMS AND SOLUTIONS

The position of the guitar was the first problem. Mckee (2017) states that the left hand positioned above the arm is a resource to allow easier access to the side of the instrument and soundboard for the l.h. (**4.5(A)/D(ME)gp** and **2.3(A)/A.B(imac-ME)gp**) and useful for performing *power chords* more easily with *i* (see "inverted l.h." in "Positions", chapter 4). In my particular case this would not be an issue, since my performance position (which I maintained) uses the guitar on the left leg, raised by an Ergoplay; this allows me to fulfill all the demands of the piece with my left hand in a "normal" position. However, I chose to use the suggested hand technique, since it is a common posture for FG tapping. The r.h. also works in a different position, as is often demanded over the fretboard to do

tappings. This right arm position had already been a challenge in the performance of *Escutorium*[95]. All of this represented perhaps the greatest challenge in learning the piece, since such a position, initially very uncomfortable, quickly fatigued the musculature, thus reducing my daily working time. After a while, a fine adjustment of the movements (perhaps associated with a strengthening of the muscles) enabled energy savings and longer study sessions; however, it is still difficult to practice for more than 40 minutes without breaks. A final challenge is the stability of the instrument, since certain techniques (especially the very strong taps necessary to compensate for nylon strings) and shifts (especially of the right arm) take the guitar away from its optimal position and leave it suspended in an unstable manner. This increases the chance of error and jeopardizes concentration.

The type of guitar, disregarding the strings (see below), did not present any major problems: the nylon guitar body presents a behavior similar to that of Folk for the PRs mobilized in the work.

Nylon strings, however, constituted a challenge. Their performance in tapping is inferior to steel, thus requiring a great technical effort to extract a good sound that is satisfactorily balanced with the basses and the PRs. In this context, the state of conservation of the basses is very influential, as their wear helps the balance with the trebles – but of course, creates other problems. Steel strings also have "explosive" properties, at least concerning *tap harmonics* (5.3(harm._nodes)/A.Bgp). It is an exuberant feature not easily reproduced in nylon.

The video uses audio capture with pickups and microphones. This certainly influences timbre and sound balance. It is not possible to reconstruct the exact sound of the music without amplification/ recording.

[95] To the point of causing injuries to the right shoulder and a chronic discomfort that persisted for months. See chapter 4, "Body Care"

CHAPTER 4

PLAYING PERCUSSIVELY

In this chapter, we will examine various facets of the use of the guitar as a percussive instrument, with an eminently practical focus. The perspective is most of the time that of the creative performer, very close to the practice of *tocautoria*, but also useful for composers[96], and can be applied in performance (including improvisation), composition, transcriptions, adaptations, as well as analysis.

We begin with a discussion on general aspects of this practice (Percussive Playing, including Stability, Guitar and Body care, Idiomatics, Integration) in the First Part.

Next, in the Second Part, come descriptions of the building blocks of percussive playing (that is, the vectors that form the PRs and SFs (guitar and hand parts, actions), with a small comment on playing positions), a description of the most relevant PRs and SFs, and an exposition of some final technical aspects (Special Techniques; Simultaneities and Sequences).

The Third Part is a short remark on notation from a general point of view (specific notations were commented on in the Second Part). A short theoretical exposition precedes a few practical recommendations for notating percussive elements within functional systems.

In the brief final part, we offer a quick comment on how to incorporate percussive playing into classical concert practice.

It is reasonable to expect some degree of idiosyncrasies derived from the specific sample used in the analysis[97] and the subjective component of the research, despite all the efforts made to converse with the theoretical literature and to expand the matrix of musical experiences – works or not – used to ground our research. We would like to emphasize this subjective component, as it affects many aspects of what follows – the perception of difficulty of each specific PR, the amount of strength that

[96] We emphasize that "performer" and "composer" are *functions* more than entities (FERNANDES, 2013); the same person can develop both activities in different moments, or even together (*tocautoria* or some kinds of improvisation).

[97] Not only the 20 works that were analysed in-depth, but all the works and practices visited during the research and mentioned througout the text.

can be safely used in the guitar, the sound of the various PRs and SFs, etc. Our biases manifest themselves also in the selection of works, the kinds of analysis used, how we organize percussive playing – including the groupings made in the descriptions –, and the content of the discussions of each topic. Some omissions are, therefore, unavoidable, also because of practical limitations.

With that in mind, we would like to remember yet again that percussive playing is vast, and art involves creativity. Both react poorly to intents of confinement. Aware of that, we would like the following pages to be read as an initiative at organizing existing knowledge – both formalized and tacit – and as a sharing of systematized personal experiences. The objective is not to restrain percussive playing to what we chose to describe but to enable practitioners to depart from its state of the art, which, from our perspective, only contributes to expanding its horizons.

FIRST PART

PERCUSSIVE PLAYING

STABILITY

One of the major problems of positioning the guitar for percussive playing is stability. As percussion can easily take the hand-arm complex away from the instrument and creates impacts that are not counterbalanced by an opposite fixation, it can turn the guitar, taking it away from the optimal playing positions. That is amplified by the effect of pulling/striking at the edges: the neck and headstock function quite literally as leverages. An additional problem is that the *standard playing position* (see ahead) relies on the contact of both arms with the guitar, and that might not be guaranteed in intensive percussive playing.

The major problems are the strokes that rotate the guitar so that the arm-headstock project ahead, or, conversely, area **2.1(B)** is projected ahead. The former tend to return more easily to playing position, but not the latter, which requires an active effort of repositioning the guitar. That renders some passages almost impossible to play or at least increases the errors significantly.

To correct those problems, straps that keep both ends of the guitar fixed are recommended. In our experience, they should aim primarily at immobilizing the guitar around area **2.1(B)** (inferior part of the lower bout), and, secondarily, areas **7** or **6.3**. They can be affixed with the use of suction cups (Carpenedo, 2020, p. 153), such as the one seen in Fig. 60, or traditional strap supports for guitars. Carpenedo (*Ibid.*) devised a simple, ingenious solution to the problem, using a suction cup and a simple strap aiming at area **4.3**, as shown below[98]:

Figure 60: Guitarist Amanda Carpenedo shows her solution for percussive playing in *standard playing position*. Source: Carpenedo (2020).

CARE WITH THE GUITAR

Perhaps counterintuitively, percussive playing does not require much deviation from normal guitar care. Hirschelman, a pioneer in writing specifically about "percussion techniques for classical guitar" (2011), advises care with the percussion to avoid damaging the instrument (p. 76). He recommends avoiding nails on the soundboard, especially those soundboards with French polish. That coincides

[98] She has since then proposed fixating the suction cup at area 3.1 (B). thus more effective immobilizing the inferior part of the lower bout as we proposed.

with our experience, and is perhaps the only specific topic to care about, as area 2 is particularly sensitive (see "Area 2 – the soundboard" ahead). He continues to state that "thick lacquer finishes are more forgiving to percussion techniques, but it is still possible to damage them".

Despite Hirschelman's initial warning, the subsequent literature seems to be less worried about that problem. More recent works, such as those by Woods (2013), Josel and Tsao (2014), Schneider (2015), Frengel (2017), Rauscher (2017), Kellie (2018), or Carpenedo (2020) do not mention the problem at all. That seems to indicate that the practice has, over time, been determined as being sufficiently safe, as long as it is contained within what we could call "common-sense margins"[99].

While Dawes (2019) reports that he uses a fortified soundboard, and new folk guitar models with reinforcements aimed at percussive playing have recently been released – for example, Petteri Sariola-dedicated model CWG23s from Cuntz Guitars (ACOUSTIC SPECIAL, 2018, p. 98-101) –, that is by no means a requirement. After almost a decade of frequent percussive use of a single instrument, ours shows no signs of any meaningful damage whatsoever.

That notwithstanding, we would like to stress a few basic ideas to guarantee the safety of the guitar:

a) Accurately measuring the strength usable on each guitar part. Progressively test each, with different body parts, to carefully measure their response. Generally, the guitar can withstand the level of strength applied in "normal" playing, and usually even a bit more than what guitarrists might think. As a general rule, both for preserving the instrument and achieving an optimal sound balance, the average strength applied in percussion should stay safely below the level from which the wood starts to lose responsiveness.
b) Not only strength but also impact areas are important to measure the resistance of the instrument. The smaller the hitting surface, the more concentrated the impact, and therefore, the greater are the risks of damage. That means the nail tips or a single knuckle of a finger have more piercing and scratching power, admitting lower strength, while more dispersed impacts (such as those of body part D) enable more vigor.
c) More frequent visits to luthiers for adjustments and check the structural integrity of the instrument are recommended.

[99] Sariola (2020) reports that he has broken or damaged several guitars over the years, but he recognizes that he uses exceeding strength while playing, especially in live shows. No other such accounts were found during the research.

d) If a guitar is being built which has percussive use in perspective, the use of a stronger varnish on the soundboard is recommended. A slight reinforcement in the soundboard, one that does not compromise its sound qualities, could also be considered, despite not being essential.
e) The use of plastic protections on the soundboard to protect the more used areas and those in which the nails might play is highly recommended.

It is expected that the varnish of a guitar used for percussive playing will require maintenance more often and that keeping a pristine visual aspect in such instruments will be difficult.

BODY CARE

Playing percussively, as any other process of learning an instrument, requires building up motor control and refining sensation and hearing. Also importantly, it requires developing muscular fitness, and that can be risky if not made sensibly. That is so especially for trained musicians who venture into percussive guitar playing, understandably aiming at more complex musical results from the beginning.

There are several ways to overcome the difficulties of building up physical aptitude and diminishing the risks of hurting oneself, and they are similar to the care any instrumentalist needs to take in their daily routine. Below, we share some precautions we have learned with our practice with percussive playing.

a) Pauses/resting time:
    a. Generally stopping **before**, and not **after**, the fatigue.
    b. Making frequent small rests during the study, with the added benefits for concentration.
    c. Extended rests within various timespans such as a day, a week, a month, and a year should be considered in cases of intensive practice.

b) Repertoire and study techniques:
    a. Choosing a repertoire adequate for the technical level of the performer;
    b. It is generally worth investing a significant time in finding easier solutions for particularly tense passages.

c. Rotate the studied passages and repertoire, so that the different muscular groups have time to rest.
d. Invest time and efforts in alternative ways of studying difficult, tense passages, such as mental study, solfege, deconstructed study of the musical aspects of the passage (rhythm, dynamics, etc.), among others.

c) <u>The body, relaxation, and sensation</u>

a. Try to focus the effort on the active body parts in each passage, leaving the rest of the body relaxed – special attention should be paid to shoulders and legs;
b. While practicing, do not maintain any extensions or contractions for too long: return the fingers, hand, or arm to a relaxed state even if they will soon be deployed again.
c. Reflect on the best muscular groups apt for a certain passage, using bigger groups whenever agility and precision so permit.

There is also the risk, less common for guitarists, of sustaining body damage due to striking hard surfaces with fingers, hands, and arms. It is necessary to be especially careful with the stiffer guitar parts, such as area **4**, and those with protuberances, such as area **1**. In those cases, studying slowly and mainly at lighter dynamics, in addition to all the aforementioned, is advisable.

A cautionary note:

I had experiences of hurting myself while learning percussive repertoire. One of them was extended fatigue when playing Escutorium*, in which a certain awkward position (r.h. use at* ***area 6****) appears in some technically difficult passages. That required a lot of practice. After a few days, an intense pain appeared, to a degree that interfered with sleeping, and it persisted for months, while playing the piece and a long time afterward. I suspect I was on the verge of permanent damage, having barely avoided it with a routine of physical exercises and by moderating the practice. The other one was a soreness in area* ***B*** *of both hands from extensively playing in area* ***4****.*

It is interesting to note that, because playing inherently involves some physical discomfort, it takes us time to realize that something is out of place. Lima (2007), in a study with 33 violinists, came to a similar conclusion:

> It is observable, however, that while performing the activity, they [the musicians] are not conscious of these postural adequations, increasing, as mentioned, the workload, which possibly contributes to the persistence or appearance of symptoms like pain or muscular fatigue, among others.[100] [translated by the author]

That is very dangerous, and for that reason, I advise frequent rests, even in the absence of strong fatigue indications.

Strengthening that body part after the discomfort ceases (or, ideally, before it appears) through well-directed exercises and discovering clever ways of studying that require less time spent in the dangerous passages are the solutions I found and recommend. In the case of persistent pain or fatigue, seeing a professional is mandatory.

IDIOMATIC PERCUSSIVE PLAYING

The term *idiomatic* is used here in the broad sense of achieving optimal results with the minimum possible efforts, which is normally a function of inherent physical properties of the instrument in relation to the motricity of the performer; it involves, therefore, ergonomy, anatomy, and principles of parcimonious energy expenditure.

There are many general principles to guide what can be considered idiomatic playing, and they are similar to the ones valid for other techniques. Despite our efforts in generalizing them as much as possible, their application varies greatly according to musical context, and sometimes expression might ask for non-idiomatic solutions; idiomatic playing or writing is a tool and not a prison.

We present here good idiomatic practices as well as some non-idiomatic situations best avoided when possible. They are useful to have in mind while playing or developing an interpretation but are

[100] From the Portuguese: "*Observa-se, no entanto, que enquanto realizam a atividade, eles não percebem essas adequações posturais aumentando, como já dito, a carga laboral podendo contribuir para a manutenção ou surgimento de sintomas como dor ou fadiga muscular, entre outros*" .

especially important for composition and transcriptions/adaptations. They are of especial relevance in fast or dense passages.

IDIOMATIC PRINCIPLES

Alternation (of hands, hand parts, fingers): A fundamental principle in percussive guitar playing, also present in the practice of other percussion instruments, alternation concerns respecting the limits of the body. With it, the player can use strong and fast muscular groups repeatedly, without straining them. A most important alternation is that between hands, also called playing "in sequence", which implies **avoiding simultaneities** between them. It is a principle that orients most of CG percussion, and, to some extent, FG as well, as attested by Thomas Leeb (2011): "It is never just the right hand, it is always left, right, left, right…".

Fixed hand position/smaller movements: The smaller the movement, the faster it can be executed. Therefore, leaving the hand stationary allows for greater agility. That also stands for the different hand parts.

Repetition, patterns, or logic progression: It is not only about muscles; the mind must also function quickly in fast chains of movements. Repetitive smaller patterns or predictable progressions lighten this mental burden. The simple alternation between hands is an example of a simple idiomatic pattern.

The arrival is more important than the departure: That concerns shifts of various natures. It is so because at the departure the previous action is already carried out; all the effort is put into the action to perform next. That means that considering any isolated 2 actions, if the second one is too difficult, the chances of error are greater than if it were the other way around.

Arrivals in less precise techniques: A derivation of the previous item. Changes in TGs, guitar areas, or body parts are more idiomatic when they go *from* more precise *to* less precise techniques; if precision is required in the arrival, any big changes (in hand presentation, shifts, etc.) should be made before that.

Intersperse easy actions among the difficult ones.

Use of adjacent guitar areas.

Use of corresponding fingers and the length of the hands: The distance between the fingers and the size and shape of the hand can be used to diminish both the distance and time of shifts, as well as to employ different, "rested" muscular groups. For example, a r.h. hit on the bridge followed by a r.h. hit on **2.3** should be executed with ***a*** (or ***c***) followed by ***p***. If they were preceded by a r.h. hit in **2.2**, this should use ***i***, to leave the other hand-splits free and better positioned for the following movements.

NON-IDIOMATIC SITUATIONS

Too much variation: Mobilizing changing body parts avoids extenuating them, but is mentally taxing; too many different guitar areas are difficult for the mind to process and tend to create bigger movements. Fig. 57 shows an example from *As Entranhas da Terra*, featuring a 15-successive-PR acciacatura:

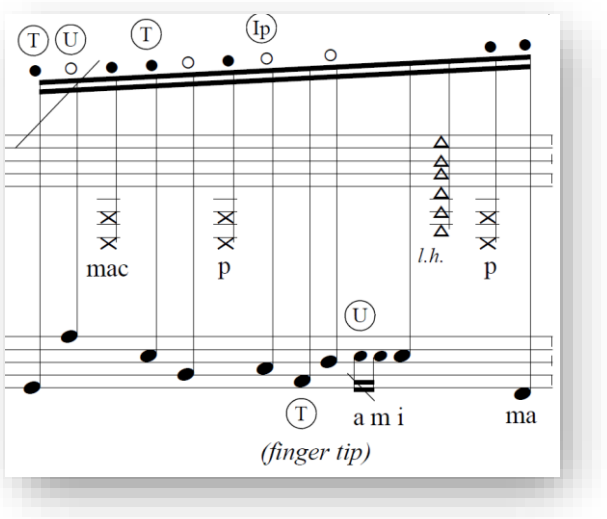


Figure 61: As Entranhas da Terra, p. 5, second system

Movements that take the hand out of position: that includes large movements between distant guitar areas, or changing the presentation of the hand (for example, closing the fingers to use area **B,** and then using them stretched again).

Repetition of the same hand-part: Fast double-strokes or *diddles* (HIRSCHELMAN, 2011, p. 80), or even triple or multiple strokes, are possible to perform and useful in several situations, but they are more physically demanding than alternation.

COMBINING WITH OTHER TGS (*INTEGRATING*)

We have been calling the process of combining different TGs *Integration*. It is regulated by many variables, such as ergonomy and musical context, but the most important is: **Deviations from the *standard playing position* (see "Positions") make TG integration more difficult**. Let us examine the behavior of each hand while integrating:

The r.h. can either *stay around*, *come back* (PR → other TG), or *depart from* (other TG → PR) its "natural" habitat around areas **2.1-2.2** (exceptionally 2.3).

Moving to/from that position requires time. This can be granted by the l.h. executing at least one event(s) (ideally two or even three, if the r.h. is too distant from **2.1**) within a sequence.

The l.h. will generally be required in area **5.3** for other TGs; therefore, it must either *stay there*, *go back* (PR → other TG) or *depart from it* (other TG → PR), the last two requiring time. In that case, the r.h. must assume the conduction of the sequence for 1 to 3 events.

As stated, it is always harder to **move towards** more precise techniques than to **depart from** them. This means that:

a) Very precise techniques, such as much of the *punteado*, require some kind of preparation. This can mean having the hand in position before the execution of the technique (for example, shifts should be made in the preceding movement, not immediately before the intended technique), introducing some element of the new technique in the previous movement, among other solutions.

b) Generally, it is easier to go in the direction plucking → strumming → PR than the other way around.

Another aspect to consider about percussive playing, and that seems to be largely ignored by the specialized literature, is the *balance* between different TGs.

As it is much easier to unconcernedly strike the soundboard than playing a plucked passage, we can say that *tendentially* – that is, considering comparable circumstances – and *on average* some paradigmatic PRs (**2/A.Bgp, 2/Bgp**) sound louder than plucking. That is also valid for some particularly sonorous PRs, such as the *snap* or the Bartók *pizz.*. Strumming is also tendentially louder than plucking.

That means that, while the integration between *rasgueado* and percussion is generally not an issue, that between percussion and plucking can be.

There are no ground rules concerning the achievement of the optimal balance because that depends on taste, musical context, guitar, acoustic environment, amplification, etc. However, playing lightly on the soundboard (or, eventually, at the back) can generally help to achieve combinations in which both TGs are clear. That technique must be specifically developed, especially for those movements that use larger muscular groups and shifts.

Also, the more common use of definite pitches as basic material for the compositions usually implies bringing the percussion to the 2nd or 3rd layers of the texture. When the intention is producing loud percussion, however, that generally makes combinations with plucking less practical.

If a particular passage is too difficult to be combined because of the superior response of the PR, we suggest the following measures:

a) changing the hand part or guitar area for one less responsive.
b) diminishing the number of fingers involved
c) changing the guitar area or hand part to reduce the length of the movement, gaining more time and control
d) other more traditional solutions that ease the passage and leave more space and time to control dynamics, such as cutting notes or other musical events, performing a *ritenuto*, etc.

If, conversely, the PR is too soft to be combined with pluckings or strummings, a common occurrence with PRs that use the ar action, *backtones*, area 5.4, among others, the solutions could involve

a) Changing the hand part or guitar area for one more responsive
b) Involving more body parts and/or bigger muscular groups in the movement
c) Reducing technical stress in louder techniques to enable more dynamic control. That can be made through traditional methods, such as cutting notes, simplifying chords, playing slower, etc.

We emphasize, though, that because percussive playing is so diverse, most of the time solutions should be found on a case-by-case basis. The most important recommendations are, then, paying attention to this specific parameter – balance – and continually refining the hearing.

SECOND PART

DESCRIPTION OF THE ELEMENTS OF PERCUSSIVE PLAYING

GUITAR AREAS

Guitar structure

The responses of the different guitar areas follow no simple pattern. There is, of course, a considerable regularity that comes from many common principles in guitar construction (woods, form, tensions, strings, etc.). However, the variations can also be significant for guitar percussion (HIRSCHELMAN 2011, p. 79; WOODS, 2013, p. 6; JOSEL AND TSAO, 2014, p.159). Not just the sounds themselves vary from guitar to guitar but also the relations among them; moreover, different *techniques* prompt different response behaviors in the same guitar area (eg, area **4** presents much more timbral variety when tapped with the nails than the flesh of the fingers). There is still, of course, the influence of the environment to consider: acoustics, humidity, temperature. Therefore, any attempt to organize the guitar parts according to sonic parameters (duration, intensity, timbre, pitch) will be, at best, limited, if not circumstantial. To give a few more examples: sub-area **2.1** will be systematically louder, longer-sustained, and darker than all sub-areas of area **4**, but such a stable principle is not to be found when one compares, for instance, sub-areas **2.2** with **2.3** or **2.2** with **6.2**; area **2.2**, which can produce a brighter feel than area **2.3** when certain techniques are employed, but not others. This means that *in loco* experimentation is always the best way to assure the intended results. We shall, nevertheless, try to ascertain a few general ideas about the various areas and their behavior, based on ergonomy and the characteristics of the instrument and the human body.

We will begin with a very important principle to keep in mind at all times: **junctions limit the vibration of the material**, be it wood, metal, or nylon. That generally makes the **pitch and/or timbre higher/brighter, the duration shorter, the intensity lower**, **and it numbs the general sensitivity** (diminishing possible variations and making the PRs harder to control). That is often used as a fixated compositional element in the literature for percussion instruments (distinguished as rim/center), but

not so often in the guitar[101] – probably due to reduced responsivity and use, this kind of variation is usually left to the sensibility of the performer. All things considered, **an effective percussive technique should, as a general rule, aim at the more vibrating areas, as far as possible from the junctions –** except when timbre variety is explicitly sought.

Despite some minor differences in concept, the construction of the guitar generally aims at maximizing the vibration of the soundboard, the main responsible for sound production. The other parts are supportive or serve to modulate the sound (fingerboard). In the soundboard, the area around the bridge (**2.1**) is the most vibrating. The bridge itself (**1**) is also very resonant, and it connects the strings (**5**) to the soundboard physically, enabling direct energy transmission. All of that means that areas **1**, **2**, and **5** are the most responsive, as partially reflected in the statistics of *use* in our analysis. Despite producing their own tone colors – after all, they differ in shapes, sizes, materials –, the other areas are also, to some considerable extent, resonated **in the soundboard**. This is probably a factor that diminishes overall timbral variety in the instrument, a characteristic particularly notable for areas **6** and **7**, whose percussion strongly evokes the dark low sounds of the soundboard; areas **3** and **4** have a little more identity, since they are thinner (more vibrating), have a bigger overall area (bigger distances from junctions) and participate in the resonating box (therefore influencing the sound directly, albeit discreetly).

Guitar construction is also almost[102] bilaterally symmetrical along a vertical[103] axis. That means that the sounds produced in **parts A** or **B** (as defined in the FH Code) are, for all practical purposes, identical. It is important to distinguish them, however, because of technical convenience; related to that is the fact that ergonomy and guitar position will induce some PR prevalences in each area (eg., areas **4.1** and **4.4** are almost always used in **part A**, as do the r.h. thumb in conjunction with area **1**; r.h. ***imac***, on the other hand, are much more frequent in **part B**).

Carpenedo (2020, p. 70-75) presents an analysis of several "mappings" of the percussive possibilities of the guitar. Among her findings and in our consulted literature (COMPANY, 1965; HENZE, 1976; LUNN, 2010; HIRSCHELMAN, 2011; JOSEL AND TSAO, 2014; RAUSCHER, 2017; DINIZ, 2018; DAWES, 2018; FREIRE, 2020), perhaps the most serious attempt at systematizing the inherent percussive

[101] With some notable exceptions, like Company's *Las Seis Cuerdas*.
[102] Small differences, such as an arm rest, a soundhole, a bevel, installed audio parts or even the eventual asymmetric bracing, generally have a small to no impact in percussive playing. Not considering, of course, the separation between the strings (basses/trebles).
[103] In standard position, with the headstock upward.

capabilities of the instrument was made by Josel and Tsao (2014, p.162)[104], who present a diagram (Fig. 58) that is a truly in-depth inquiry on percussion with the guitar:

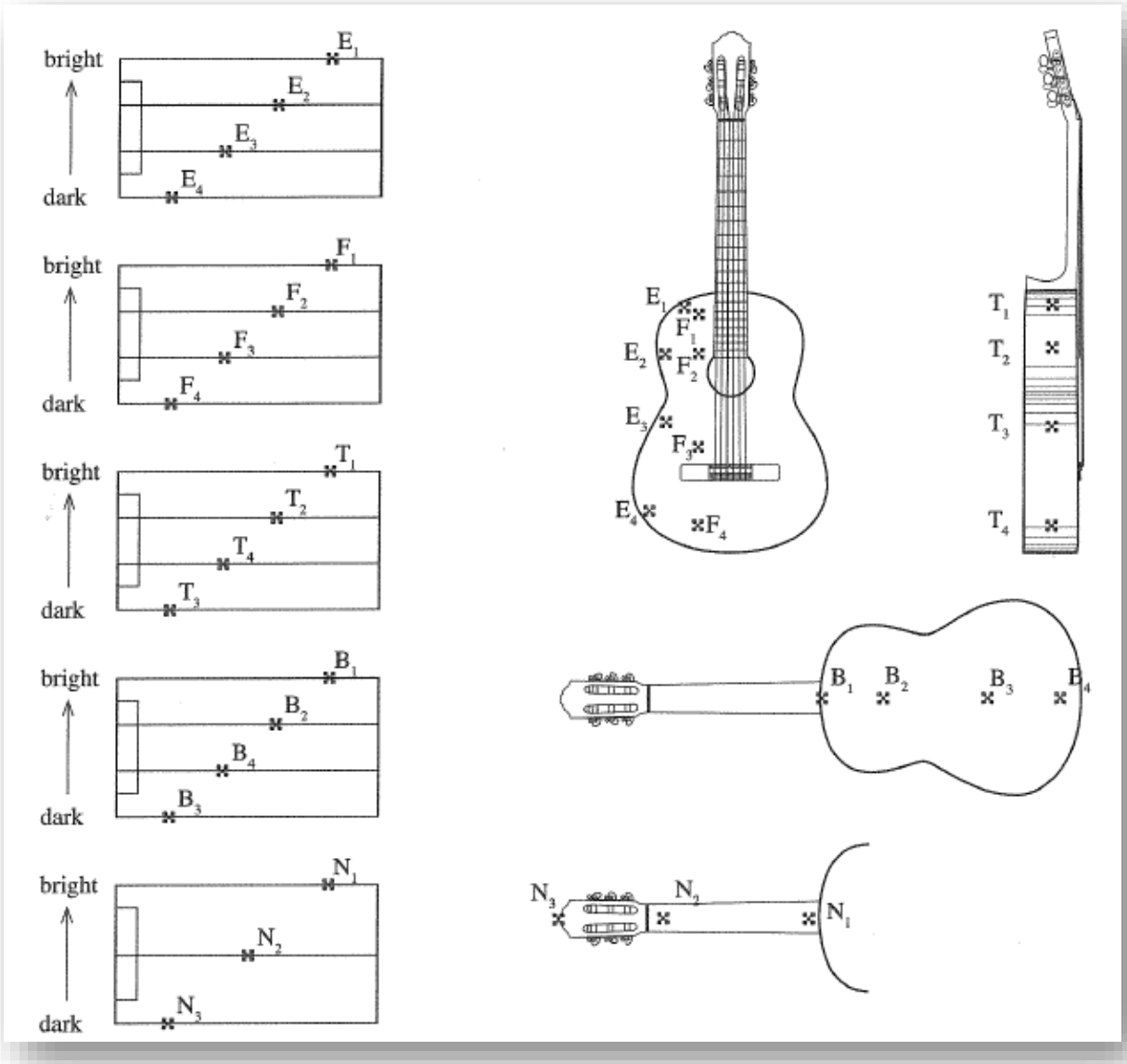


Figure 62: Percussive map. Source: Josel and Tsao, 2014, p. 162.

Let us briefly discuss their proposal. The letters indicate what we call "areas", with numbers being equivalent to our "sub-areas". They arrange their diagram so that it progresses from "brightest" (E) to "dullest" (N). Even if the exact meaning of that is not totally clear to us (timbre? Pitch? Responsiveness/loudness?), we do see some possible divergencies in the fact that area **3** ("B") is more resonant (albeit darker) than area **4** ("T"), while area **2** ("F") is undoubtedly lower in pitch and

[104] Alvaro Company (1965) also created a complex notational system that implicitly divides the guitar in several parts. However, he was not totally comprehensive nor did he pursue the task of organizing the instrument parts according the their characteristics, with a corresponding discussion.

timbre (albeit more resonant) than the sides. One way or another, there seems to occur a small inconsistency in the placement of area **4** ("T").

Timbral evolution within the guitar areas is, as a rule, a (non-linear) continuum. As such, any spatial regions or points used as references within those areas will be necessarily arbitrary – which means there are no "correct" divisions of them. We do feel, nevertheless, that reference points are less useful than areas, and less grounded in practice[105], and that references too close to the junctions (such as B4, E4, and F4, see Fig. 58) are somewhat redundant for two reasons: because the junctions are, themselves, references, and because, more often than not, these points/areas will be avoided in favor of more responsive ones.

As for the sides, their wavy tridimensional form requires attention, because the curves stiffen the wood, changing timbre and reducing its responsiveness. They end up creating 3 predominantly flat segments (**4.1, 4.4,** and the bottom) and 3 curves (upper bout (**4.5**), lower bout (**4.3/4.2**), and the one between **4.1** and **4.4**, which separates both bouts). Because they present distinct features, only two of their three flat segments (**4.1** and **4.4**) should most certainly be used as references; the third, the very bottom of the guitar, is too dull and rarely, if ever, used. Similarly, two out of three curves as well, those of the upper (**4.5**) and lower (**4.2** + **4.3**) bouts; the one that separates them is too stiff and narrow and seldom activated. Interestingly, the authors divide the upper bout (our area **4.5**) into two areas, while we do the same with the lower bout (separating their T4 into **4.2** and **4.3**). All of these divisions have technical and timbral reasons, but it is clear for us that coherence of procedure demand that either both curves be divided or none of them; we are inclined to think that a better segmentation of the sides, more corresponding to their shape/sound and more parsimonious, would be in four[106]: two flat segments and two curves[107].

For the sake of a simpler explanation, we also preferred to divide the guitar areas mainly in three, instead of four, believing that it covers the potential timbres of each reasonably well[108]. Echoing the practice – but not necessarily the inherent potential of percussive playing –, Josel and Tsao join the neck and headstock together, dividing this seldom-used compound into three parts. That happens because, while our segmentation is mainly technically-oriented, theirs is sound-oriented; from that

[105] Despite the drawings, that was probably the spirit of Josel and Tsao's proposition as well.
[106] Exactly as implicitly proposed in the notational system of *Las Seis Cuerdas* by Alvaro Company in 1963.
[107] We intend to include that as an update in the next version of the FH Code; see the closing remarks.
[108] We left the possibility of contrast between center and border (junction) of each open.

perspective, we would agree with a less specific division, as the sound results in those areas vary generally less than in others. However, we object that a) there is still significant timbre variation to be found in the middle of the neck and the middle of the headstock[109]; and b) in our experience, N2 is brighter than N1.

All things considered, we feel more similarities than divergences between our guitar maps. Having highlighted the main divergences, we will carry on exposing our proposal for guitar segmentation, following the FH Code.

In Fig. 59 we present a small diagram of inter-area comparison, leaving the behavior within areas to be discussed in individual entries. We do that because they are often wide enough to create large intersections between areas; for example, there are sounds to be found at the sides (e.g., 4.1(A)/E(MD)gp) which are lower than some of those at the back (e.g., 3.2(A)/C.A(MD)gp) or even at the soundboard. Fig. 63 is then an approximation of the "averages" of each area:

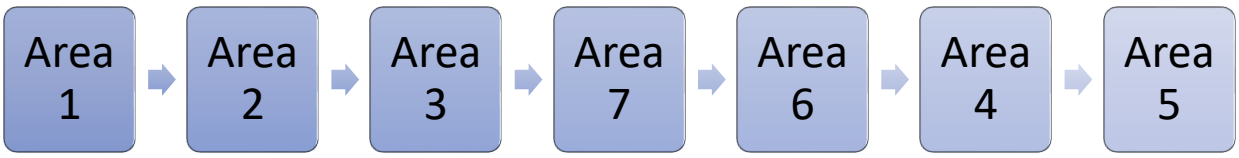


Figure 63: Comparison of the approx. average of "brightness" of each guitar area, progressing from dark to bright.

Interestingly, that does not correspond exactly with responsiveness averages, as shown in Fig. 64:

Figure 64: Comparison of the approx. average of responsiveness of each guitar area, progressing from dark to bright.

[109] In this last case, a surprisingly dark sound!

As mentioned, these assessments are approximations made by ear, variable according to the technique employed and the guitar. A more interesting proposal for the organization of PRs, overseeing the entire instrument and techniques, is the application of software of timbre analysis to classify a large sample of sounds, creating a "timbral map" out of the results. We will discuss preliminary results in that area in the Closing Remarks.

Ergonomy is another factor of major importance, considering the asymmetries between the guitar and the human body. The relation of these two entities is fundamentally regulated by the playing position, determining what is possible or not to play, and how easily. For example, in standard playing positions, the parts of the guitar facing the ground are more distant from the comfortable playing range of the hands and offer poor visual reconnaissance; or yet, in lap position, all the soundboard is equally accessible. Many incompatibilities or difficulties are obvious, such as playing in the headstock with the r.h., in area 4.2 with the l.h, or worse, both at the same time. Other situations are mere inadequacies, such as using *p* in area 2.1(B), but must still be accounted for to achieve optimal playing.

In the most common positions, the body of the guitar is closer to both hands and arms, a little more to the r.h. than to the l.h.; the headstock is a bit farther away, especially for the r.h.; and the back is generally hidden. That interferes greatly with the convenience of using certain areas and PRs, as seen by the obvious predominances (l.h. in the fretboard, r.h. in area 2, l.h. higher-than-average participation in area 4.5, low usage of area 3, etc.).

The possibilities are many and impractical to cover comprehensively, so experimentation is recommended. Specific advice will be given in each entry. An alert: players often overlook ergonomy/position when searching for solutions to technical problems, so it is important to keep an open mind for trying new playing positions.

A last general aspect that should be considered is the total size of a given playable surface/area with constant sound response (materialized in our research approximately as the sub-areas). The bigger the total playable area, the less precision the PR will require, making them easier and fit for a greater number of technical and musical situations. To give an example, that is a possible explanation for the diminished use of area 1 when compared to areas 2 and 5, despite them being similarly resonant.

AREA 1 – THE BRIDGE

The bridge consists of a "castle", made to hold the strings, a saddle, which transmits their vibration to the soundboard, and "wings" that sprout out of them with fixation purposes. In this area, we generally find the darkest sounds in the guitar. Its response is similar to that of the soundboard, but its use is hindered by two factors: its complex shape, full of corners and recesses, and its reduced area. These probably explain its residual use in percussive playing (**approx. 2,3% Use**), almost 20 times less the area **2**. We found out, however, that many PRs are conveniently performed there (such as variations of *güiro* and taps with *p* and *c* analogous to **2/A.Bgp**), and that the technical cost is often not so high as to dismiss its distinctive deep and loud sound. Additionally, it is a bit more resilient than the soundboard, being a good alternative for the use of nails. It is adequate for **gp**, **rg** (in the güiro) and **ab** (dampening) actions, with body parts **A.B** and **C**, and, to a lesser degree**, B.B, B.C, D**, and **E**. Table 13 summarizes those applications:

Area 1 applications
Deep, low sounds (timbre variation for area 2)
Large dynamic range
Tremolos with forearm rotation (*p* x *ac*)
Güiro
Careful use of nails

Table 13: applications for area 1.

Diniz (2018) makes extensive use of area **1** in his *Escutorium*, which is a uncommon occurrence. There, area **1** participates in a variety of textures, from tremolos to melodies of timbre and pointillist kaleidoscopes, as in Fig. 65:

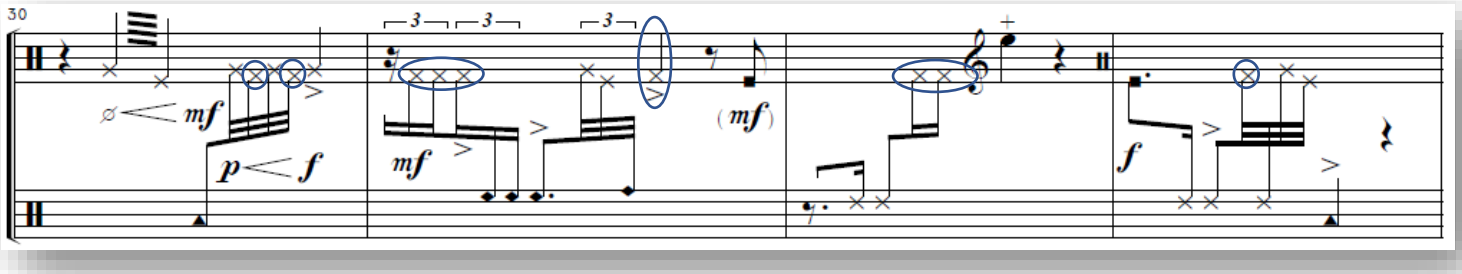


Figure 65: Escutorium, bars 30-33. Taps at the bridge are highlighted in blue (first staff, first space). They are used in timbric melodies along with sounds in the soundboard, arm, and nut.

AREA 2 – THE SOUNDBOARD

This is arguably the most important area for all TGs. For percussive playing, it offers the second largest and the most responsive surface of the guitar. Additionally, it is ergonomically accessible to both hands, especially the r.h., with which it is possible to alternate between TGs without big shifts. Because of that, it alone responds for approx. **43% of the Use** we measured in our sample.

This area bears the greatest responsibility for the sound production in the guitar, and not only for the sound of the strings, or the sound of percussion on itself or in the soundbox as a whole. **Tests[110] indicate that it is also responsible for an important portion of the sound produced when tapping the sides, the arm, the back, and the hand of the instrument**.

Along the soundboard, even disregarding the striking influence of the performance technique on the sound result, there is a wide variety of nuances of timbre, pitch, and dynamics. In general, the sounds tend to become higher, more penetrating, thinner, and softer near the edges (junctions) and towards the fretboard/upper bout, and darker, more resonant, and powerful near the bridge, in whose vicinity we find the most sensible area of the guitar – that equals saying more dynamic range, fuller sound and a bigger pallete of colors. This renders the sounds produced there timbral variety even if, technically, hand area **A (55%)** and action **gp (83%)** are largely prioritized.

The soundboard of modern guitars can follow a variety of concepts and designs. There are three major branches – traditional, Australian lattice, and double tops – but innumerable variations. All of them use spruce or cedar as their main material. The traditional ones follow more or less the

[110] Muffling the soundboard and playing at various points, and measuring the response of several guitar areas through the use of piezos.

directives laid out by Antonio Torres (1817-1892) (OLIVEIRA, 2020, p. 123), and consist of a surface of wood with different patterned bracings on the inside. The "lattice design" uses reinforced bracing, often with synthetic materials, to obtain a thinner layer of wood that will achieve more sound power. Double tops are constructed with two very thin layers of wood (circa 0.5 mm) reinforced on the inside with patterns of Nomex or wood.

It is very important to ascertain the actual resistance of each soundboard to percussive playing. To the present, that does not seem to be sufficiently tested, and even luthiers cannot state what exactly works and how. Most of them seem to think that traditional tops have more mechanical resistance, and it seems clear that the other types of construction, with their very thin surface layers of wood, can be more easily pierced in the intervals of their reinforcements by concentrated impact points, such as those of parts B and C.

In our experience with a traditional guitar[111], most taps, even with body parts B and C (lightly) can be used – in this last case, with some superficial harm to the varnish, especially if it is French polish. Moreover, significant strength can be applied in conjunction with bigger body parts that spread the impact, such as D and E – for example, the same level of strength used to play very strong *tamboras* or to firmly knock at a door. As a general rule, however, we can only recommend playing within a safe strength margin and using hard tapping material such as bone and nails only sporadically. Some luthiers seem to think that double tops can handle stronger percussion, as long as the impact points/areas are not smaller than the intervals of their intern reinforcements (generally small hexagons with 3-4mm diagonals). Our limited experience confirms that, suggesting that even light taps with area B could be safe. Many players have successfully used "conventional"[112] percussion in lattice-braced guitars, but a constant and varied use is yet to be evaluated.

The use of plastic protection[113] has successfully avoided damage in the covered areas, even allowing for a more constant (but controlled) use of the nails, and is therefore highly recommended. Heavier protection such as hard plastic pads, on the other hand, can have a negative influence on the acoustic properties of the instrument.

[111] Luthier Paulo Marcos (Brazil), spruce, 2009.
[112] Eventual occurrences of **2/A.Bgp**.
[113] There are several options currently availabe in the market, like *Oasis®* or *Kling On®*.

All body parts can be deployed to activate the soundboard, through **gp**, **ar**, **ab** (dampening), and, to a limited extent, **rg** actions. This last action can be safely performed in the borders, on the plastic protectors, or, with great care, in area **2.3**; the other areas present significant risk of damage.

Sub-Area **2.1**, the area around the bridge, is the most responsive of the guitar. Its sound is deep and malleable, and it is close enough to standard playing positions of the r.h. to be used in conjunction with other TG without big hand shifts.

Sub-Area **2.2** coincides with the standard playing position of the r.h., thus offering the optimal solutions for TG integration. Its tone color is brighter than **2.1**, still offering good resonance and projection.

Sub-Area **2.3** is significantly less responsive than the other two, with a thinner and more brilliant sound, but at the same time more structurally resistant and recommended for actions with the nails, in case they are needed. It lies close to the *sul tasto* range of the r.h. but tends to otherwise incite bigger hand shifts. Conversely, it is better positioned for actions of the l.h., and good TG integrations with this hand can be achieved when it works in advanced fretboard positions (8th on).

Fig. 66 summarizes that information, comparing the sub-areas. It is never too much to remember that the progressions are not discrete, but continuous.

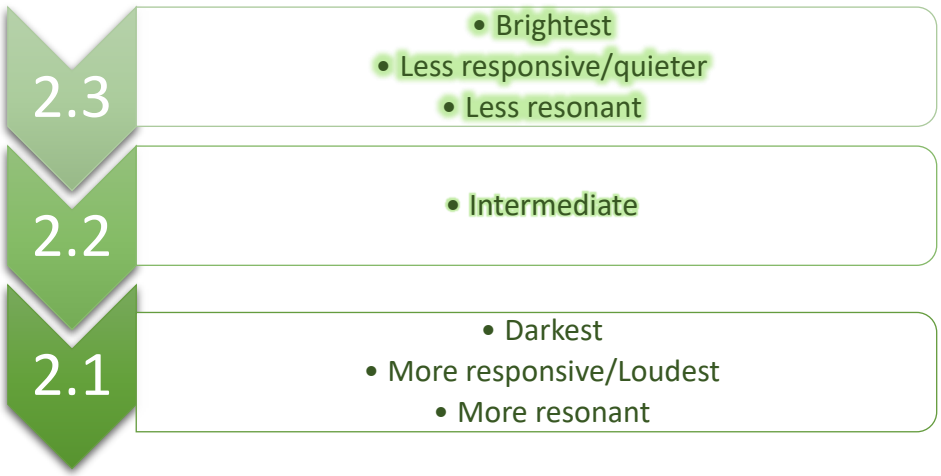


Figure 66: Sound evolution along area 2.

AREA 3 – THE BACK

This area is characterized by the largest *playable area* in the instrument, bigger than area **2** because it is free of "obstacles" – the bridge, the soundhole, the fretboard, and the strings –, being extremely docile to play in lap position. It is also very responsive but inferior to areas **1**, **2**, and **5** in that respect. It offers, however, unique tone colors, and a still relatively broad timbral and dynamic range. Another prominent feature is its positioning in *standard playing position*, almost totally hidden and out of reach; that is, undoubtedly, the reason for its unexpressive usage. Moreover, being opposite to the soundboard makes integration with other TGs severely limited.

That notwithstanding, we found out that in some positions – those with an ergonomic support or a footstool – it is still possible to find access to a limited portion of the back, especially with the l.h.; **3.3** is closer to this hand, while **3.1** is easier for the r.h. to reach. Body parts **B.A, B.B**, **C.B,** and the **dorsal part of the wrist**[114] are usable in this context. It cannot be used at all in lap position when facing the ground. We used that knowledge to obtain timbre variation and a scenic effect[115] in *As Entranhas da Terra* (see the corresponding entry), as seen in Fig. 67:

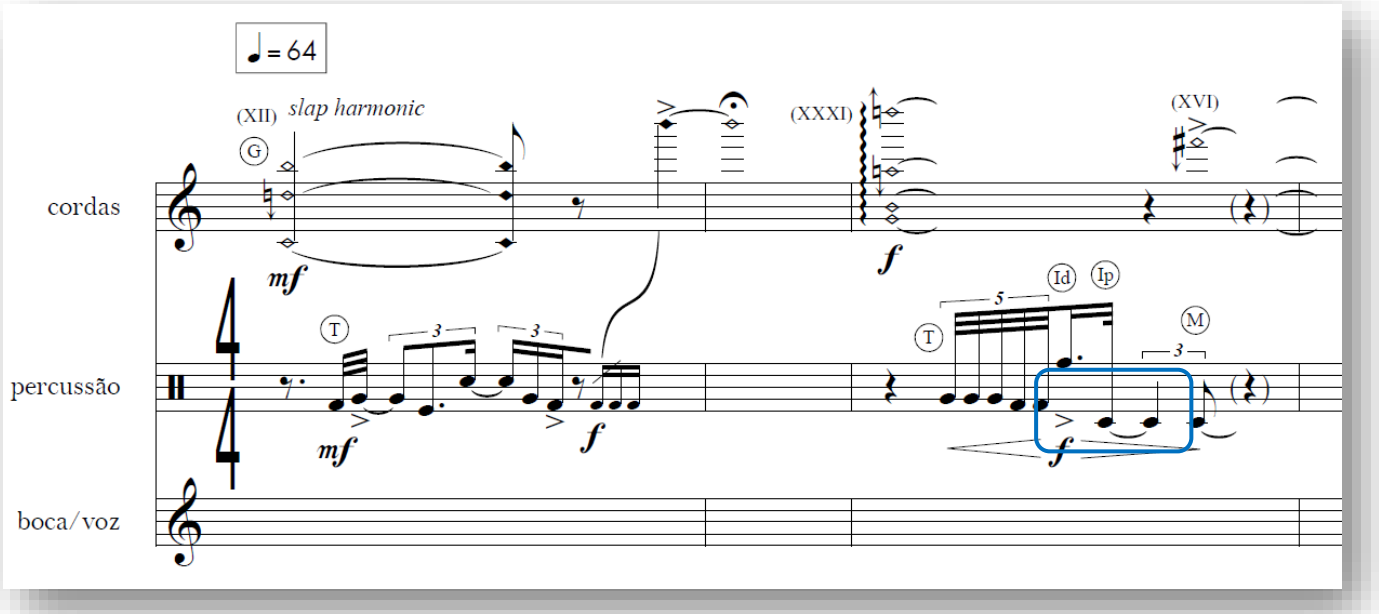


Figure 67*: As Entranhas da Terra*, bars 1-3. The percussive staff indicates several percussive taps (circled "T") on different areas of the soundboard and sides, finishing the semi-phrase with a descrescendo at the back (blue rectangle), using *B.B* ("Ip") and *B.A* ("M").

[114] Because it has not found application in the literature, this part of the body has not been coded. But it does raise a question about whether all the posterior joints of the arm-hand complex, starting at the elbow, should not be in the same category, an expanded "B" body area – see the closing remarks.

[115] The sound source is hidden from the public, because the hand discreetly plays behind the guitar.

Due to its available area, the back is particularly adequate for **ar** actions of all kinds, and we have used that potential to build the coda of the same piece (Fig. 68):

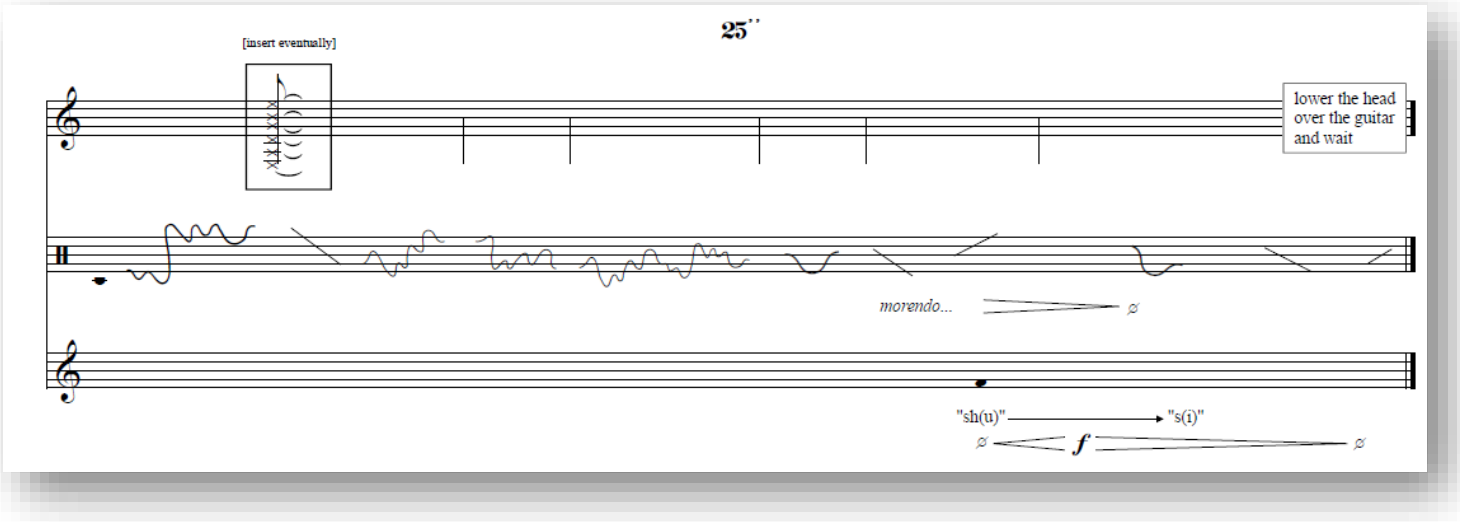


Figure 68: *As Entranhas da Terra*, last measure. The central (percussive) staff shows the ar action (character) in the back (character position in the staff).

Finally, the back is a little more resilient than the soundboard, thus admitting more energetic actions. The back functions much like the soundboard when it comes to the sounds produced. Fig. 69 approximates its behavior – it is never too much to remember that it is not discrete, but continuous:

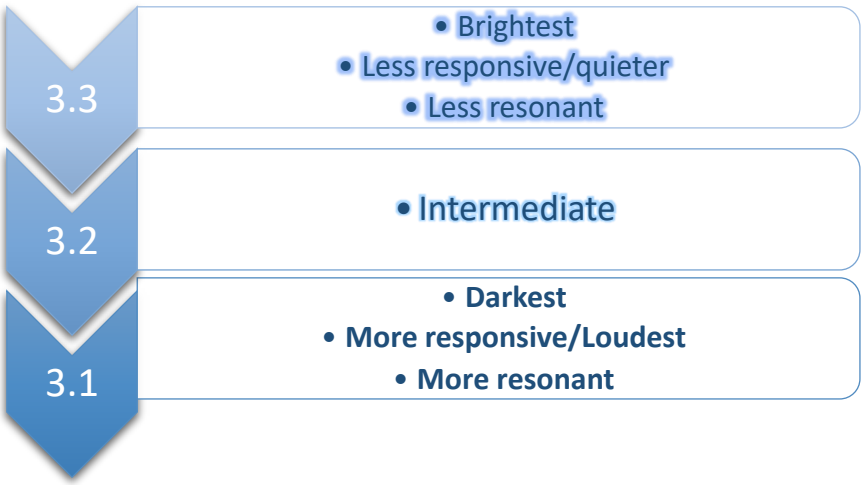


Figure 69: Evolution of sound along area 3.

AREA 4 – THE SIDES

The sides are no strangers to percussive playing, eloquently occupying the third place (around **17% Use**) among the guitar areas, according to our analysis. That is significantly lower than areas **2** or **5** (approx. half), but way higher (8 to 20 times) than the other areas. That means that, far from being mere coloristic, they constitute the very matter of contemporary percussive playing.

Differently from the other guitar areas, which, for all practical purposes, behave as surfaces (2D), the sides are convoluted by nature (3D). As previously discussed, their wavy surfaces radically alter their sound responses. They present two predominantly flat segments (**4.1** and **4.4**), which are their more responsive and darker sub-areas, and two curves (upper – **4.5** – and lower – **4.2** + **4.3** – bouts), which are, because of the stiffer wood, brighter/higher-pitched and less responsive. Overall, the sides present a palette of timbres as varied as the soundboard itself.

Their technical costs are, however, significantly higher: its form, position in the guitar, and function make access to their **B** (inferior) **part** problematic in most common playing positions. Moreover, a big part of their surface (the whole area between **4.2 (A)** and **(B)**) is dull, out of l.h. reach and takes the r.h. significantly away from the strings. Finally, the remaining playable areas present themselves at different angles, sometimes curved, and are thin – the sides are, after all, a stripe, whose big total area is poorly distributed for playing, as it was not their original function. Table 14 shows the availability of sub-areas in all playing positions.

Sub-area **4.1** has a response that approximately equals that of **2.3**, but is brighter; despite being less accessible than the soundboard, it is still the biggest free surface in area **4**, and it is therefore surprising that it presents relatively low Use (18% of total area **4** Use), indicating an open highway for future developments.

Sub-area **4.2**'s main feature is its combination with **2.1**, very common in FG (80% of occurrences) as popularized by Andy Mckee (see "Mckee Combo" entry), and, as such, 87% of the time it is performed in **part B** of the guitar. Thanks to that, it is the most used sub-area in our analysis, accounting for approx. **37%** of area **4** Use (around **7,4% of total use**, which is very significant, most of it in the mentioned combination with **2.1**).

Sub-area **4.3** is the least used of all (approx. **5,1% of total area *4* use** or **1% of total use**), functioning more as a gradation of timbre from area **4.2**.

Sub-area **4.4** is significant in percussive playing (approx. **18% of total area *4* Use** in our sample), probably due to the eventual technical convenience, as it is less responsive than area **4.1** and lacks the brilliance of area **4.5**. It is good to be used in timbral transitions from area **4.1** to area **4.5**.

Sub-area **4.5** produces the brightest sounds of wood in the guitar. Moreover, it gives easy access to the l.h., offering the r.h. some rare technical relief. Because of all that, it reaches **22% of total area *4* Use** (circa **4,5% total use**). We feel that there is still room for expanding its usage, especially with the r.h., as 100% of the occurrences in the sample used the l.h..

Table 14: Technical accessibility of all area 4 sub-areas in all different playing positions, differentiating its superior (A) and inferior (B) parts.

AVAILABILITY OF AREA 4 SUB-AREAS PER POSITION

	4.1	4.2	4.3	4.4	4.5
Lap	B	B	B	B	A,B
Footstool (left leg)	A	A,B	A,B	A	A,B
Ergonomic Support (left leg)*	A, B-	A, B	A, B	A, B-	A, B
Right Leg	A-, B-	A-, B	A-, B	A-	A,B
Standing with straps	A,B	A,B	A,B	A-, B	A,B
Inverted l.h. ("over the top")	As per guitar position	As per guitar position	As per guitar position	As per guitar position	Prioritizes A over B

* Considering an *Ergoplay*®, model *Trötster*®. *Guitar Lift*® and similar products enable the complete use of area 4(B), while the structure of the support also creates a zone in the back (generally 3.2/3.3) where the wood is not accessible, but the support itself can be percussed instead (producing a particular tone color that guards resemblance to that of the wood below it). Other supports will have different characteristics.

- Access is possible but difficult

The construction of the sides – woods[116], stiffness, form, width, and thickness – can vary greatly from guitar to guitar, affecting the sound and responsiveness. The larger and thinner they are, with fewer junction supports, the darker, louder, more vibrant and more resonant they get.

[116] There is a prevalence in the use of different species of *jacarandá* (rosewoods, from Brazil, India, Bolivia, etc.) in their construction.

The stiffness of area 4 has two additional consequences: it responds better to harder body parts (especially B and C) but requires a special care from them, due to the strength of the impact. In our experience, extended use of these techniques will hurt the hand; therefore, restraint and organization are recommended – for example, limiting the practice of these passages/techniques to around 40 minutes every 48 hours.

Figure 70 gathers information about the various sub-areas:

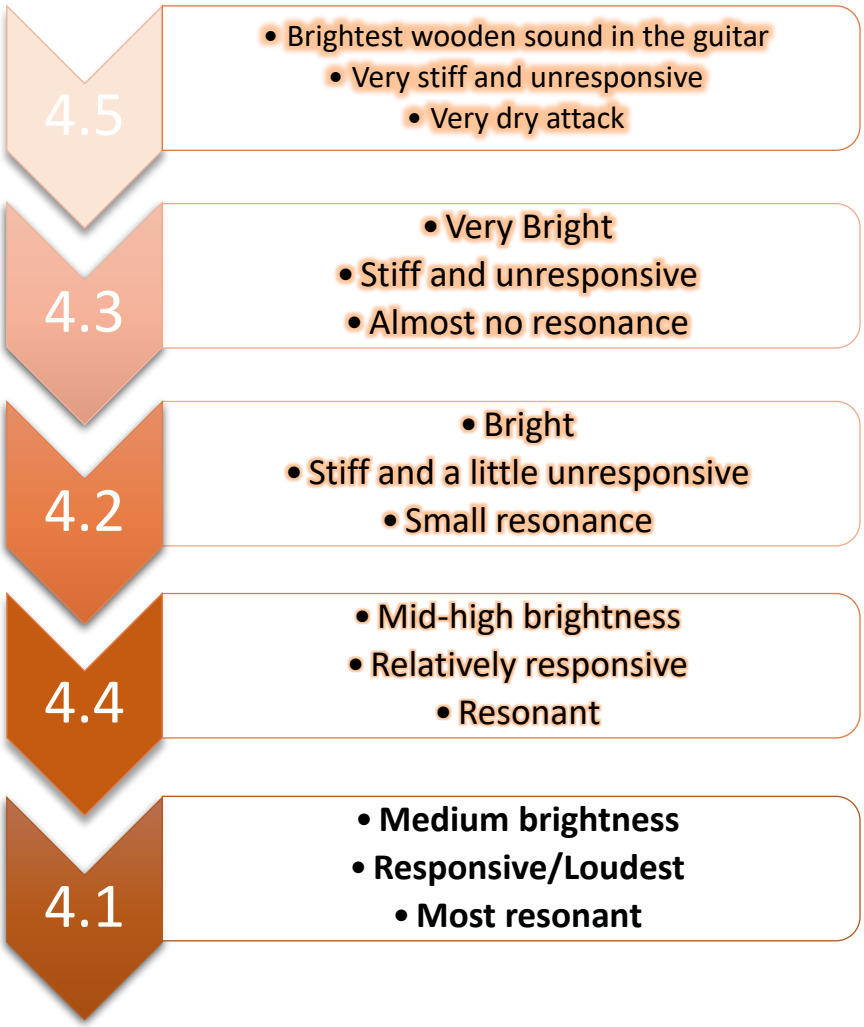


Figure 70: Sub-area characteristics for Area 4.

AREA 5- THE STRINGS

Being the traditional playing area of the guitar, the strings are an integral part of the *punteado* and *rasgueado.* Because of that, all guitar literature deals extensively with them and their properties, and for those specific uses, we will refer the reader to the classical and modern methods.

However, they play an important role in percussive playing as well, for three reasons. First, they account for approx. **35% of total Use** in our analysis, second only to the soundboard, most likely due to the history of the instrument, their unique properties when compared to the prevailing wood, and their very high responsiveness; second, they shelter approx. **42% of the types of SFs**, by far the largest SF density in an area; and third, that is a diversified group of SFs, in which the largest variety of hand parts and actions can be found. All of that means that **the strings are so far the most malleable guitar part for percussive playing**, in which the biggest diversity of sounds can be produced.

The fixation points are very important in string consideration, for they define areas where those are at their stiffest, and, by opposition, laxest – that happens in the 12th fret when the strings are open. The fingers act as fixations when they stop a string. As we shall see in the specific descriptions ahead, approaching or avoiding fixations is important for the technique and definition of many PRs.

AREA 6 - GUITAR NECK

This area has an elongated form and relatively small total playable area, elements that sum up to technical costs. Its transversal form varies, a curved shape being the more traditional; flat necks are, however, more practical for percussion. Having only structural functions – support the fretboard and headstock –, it is not involved in sound production, being, therefore, stiff and inert, unresponsive. That also means that the sounds produced there are amplified in the resonance box/soundboard, all of that lending it a certain degree of longitudinal timbral constancy. Its placement greatly favors the l.h.. All those elements probably explain its residual use (**less than 1% Use** in our analysis) and, partly, the strong prevalence of the r.h. in percussive playing. With that in mind, we imagine that one of the keys for a better balance between hands in percussive playing goes through the neck, and we present in this work a few techniques that might help with that, for example, *Thiago's Slap, Bone to Bone Finger Tap,* and the *Emergency Neck tap* (see respective entries).

An interesting – and unexplored – feature of area 6 is that one can get a wider tone range varying the stikes **transversally** rather than longitudinally – vertical strikes at the edges produce higher tones, while the center of the neck has a deeper more resonant color. The combination of transversal and longitudinal shifts produces an unsuspectedly rich pleiad of timbral varieties: a strike with **C.A** at the center of area **6.1** produces a significantly different sound than at the upper or lower parts (**A** or **B**) of **6.3**. Depending on the construction of the instrument, this timbral range can be larger than the one found within other more responsive guitar areas.

Despite being stiff, its timbre is predominantly low, thanks to its reverberation in the guitar resonance box. However, it can go brighter than many area **4** sub-areas when one reaches the upper timbre limit (**6.3(A)**).

As is the case when the wood is stiff, it is more senstive to harder body parts, but body part **A** is still effective. The advice for area **4** is still valid: prolonged practice, especially with **B** and **C**, demand caution not to hurt the hand. Extra care must be taken when using the r.h. in standard playing position, because the effort to keep this awkward playing position leads to muscular fatigue.

Few pieces explore this area, as do *La Toqueteada* (Figs. 142 - 143), *Cenas Infantis, Escutorium*, *As Entranhas da Terra,* and *Laputa Variations* (Fig. 118).

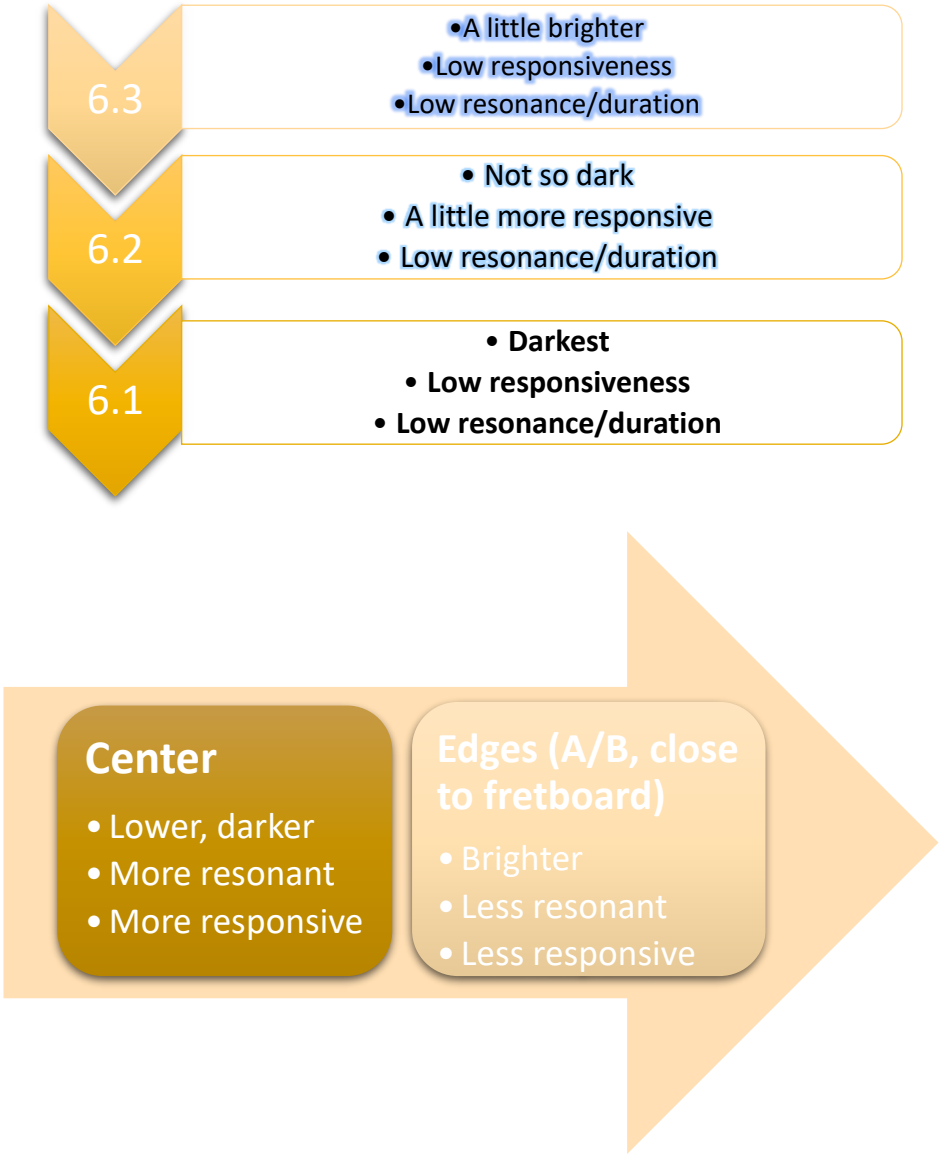


Figure 71: sound evolution in area 6

AREA 7 – THE HEADSTOCK

The headstock is rarely used (0,6% Use). Surprisingly, it produces a dark sound, and its subarea 7.3 is even more responsive than the neck or, in some guitars, than 4.5. Its distance from both hands (especially the r.h.), its small playable area, and its irregular form full of obstacles (the strings, the pegs, the roller holes) are probably to blame for its neglection in percussive playing.

Sub-areas 7.1 and 7.2 are technically challenging and they offer little in terms of sound to justify their use. Area 7.3, on the other hand, often offers more space and is sufficiently resonant to find some practical applications. It offers a deep bass sound, not as much as area 2.1 but still apt to be used as a variation for bass drums, as it blends pretty well with hand part E. Contrary to what generally happens, its most responsive, resonant, and darkest point is not at its center, but at the very tip of the instrument, as shrewdly perceived by Josel and Tsao (2014; point N3 in their diagram, Fig. 62).

It is generally played at its back, but the front could be used (especially in lap position).

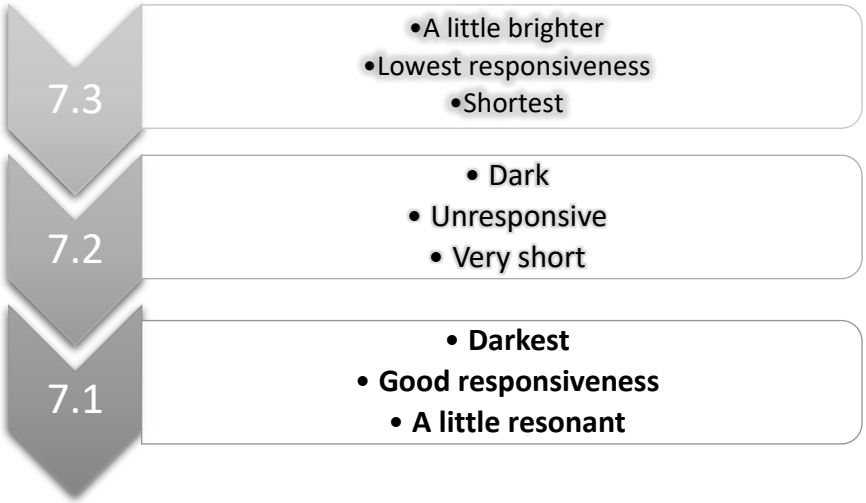


Figure 72: Sound evolution in area 7.

Hand parts A, B (especially B.B), C, and E are all effective, always with the l.h..

TECHNIQUE

A - BODY PARTS

Along with their diagrams of guitar response and timbre color, Josel and Tsao (2014, p. 161) also present a scale of body parts "from brightest to dullest in timbre": "**nails, back of nail, outstretched finger, and knuckle**". Our tests corroborate theirs, as seen by our results in Figure 73:

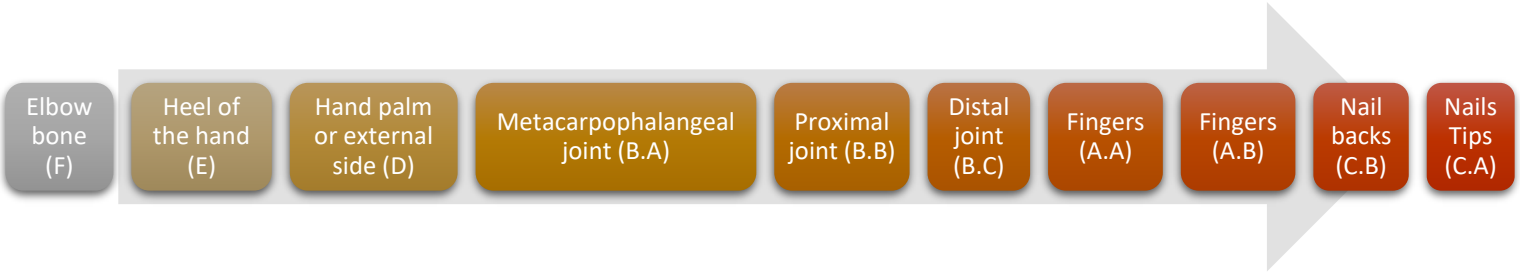


Figure 73: Body parts from darkest to brightest.

It is important to say that it is not easy to aurally establish a sequential placement. Firstly, because many variables intervene: angle of attack, intensity, guitar part, etc. Secondly, because even when the sounds are clearly different, it is not always possible to translate this difference in terms of "brightness".

As mentioned about the areas of the guitar, different guitarists have slightly different techniques and bodies, leading to different sound results, not unlike what happens in the TG *punteado*. Therefore, the individual entries should not be taken literally but as general remarks that need to be adapted to each instrumentalist.

Some general principles that apply to the hand parts and can be useful for composition and performance are:

a) **The harder the exciting body part and the more concentrated its area, the brighter, and more focused the sound**. Flesh (skin and muscles) tend to produce more muffled, darker, unfocused sounds; bone (body parts **B**, **F**, and **A.B** to some extent) is harder but comes necessarily mixed with different proportions of flesh. The nails produce the highest, clearest, and more focused sounds.

b) The bigger the body part, the darker the sound. This generally means less projection as well[117].

BODY PART A – THE FINGERS

The fingers are the most used body part in percussive playing: approx. 70% of the PRs use them. That comes from their sensitivity, flexibility, and them being at the extremity of the body. They bestow a refined control of strength and great precision to the percussive actions, having a lower technical cost than other body parts.

A.A refers to the fingertips, but only the very end of the finger, not the whole last phalanx. They go from the junction with the nail to the vicinities of the anterior bone projection of the distal knuckle (B.C), not including that bone protuberance. This is the part of the finger that stops the strings on the fretboard. To hit the surfaces with it, the fingers must be used "standing", almost perpendicular to the attacked surface, as opposed to the laid position used for A.B. The fingertips have their particular sound, more muffled and less projected than A.B. In areas 2.1, 3.1, 6, and 7.3, it can produce surprisingly full, round bass sounds. A.A excludes the nails, which makes it difficult to use with the r.h..

A.B constitutes the rest of the anterior part of the fingers, but it is often restricted to the bone protuberance at the last joint between phalanxes (the anterior correspondent of area B.C). The thumbs generally tap more to the side to find a bone protrusion, using the leverage of the forearm rotation, while fingers *imac* use semi-circular frontal movements with the wrist or finger. Stronger strikes use the full surface of the fingers and the strength of the whole arm; the risk of damaging the guitar is reduced by the distribution of impact over a larger area, and as a consequence, the sound is less focused.

In both, Finger *c* is seldom used, except in full-hand strikes.

The fingers are effective with all six actions.

[117] However, the saturation of the microphone signal perceived in strikes with areas **E** and **F** (for ex**., 2.1/Egp** or **2.1/Fgp**) suggests that, despite a fainter auditory sensation, they actually produce more energy.

BODY PART B – THE KNUCKLES

The knuckles occur in approx. **6% of the PRs** identified. Their higher technical cost is probably one of the explanations: they demand closing the fingers, thus diminishing their reach, the availability of muscles of fine control, and the articulations available for the movements; that also hinders TG integration, as it adds opening and closing hand movements. Additionally, some artists fear damaging their instruments because of the reduced control and a harder bone impact concentrated in a smaller spot.

Despite all of that, they present advantages. They have a particular timbral signature – brighter and focused when compared to areas **A**, **D**, **E**, and **F** – and the potential, even with their inherently more complex technical demands, to construct effective musical passages. We can find examples of such usage in *Escutorium* (Fig. 74) and *As Entranhas da Terra* (Fig. 75).

The technical costs grow as we progressively curve the fingers (**B.C** → **B.B** → **B.A**): there are fewer articulations available, greater dependence on bigger muscular groups, and longer movements to be made. Therefore, **B.C** tends to occur more, while **B.A** is very rare.

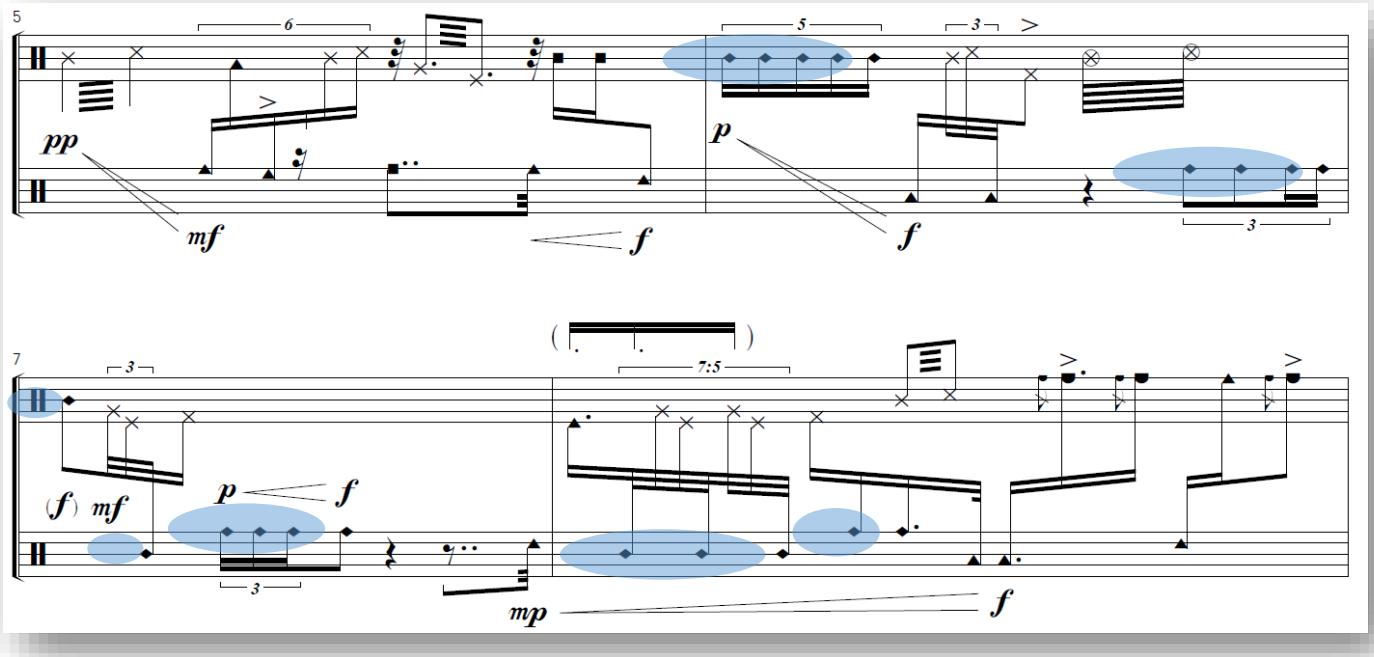


Figure 74: Escutorium, bars 5-8. The diamond-shaped notes represent strikes with *B.B*. Each hand has its staff, and the lines and spaces represent different guitar parts.

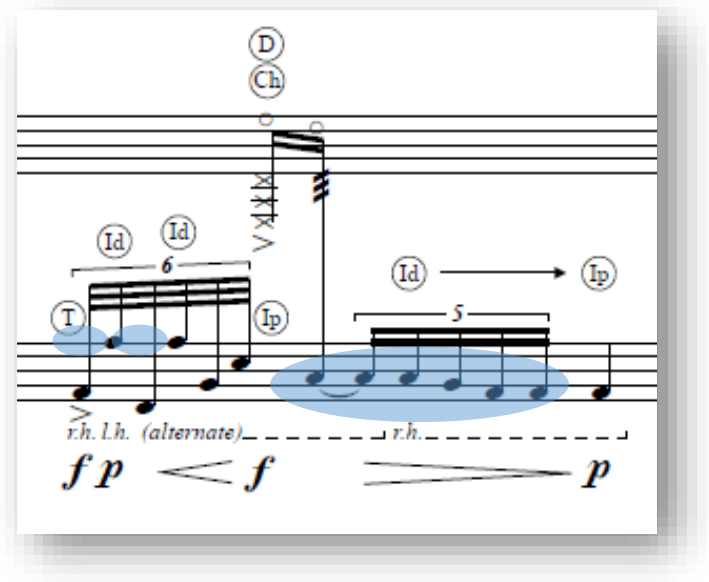


Figure 75: As Entranhas da Terra, page 2. "Id" and "Ip" indicate, respectively, *B.C* and *B.B*

B.A: Because of the curved disposition of the bones in the four fingers (*p* is not usable), it is normally impossible to tap with all at the same time; the more comfortable position is usually using *ma*. Their ergonomic placement is not favorable in most common playing positions and most guitar areas, because they have fewer articulations before them to provide an adequate attack angle. This overstresses the wrist, elbow, and shoulder. It also makes TG integration unpractical. Because they lack the fine muscular groups of the fingers, they rely on the forearm and arm muscles, which are slower and less precise. All summed, B.A is generally unpractical for percussive playing, but in exceptional circumstances, it can be mobilized for a unique dark but well-defined sound[118].

B.B benefits from the good balance of strength, precision, and control of the wrist movements, and it still has B.A to help it reach the curvature necessary for playing. It is not as agile as B.C and requires some virtuosity for quicker TG integration, but, in exchange, it offers variation, with a sound a little darker than B.C. Interestingly, can be used to produce *super-high notes* and upward glissandos in area 5.2 (after the fretboard), especially in the trebles. This body area is better employed with knuckle B.C extended and relaxed, which, in our experience, is counterintuitive; that diminishes the effort of forming the right-hand presentation and allows for quicker TG integration.

[118] It was not detected in the analysis, but we briefly used them in the second bar of *As Entranhas da Terra* (Fig. 67).

B.C is the most common sub-area of B, and it benefits from the precision of the semi-extended fingers and the versatility of the other finger articulations to ease its angle of approach. Moreover, its smaller curvature allows for a more agile TG integration. Its timbre is the brightest of the B area. It is necessary to be careful not to include C.B in the strikes if that is not intended. As B.C, but to a lesser extent, it can be used for *super-high notes* and upward glissandos in area 5.2.

It is generally used for gp actions. Ar actions are also possible and more practical in areas with less availability of space. In those cases, as in most gp action in area 5, the spaces between the knuckles are used, rather than the knuckles themselves. Ab actions are possible but rarely used.

BODY PART C – THE NAILS

The nails can participate in a variety of percussive techniques in strings that employ plucking or strumming techniques, such as muted notes, *pizz. Bartók*, crossed strings, etc. Besides, they can be used for percussion in the whole body, creating sharp sounds with a brighter timbre. In that enterprise, they function particularly well with area 4.

C.A is hand-sensitive in the classical guitar, due to the different size of the nails on each. It is effective with both, but the feeling and sound produced are different. In the l.h., the tap will be mixed with flesh, attenuating its hardness and giving the player more sensibility and control. In the r.h., it is the sharpest "mallet" available, with a distinctly bright sound identity and a continuum of timbral possibilities: a more straight, 90 degrees attack (generally with B.B curved), produces a darker sound, while an inclined attack with the extended fingers (similarly to a normal plucking technique), aiming as well as possible at the area below the nails (one must avoid the flesh), produces a brighter, more explosive and projected sound. Especially with the r.h., the very focused impact points produce sharp attacks but limit the strength applicable to them: on stiff areas, it can hurt the hand, and, on the soundboard, it can damage the instrument. On the other hand, the nails are loud by nature, even with soft strokes; this makes control in soft dynamics (*p, pp*) more difficult.

C.B is largely used in all kinds of strummings, being an element that bestows identity to the rg action. It is also used in string buzzes and taps. They are generally controlled by the extensors of the fingers, which many guitarists do not have developed as much as the flexors: their extensive use will probably require specific training. Their sound is not so bright and focused, and is a bit less intense, but it enables more vigorous strokes – at stiff areas, such as 4, it is necessary to be careful not to hurt oneself. The base of the nails, where they are more fixed, is brighter and louder.

The use of the nails on area 5 allows for very efficient TG integration. Outside that area, however, the necessary hand shifts decrease the precision and speed of the changes in TGs.

The nails can be used in all guitar areas, but their use in area 2 (especially C.A) is dangerous and should be limited to soft taps, preferably in areas covered with plastic protection. They can be combined with all six actions.

BODY PART D – THE PALM

Despite its intuitive use, similar to that of the fingers, the palm is not so often deployed (circa 8%). That is probably due to its size and position, which implies shifts with the whole weight of the hand. It uses frontal wrist or forearm movements, which are cumbersome but strong. It is clumsier, slower, and harder to control than the fingers, often not practical for delicate passages, but at the same time stronger and, when properly employed, with relatively low technical demands.

The inner space of the palm can form a small resonating chamber in a stroke. That changes the character of its sound, making it sharper, more explosive, and louder. It is a technique that requires hitting a surface, even a slightly curved one such as the sides, with a specific hand disposition and at a particular spot, demanding precision and, therefore, training.

Its big surface is good for damping and rubbing, but not for focusing (points, strings). It distributes the impact and is padded, thus enabling the use of the strength of the whole arm in vigorous strokes, if necessary. These, when combined with the resonating chamber technique, provide truly sonorous explosions that rise to the apex of guitar dynamics if used on the soundboard or back.

It normally leaves the fingers free, and, because of that, it creates effective splits, usable in one or two different guitar areas. These are especially effective over the edges of the resonating box, where the fingers have more space to maneuver (for example, the palm hitting the soundboard and the fingers at the side).

It is used in rubbing (strings, soundboard, back), snaps, *tamboras* (in which they are not particularly effective, despite uses in the repertoire), and many kinds of muting. The traditional dampening usage is on the strings, with its side (hand used as a “blade”) or center, but its surface and strength allow for good soundboard damping as well.

Area D is usable in all guitar areas but 7, where they generally do not have enough maneuvering space. It can be employed with gp, ar, and ab actions.

BODY PARTE E – THE HEEL OF THE HAND

Guitar practice owns the extensive use of this hand partially to FG. In that genre, the "kick drum" technique has been largely standardized by now with the use of E., while in CG it is not specifically requested.

This body part is noteworthy for three reasons. Firstly, it has the darkest timbre among the surveyed body parts, because of its large, padded surface, supported by a large mass of bones. If that, on the one hand, makes its sounds somewhat dull, on the other hand, it also makes strong strokes possible. Secondly, it is relatively independent of other hand parts, creating very effective splits. It uses mainly frontal wrist movement, and secondarily a forearm motion emanating from the shoulders. Both are less precise and agile than forearm rotation of finger movements. Thirdly, in the standard playing position of the r.h., it is ideally positioned over the very responsive areas 2.1(A) and 2.2(A).

Similarly to area D, its large, absorbing surface and its strength make them effective for muting. On the strings, that demands a specific presentation that is good for tapping but generally not so much for plucking or strumming. Because it can sustain even more pressure than area D, it is ideal for damping the soundboard (or, eventually the back). It can also be used in rubbing actions and in area 7 with an advantage, as it requires less space; its use outside area 2 is rare, however, because of its unresponsiveness.

Integration with other TGs is particularly effective because of its r.h. *hand splits* that leave the fingers totally free and even better positioned than those of D. Besides, its positioning is favorable, and it is possible to use the frontal wrist movement in a way that does not shift the hand too much out of position. All of that makes it possible to alternate between TGs with great ease, or even to use different TGs or PRs simultaneously with the same hand. E strikes are commonly combined with *slaps, snaps,* bass notes, and *rasgueado* chords. Despite not being canonic, l.h. usage can be as effective, especially in lap position, and integration works well between different PRs (not so much with different TGs).

It participates mostly or could be especially effective in "Kick-drums", whole-handed snaps, "son-sifflé", "squeaks", and soundboard rubs.

Can be used in all guitar areas and with gp, ar, ab.

BODY PART F - THE ELBOW

This body part is cumbersome and therefore seldom used; so far, it has been registered only in performances by Italian FG artist Luca Stricagnoli, such as the arrangement *Feeling Good Inc* or *The Future.* It can be helpful in situations in which the right arm is stretched towards the fretboard, or even the headstock, leaving the elbow already in position for strikes at the soundboard. It can also be very useful for muting the strings, as seen in *The Impossible* or as we could attest in our interpretation of *Ko-Tha* (II).

An adequate guitar playing position is hard to find. Lap position favors it the most, while more common positions require an inclination of the plane of the soundboard of at least some 30 degrees, pulling area **B** of the guitar away from the player and thus exposing the soundboard upwards. That has been confirmed by the practice and testimony of Stricagnoli (2020).

Dynamic control is difficult and requires specific training. The strikes are sluggish and not fit for fast passages. Deadstrokes are very effective in areas **2.1** and **3** (especially **3.1**).

It is used mostly in conjunction with area **2.1**, where it tends to produce very dark sounds, similar to that of bass drums and not unlike **2.1/Egp**, perhaps a bit more focused. In those uses, it presents the advantage of not shifting hand position, thus enabling its simultaneous and integrated use with other TGs and PRs.

It is fit for actions **gp** and **ab** only.

B - ACTIONS

The nature of the categories we chose to classify the actions into derive from guitar practice and the mental models guitarists have to understand their movements. They are not, therefore, a good description of natural phenomena (trajectories, speed, etc.) but rather practical tools for guitar playing. This means that convention was as strong an aspect to be considered as the inner logic consistency of categories. For example, **rg** could most of the time be classified as a strike (**gp**), and **pin** would be something in between **gp** and **est**. But that is not how guitarists think of it and how they organize their physicality.

Movement description is a complicated matter. A “scientific” description of movements, as seen in sports science or anatomy, would be overcomplex, inappropriate, and unnecessarily confusing for

musicians. The solution we opted for was focusing on the interaction of the hand part with the guitar rather than describing the movement itself. That resulted in broad, however well-defined categories, and in a manageable number, which was much more economic than the other movement descriptors we considered.

PLUCKING, *PUNTEADO*, *PINÇADO* (PIN)

Includes all movements related to plucking, that is, quickly pulling the strings in the middle of an arched movement of the fingers, releasing them and continuing the movement, using the fingertips (A.A) and nail tips (C.A) as contact areas.

The difference to a common strike is that the movement does not stop when meeting the string, and exerts, even if briefly, a pulling motion. This pull is different from others (under **est**) because it is not an active pull but results mostly from the inertia of an initial, previous impulse, and because it is not the micro pull itself that is important, but the release.

Exceptionally, this category might be used to describe l.h. actions related to the *punteado* TG, such as slurs.

STRUMMING, *RASGUEO* (RG)

Involves sliding the nails/fingertips transversely over the strings, treating them as a surface. It is similar to the **pin**, with the difference that it adds the particular color of C.B, tends to treat the strings in groups (surfaces), and enables the active use of the extensor muscles and forearm rotation.

It is important to remember that, while both **pin** and **rg** are traditionally r.h. actions, they can be performed with both hands.

MUTE/DAMP/TOUCH/PRESS, *ABAFAR* (AB)

This action refers to all that has to do with damping (as in the *ghost notes* or deadstrokes), touching (as in a *string buzz*), or pressing (solid non-deformable material, such as the soundboard). It is generally, but not always, used to diminish/transform sounds.

Muting is difficult outside area 5, tending to require pressure and a big covered area. To mute percussive sounds all over the instrument, it is generally more effective to press only area 2.1, where most of the sounds are resonated regardless of their origin.

SCRATCH/RUB, *ARRASTAR* (AR)

While **ab** describes all that is static, **ar** deals with sounds produced through a sustained pressure, generally over a surface, combined with a movement to produce friction. In a micro-analytical level, all of these sounds are discontinuous, but at the perceptual level, many are felt as constant. These actions tend to be more effective on rough surfaces, such that of the wounded strings or worn-out varnish, but there are exceptions (such as the *squeak*).

TAP/STRIKE/HIT, *GOLPEAR* (GP)

This is, by far, the most used percussive action in guitar practice, standing a whole order of magnitude above the others. It consists of departing from an initial impulse to create a movement that ends in a sonorous shock with the guitar. This impulse might or might not be sustained throughout the trajectory and during/after impact – these qualities are often related to different qualities of sound. Any pulling and deformations that might occur as a result of that shock are secondary. The **gps** generally end at the impact, but some resemble **pin** in the sense that the interaction occurs in a point within a larger trajectory (such as the *Thiago's Slap* or the use of an *i* strike at area **4** in *These Moments*); differently from **pin,** however, there is no pull and release involved, the sound coming directly from the shock. In those cases, as it is with **pin**, the flexibility of the joints is indispensable.

PULL/STRETCH, *ESTICAR* (EST)

This action, along with **ab**, is generally passive, as it does not produce the sound by itself, but rather creates the conditions for it. It requires solid material that is deformable, being characteristically employed in area **5**.

POSITIONS

There are many possible positions in which to play the guitar, some very common, others not so much. They regulate the ergonomy of the instrument and the behavior of the guitarist's body, and therefore limit or expand playing possibilities. **How** exactly that affects playing is an extended discussion that partially transcends our objectives; we will limit ourselves to briefly commenting on some of their fundaments.

Based on our experience and repertoire (video) analysis, we grouped the various positions into five basic categories[119], all of which present a range of variations within, such as support or strap adjustments, chair height, angles, etc. The first four consider a sitting player, while the fifth considers him or her standing[120].

Despite our efforts in providing some insight into the various categories, it must be noted that our experience is based on the traditional left-leg position with footstool or *Ergoplay*®. That means that the technical and ergonomic discussions, especially at the description of individual PRs or SFs, are based mainly on that position.

Standard playing position: For traditional *rasgueado* or *punteado* playing on the concert guitar, both hand-arm complexes have a standard position, or, better yet, a standard range of positions. That is located over the fretboard in positions I to X, for the left hand, and just above the strings, between soundhole and bridge, for the right hand. The l.h. elbow stays afloat, sustained by the arm; its thumb opposes the other four fingers from the back of the arm. That gives the hand a specific reach and its fingers different functions. The r.h., on the other side, has the elbow supported by area 4.3(A), and all the fingers facing the soundboard and ready to use in functions similar to each other. These hand positions consider that the guitar is sustained by the left leg, with the support of a footstool or ergonomic support. They correspond to the descriptions found in the modern methods for traditional classical guitar playing.

The guitar is positioned over the left leg, with the support of a footstool or some kind of ergonomic support. It is actually sustained by a set of contacts: the leg/support, a contact point on the right leg, the contact of area 3.3(A) with the left chest of the performer, the right arm resting on area 4.3(A), and eventually the left-hand grasp on the arm/fingerboard.

Deviations from the standard playing position are one of the foremost factors influencing TG integration.

FOOTSTOOL (LEFT LEG)

This position allows access to most of the guitar:

[119] The sixth and last is not properly a complete position but rather a l.h. variation for previous positions.
[120] There is also the possibility of playing on the floor, as seen in some interpretations of *Ko-Tha*, but that is exceptional.

Extended access to areas 1, 2, 4.2(B) and 5.1/5.2 for the r.h., and 5.3/5.4, 6, and 7 for the l.h..

Limited access for the r.h. in areas 4(A), 3.1(B), 5.3/5.4, and 6(A), as well as 2, 3, and 4.5 for the l.h.

Very restricted access to 4.1(B) for both hands.

Other accesses are not impossible, but too difficult and impractical in most situations.

In this position, the guitar is slightly to the left of the performer, and this means that extensive use of the whole guitar body (including areas 6 and 7) will require care to avoid muscular damage.

ERGONOMIC SUPPORT (LEFT LEG)

Ergonomic supports over the left leg function mostly like a footstool, with minor differences according to the specific kind of support.

Using an *Ergoplay®* augments the available percussive area, enabling actions at sub-areas 4.1 - 4.4 (B) (both hands) and a slightly improved access to area 3 (especially with the back of the hands). The model "*Trötster*" offers more adjustment options.

We could not test other models, but its imaginable that the *Guitarlift®* and *Pompeo®* models would function similarly, perhaps with even more open access to sub-areas in 4(B).

ON TOP OF THE RIGHT LEG

This position has variations, such as with the legs crossed or separated. We could not conduct extensive exploration with them, so the following should be read as preliminary impressions.

It functions similarly to using a footstool on the left leg, being perhaps a bit less stable. The guitar resonant box is brought closer to the r.h. and away from l.h., making l.h. percussion more difficult in that area, except for 4.5. On the other hand, it brings the headstock, neck, and fretboard closer to both hands, especially the left.

This position favors *inverted l.h.* usage (see ahead).

LAP

Laying the guitar face-up in the lap is a classical position in certain genres; despite that, it is rarely used in CG and FG. It was employed, for example, by Scelsi in *Ko-Tha* and Stephen Goss in *Oxen of*

the Sun. Dawes (2017), Stricagnoli (in *The Future;* 2014, and many arrangements), Erik Mongrain (2006), and others also use the position. It relies on gravity to favor the percussion on the soundboard, and that also makes tapping easier. It also enhances the soundboard access for the l.h.. All the TGs are still available, but the l.h. approach to the fretboard in this position is significantly changed and will require major adaptation for most guitarists. Some rare techniques, such as a specific slap harmonic consisting of slapping the harmonic node with the inner side of the *i* finger (STRICAGNOLI, 2014; MONGRAIN, 2006) are only possible in this position.

STANDING, WITH STRAP

We could not assess the percussive potential of this position. Its use by many fingerstyle guitarists suggests that it functions pretty well for most standard PRs. Moreover, it enables the use of the whole area **4**, but the back is out of reach. It also facilitates the r.h. thumb strikes at area **6** while tapping.

A SPECIAL CASE: INVERTED L.H.

Named "over the top l.h." by Rauscher (2017, p. 46), this is something between a technique and a position and was largely popularized by Andy Mckee (*Drifting*, *Hunter's Moon*). Mckee, however, states that this technique has been in use at least since 1980/90 in the music of Preston Reed (MCKEE, 2017). It consists of playing with the palm of the l.h. facing the ground, opposite to the conventional position. This enables the use of gravity in the extension movement of the fingers, especially in the common multiple-strings percussive tappings with **A.B**, normally creating bass lines or chords (*Drifting, Hunter's Moon*), which Mckee calls "*power chords"*[121]. It is widely regarded as a tapping position.

It inverts the fingers' disposition, bringing **1** to the front; at the same time, it is possible to use area **4.5(A)** to support the left thumb. Both characteristics significantly improve access to the fretboard after the 12th fret and higher positions in general. Besides that, the position of the left thumb is favorable to taps on the neck, enhancing the percussive potential of that hand.

It is better suited to use with the guitar resting on the right leg and the guitar neck at a low level around the shoulders.

[121] The name is unappropriate, as some chords he plays using that technique – for example in *Hunter's Moon* – are not strictly *power chords;* in any case, one can play many different chords using that position.

This position also enables the use of area **F** of the left arm on the neck of the guitar when the hand is operating in elevated positions or the resonant box.

DESCRIPTION OF RELEVANT SOUND FAMILIES AND PERCUSSIVE RESOURCES

The percussive elements described in this work come from three main sources:

PRs found in the literature, especially but not necessarily in the analyzed sample, and their corresponding SFs. Appendix A shows a list of mentioned works and, as such, the most important works consulted. Many other works were consulted whose SFs fit the ones descripted here.

PRs developed in the course of artistic research and free exploration of the instrument, whether or not inspired by the literature;

PRs derived from extrapolations of the FH Code.

In the following sections, we shall discuss many of what we consider, or that the statistics point as, the most relevant PRs or Families. The PRs from the third group mentioned above (extrapolations), however, may require some clarification.

Our model explains existing percussive playing by dividing it into forming vectors (guitar area, technique). These vectors are isolated from their respective domains (the guitar, the guitarist) and can be subsequently freely combined. That allows for a description of existing phenomena, but there is a significant "excess" of possibilities not yet explored. We discussed above, for example, how those extrapolations opened an enormous highway for application of hand area **B**, some of which we will detail ahead. However, many of this theoretical, systematic possibilities do not produce satisfactory sound results (for instance, **5.4/B.C(imac-ME)gp**, or more generally the **5.4/Bgp** Family), are not physically or ergonomically feasible in standard playing position (for instance, respectively **5.2(VI-IV)/B.C(c-ME)gp** and **5.2/B.A(imac-MD)gp**) or are just too difficult and easily replaced by some other PRs with a similar sound (for instance, **5.2/C.B(imac-ME)gp** is much more difficult than **5.2/A.A(imac-ME)gp** but delivers an almost identical sound).

We were not able to thoroughly test all the PRs that can be extrapolated from the code. Not considering secondary descriptors, there is a hypothetical total of 2,800 possible combinations of hand parts and guitar areas, to which we must add all their combinations with different actions and the composite PRs just to arrive in a number of SFs that might easily reach ten thousand. Within that number, there is still a plethora of variations with fingers, hands, angles, combinations, special

techniques, etc. We do not think, at all, that percussive playing can be reduced to what can be described by our model, but it alone makes conceivable an immense, unfathomable array of possibilities. Even if many of them are not practical, a small percentage of that is already enough to firmly attest a very broad space still open for exploration and creativity – and that is not considering all that still lies outside the reach of the code.

A partial list of extrapolations achieved out of combinations from FH-Code vectors can be found as Appendix D.

A - Prevalent Sound Families in the sample (Main Group)

We will begin our descriptions with what we call the *Main Group*, that is, those eight Families that respond for **65%** of percussive playing in the sample analyzed with the PACT model. Grouped in these broad families we have sometimes PRs with small timbre, usage, or technique differences. That notwithstanding, the Families still provide an economic mental system to harbor these PRs, based on central technical and perceptual similarities.

Some conventions adopted in the descriptions:

General Description: We avoided the ungrateful exercise of long descriptions of sounds in favor of video examples. Please refer to them, whose links appear at the beginning of the description, when reading the entries.

Notation: Conventions are, at best, loose; often enough, they do not exist at all. The most common notational resources found in the literature are a) dedicated or shared special characters, b) the augmentation of the notational space with the use of new partitions (*layers*), generally, an extra staff with *n* lines or the sharing of the existing staff, c) explanative texts, and d) any mixture of them. Most of the time, the sounds with less-harmonic spectrums will be differentiated from notes by the use of a different notehead, its notation on a dedicated staff, or both. Less frequent are other systematic rules, such as attributing meaning to the size of the characters, colors, etc. In the descriptions that follow, we will examine, without comprehensive ambitions, the occasional common-place notations, if they exist, and some more recent works, including the products of this research. Occasionally, we will suggest a recommended notation or notational practice.

Parameters:

Range: Since most PRs do not produce definite pitches, the classification will usually follow a distribution within the guitar tessitura of sounds, according to a subjective appreciation.

Timbre: As with all PRs, an increase in Intensity is strongly associated with a complexification in timbre, and playing close to junctions makes the sound higher, less resonant, and quieter. These general principles are taken for granted and will not be repeated in every entry.

Intensity: descritptions are given in traditional score notation (*ppp* to *ff*), considering *ppp* to be the tiniest possible playable note or tap (a barely audible sound), and *ff* the strongest *snap* or *Bártok pizz.* attack.

Duration: To better avail the PRs, SFs, and percussive playing in general, it is important to develop a "feel" to differentiate very small durations. Commonly, we perceive the various taps, strikes, slaps, rubs, and scratches unspecifically as "attacks". However, our perception can be refined so that we start feeling time differences of a fraction of a second. With that in mind, we created some very approximative categories, more out of our experience than systematically, that might help to draw attention to the varied duration of the sounds we describe:

Very short (completely "dry" sounds with little that resembles a resonance; they give the impression of not having a "body", only an attack; circa less than 0.3 sec)
Short (sounds like a "rounder" attack; circa 0.3s to 0.6s)
Medium (sounds that either last longer, having a discernable "body", or that have a small resonance separated from the attack; circa 0.7-1.5s)
Long (these sounds either have an attack separated from the resonance, in which case the long duration refers generally to the latter, or can be sustained, such as rubs and scratches; duration longer then 1.5s).

Some parameters are correlated, such as the mentioned increase in Intensity that is strongly associated with a complexification in timbre, but the intensity is also causally related to duration. Spectrum range is most of the time inversely correlated to intensity and duration.

The areas where the materials are fixed or more massive tend to be less resonant (decreased intensity and duration) and have a more brilliant timbre (higher partials). Conversely, areas where the wood is softer, less massive, or more vibrating (distant from fixed areas) tend to be more resonant (louder, greater duration) and have a lower/darker timbre.

The structure of the guitar (materials, fan bracing, size, form), as well as the physical characteristics of the players (harder/softer nails, more or less projected bones, size of the hand, muscular disposition, etc.), influence all the parameters mentioned[122].

2/A.Bgp **21,33%** **Strikes on the soundboard with the flesh of the fingers**, low to mid range, drum-like wood sound

Bass drum (CANDY, 20--), *Kickdrum* (WOODS, 2013, p.20), *Golpe* (SCHNEIDER, 2015), *Golpé* (JOSEL and TSAO, 2014, p 158), *Low Strike, Bass Strike, Lower bout hit* (HIRSCHELMAN, 2011, p.78), *Conga* (DAWES, 2017), *Tom-tom* (DAWES, 2017 and 2018, p. 5), *Soundhole snare* (DAWES, 2018, p. 5), *Hand Drum* (DAWES, 2018, p. 5).

Video 01: 2/A.Bgp (Bass Drums)

General Description

This is, by far, the most common Percussive Family in our sample and percussive playing in general. It is the sound that we tend to associate with percussion in the guitar because it combines the most sonorous and accessible area of the instrument (**2**) with the most direct *technique* (tapping (**gp**) with the face of the fingers (**A.B**)). This results in the most effective PRs, all of them characterized by a wooden sound with a strong attack, low to mid-range, and a small but noticeable resonance of the wood. The resonant qualities of the soundboard lend this family considerable flexibility: many tonal variations are possible (mostly associated with guitar area changes), there is a large dynamic range, and the resonance can be augmented (allowing the strings to vibrate) or, in some cases, diminished (with deadstrokes, also changing the timbre).

The soundboard resonates significantly differently in its various sub-areas. Normally, there is a predominant tendency from mid to low following the direction **2.3** → **2.2** → **2.1**. That is associated with an increasing general responsiveness, which also means a progressive increment in the upper range of dynamics. This tendency is not completely linear, depending on the constructive characteristics of the guitar (bracings, density, depth, materials, etc.).

[122] As do the acoustics of the space, the audio equipment, etc.

This Family occurs mostly (81%) with the r.h. While the proximity between r.h. and area 2 is a partial explanation, the prevailing musical contexts in the literature seem to be the determining factor: tonal or atonal, but always prioritizing definite pitches, and thus requiring the l.h. in the fretboard. However, it is our personal experience that, some ergonomic limitations notwithstanding, this SF is very effective when executed with the l.h. as well.

It has a wide range of musical applications. As its names suggest, it is often used to emulate bass drums or timpani (rhythmic patterns in pop music or in an orchestral way), tending to appear in downbeats. It can also be used, especially in sub-areas 2.2 and 2.3, as a mid-range component of textures, like a tom-tom, conga, or tambourine, in which case it can appear at any moment of a metric rhythm. Apart from composing musical patterns, thanks to its power, it is often used to punctuate the musical discourse (interjections), appearing also in other contexts, from dramatic to mysterious textures, being explicit or evocative throughout the many bands of its wide dynamic tessitura. In all of these usages, it assumes the roles of *exposing* main or secondary musical ideas, *interjections*, or, rarely, *transformations*.

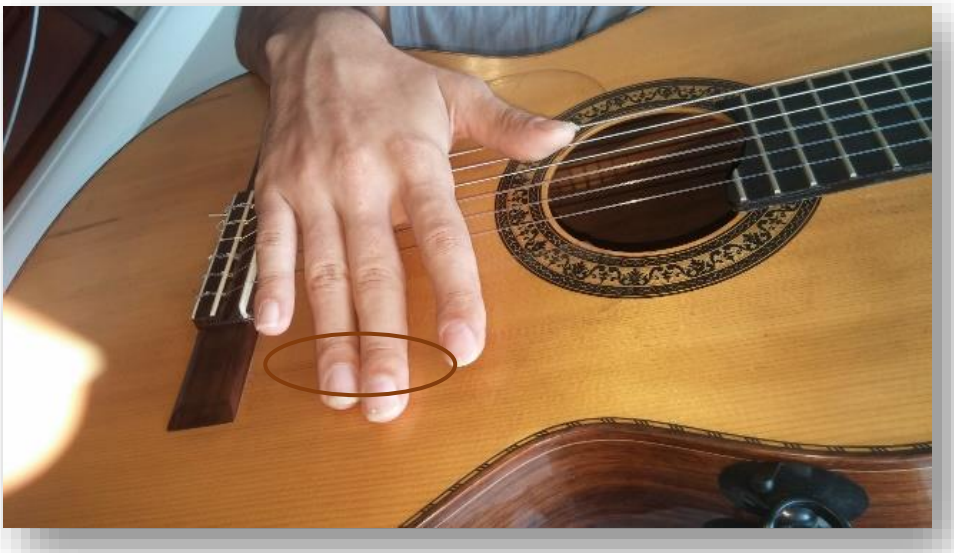


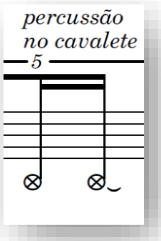
Figure 76: Different soundboard finger-tapping possibilities.

Notation: Using an "x" (that is, a dedicated character) as notehead for unspecific strikes at area **2** is relatively common, but more complicated systems are required for compositions that dwell in nuanced timbral, dynamic, or articulatory differentiations: one might want to detail the part of the soundboard being struck, and how.

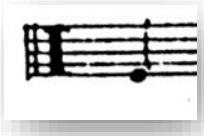
The examples below fall into one of three categories: dedicated characters (A), dedicated staff (B), or both (C). In *Tensibillia II* and *Malambo,* both for guitar quartet, Vasconcelos and Santórsola use special symbols ("x" or similar) accompanied by textual explanations. In his *Sonata*, Ginastera uses the same symbol but on a dedicated staff. Kampela uses a dedicated line for all inharmonic sounds in his

Percussive Study n. 1; special characters are assigned for each PR, with great specificity – the three portrayed in fig. 77 denote, each, a very specific fingering, hand, and soundboard sub-area to be hit. Scelsi's *Ko-Tha* uses a dedicated staff for the sounds performed in the guitar box; on it, it uses different lines and characters to define different parts of the hand to be used; soundboard sub-areas are not specified. Lastly, *Seringal* and *As Entranhas da Terra* use almost identical systems, defining the soundboard sub-area through the placement of the notes on a staff dedicated for percussion, and using letters as indications of the hand part to be used and actions to be performed (see the instruction sheet fragment in the picture, valid for both of them).

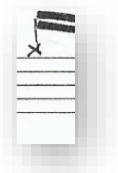
Salut für Caldwell (A)



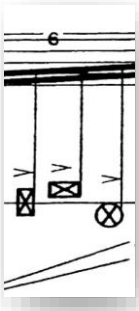
Tensibillia II (A) ("percussion at the bridge"[123])



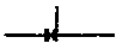
Ko-Tha (B)



Ahnk (A)

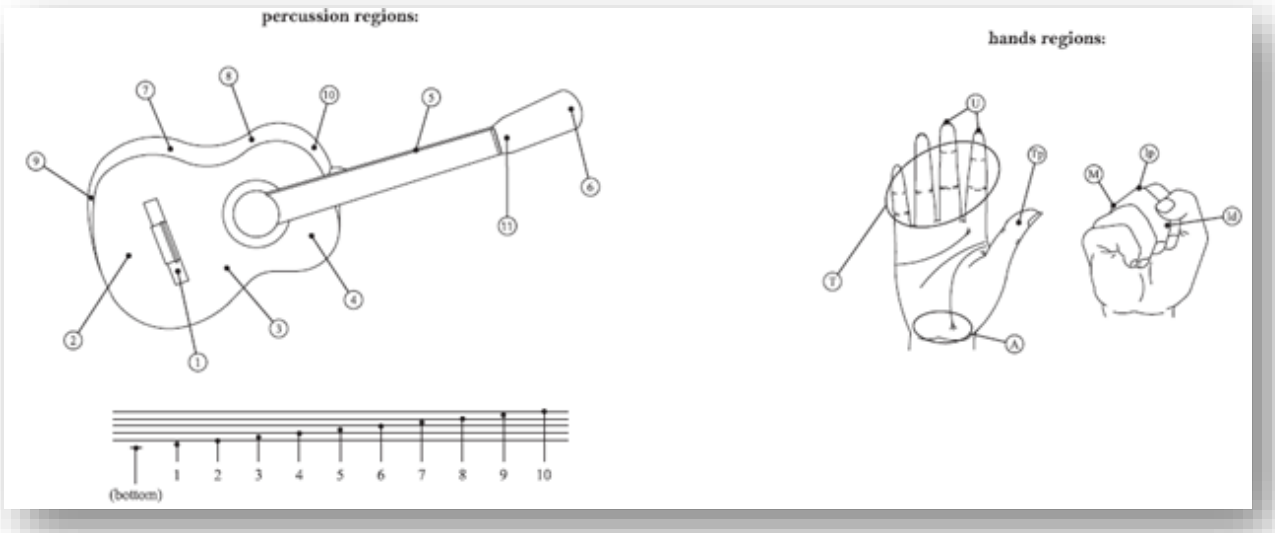


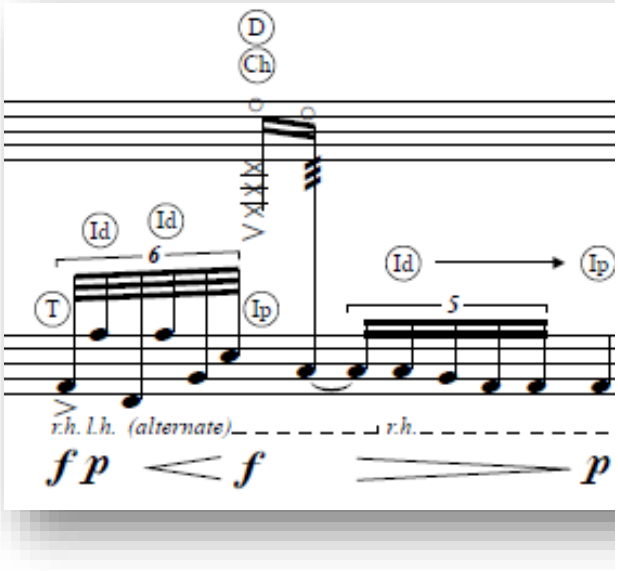
Percussive Study n.1 (C)



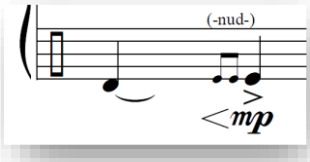
Sonata Op. 47 (C)

[123] Despite the instruction, the were mostly executed in area 2.1

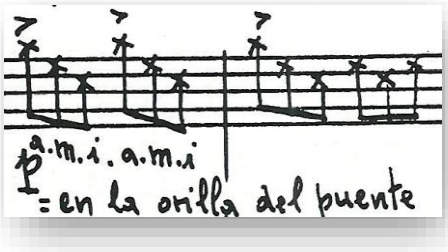




As Entranhas da Terra (B)



Seringal (B)



Cuatro Piezas Latinoamericanas, IV: Malambo (A)
("at the border of the bridge")

Figure 77: Various notations for 2/A.Bgp

Parameters

Range: Generally low (2.1) but up to mid (2.3)

Timbre: There is energy dispersed throughout most of the sound spectrum but concentrated in the guitar low range (around the tuning of the soundboard of the guitar; in our case, A2). Leaving aside an affinity with some frequencies[124], it sounds like an unpitched sound of varying colors, in general getting darker as it progresses in the direction 2.3->2.2->2.1. It feels like a "rounder" sound both for its richness and low-end emphasis and for the fact that its duration is not so short.

Freely vibrating strings will lend the timbre a pitched quality, for they strongly resonate with the strokes (increasing intensity towards the lowest string and in open strings); the effect is more pronounced as it approaches the bridge (in the direction 2.3 -> 2.2 -> 2.1). There is a very subtle difference in resonance tone between strikes in areas A and B, as the first tends to overemphasize the basses. Open strings will sound more than stopped ones.

Intensity: *ppp* to *ff*

Duration: Short (can get to medium with *ff* taps in area 2.1, and long with open strings resonance). Pronounced attack with a fastly decaying resonance reaching more than 1s at *ff*, therefore significant, and lending the sound a "rounder" feel. Open strings will resonate proportionally to the strength of the hit, according to the normal vibrational pattern of the strings (metallic strings resonate longer). Area 2.1 around the bridge resonates the longest.

Technique

How to play: Strokes with the anterior part of the fingers on the various soundboard areas. The larger the finger surface used, the less sharp the sound becomes. This means that more fingers and a larger contact area can enhance dynamics but also slightly blur the attack, changing the overall color of the sounds. The clearer sounds are obtained with optimal finger spot contact (bony area below B.C) with one or two fingers.

[124] Related to the tuning of the soundboard. In our case, that was **A** and, secondarily, **C**.

Deadstrokes are effective only in area 2.1 around the bridge. All rolls are effective. Because it requires less strength to play, it lends itself particularly well to *multitaps* (see "Description of special percussive techniques").

It has good ergonomy in all common postures. The lap position is favored by gravity and eases the access of the l.h. to the soundboard.

Care: The soundboard, especially in double tops, lattice-braced, and other guitars whose top is especially thin, is very sensitive, and that characteristic stems directly from its low mass and density. This means that:

a) The intensity of the strokes must be well controlled by the guitarist, to avoid damaging the instrument[125].
b) The technique must be more attentive to the timbre and intensity variation than in other areas. This can be insignificant in some musical contexts, but it is crucial where percussive exploration is a fundamental element of the music. Coherence of fingering, relatively specific guitar tapping areas/finger striking parts, and consistency in applied strength are important to achieve optimal results.

TG Integration: Many strokes within this Family lend themselves well to be used in conjunction with other TGs or PRs in the strings, because of the hand position and the possibility of a hand-split alternation. The most important split in this situation is the one between thumb and fingers; when a percussive stroke is executed with one of these parts, the other can, immediately thereafter or even simultaneously, activate the strings with another PR, plucking or strumming, and vice-versa.

Most important PRs, Families, and variations:

Strikes with *p* are by far the most common; r.h. responds for 81% of total Frequency; l.h participates mostly in area 2.3.

Families encompassed*:* 2.1/A.B(p-MD)gp, 2.2/A.B(MD)gp, 2.3/A.B(MD)gp, 2.3/A.B(ME)gp.

[125] Our most substantial experience, with a traditional spruce guitar, showed that the vigour befitting virtually any musical context was safely supported by the soundboard. This does not eliminate the need for care and adjustment of strength.

Variations

P or ma: Since the sound result is relatively consistent (as long as the same or analogous areas are used), the performer is free to use the thumb or the other fingers (alone or in any combination, most often *'ma'*) as it is more technically convenient. Because of the hand position, *p* is generally associated with soundboard part A, and the other fingers with B. The vast majority of l.h. interventions uses *imac* fingers.

Soundboard sub-areas: 2.1, 2.2, 2.3. Progressive transitions between these areas are also relatively common.

Tremolos: The finger, pulse, and hand tremolos and their combinations, are all very effective.

Multitaps: All multitaps are effective.

Body part B: As discussed in the entry "Body part B", this hand part creates a refreshing tone variety and is usable all over the soundboard. The sound is more focused and extra care should be taken not to damage the instrument since the impact area is more concentrated; otherwise, its productions and applications follow the general guidelines given in this section. A thorough description is given under 2/Bgp ahead.

MultiClap®: The use of MultiClap®[126] on the soundboard can help to produce new, louder, and generally more piercing sounds with little technical alteration. Its use on French or other weaker finishes can leave marks. The contact surface is also inadvisable to use in areas without solid wood in double-top, lattice-braced and similar guitar projects[127].

Use of area 1: Area 1 (especially the "wings") can be used as a substitute for area 2 to generate timbre variety, with little technical adaptation.

Examples in the literature:

FG: *The Mirror, These Moments, Hunter's Moon, Dance Of The Last Rhino, Telepathy, Passionflower, The Impossible, The Future, Boogie Shred, Drifting, Broken Rhapsody, Reminiscent Rain*.

[126] Multiclap® (https://www.schlagwerk.com/en/products/cajons/cajon-add-ons/multiclapr/) is a product by the german company Schlagwerk. It is sold in the global market for around €20. It comes in 4 sizes and can be attached to any area of the guitar.

[127] The use of attached objects is outside the scope of the research. We made this exception because it was seen in the repertoire, prompting a trial that revealed itself very successful.

CG: *Las seis cuerdas, N-Dimensional, Kurzen Schatten II,, Royal Winter Music I (I), Sonata op. 47, Percussive Studies I and II, Ko-Tha, Algo, Cenas Infantis, Canticum, Shadows, 11 Studies, A Sad Humoresque, Ahnk, Torre de Espelhos, Incrocio Scarlatto, Salut für Caldwell, Aulodia per Lothar, Cuatro Piezas Latinoamericanas IV: Malambo*, *Cielo Abierto.*

Original Works: *Seringal, As Enstranhas da Terra, Eclusas, Escambo, Escutorium, Comunhão, Malambo Mulambo, Quantos violonistas são necessários para descontruir um piano?*, *Laputa Variations, Vril.*

Commented excerpts

Example 1: In *A Japanese Saga: Laputa Variations,* the soundboard strokes are notated in the dedicated percussive staff, just below its inferior line; stems up represent r.h., while stems down represent l.h.. The fingering comes above/below each stroke. The exact soundboard area is most of the time left to the performer's discretion. The PRs are used mostly as exposition or transformations of main musical ideas, reaching long virtuosic phrases, and are often microstructurally interspersed with other TGs. They appear dispersed through the score, dissolving the interjective impression they have in other contexts.

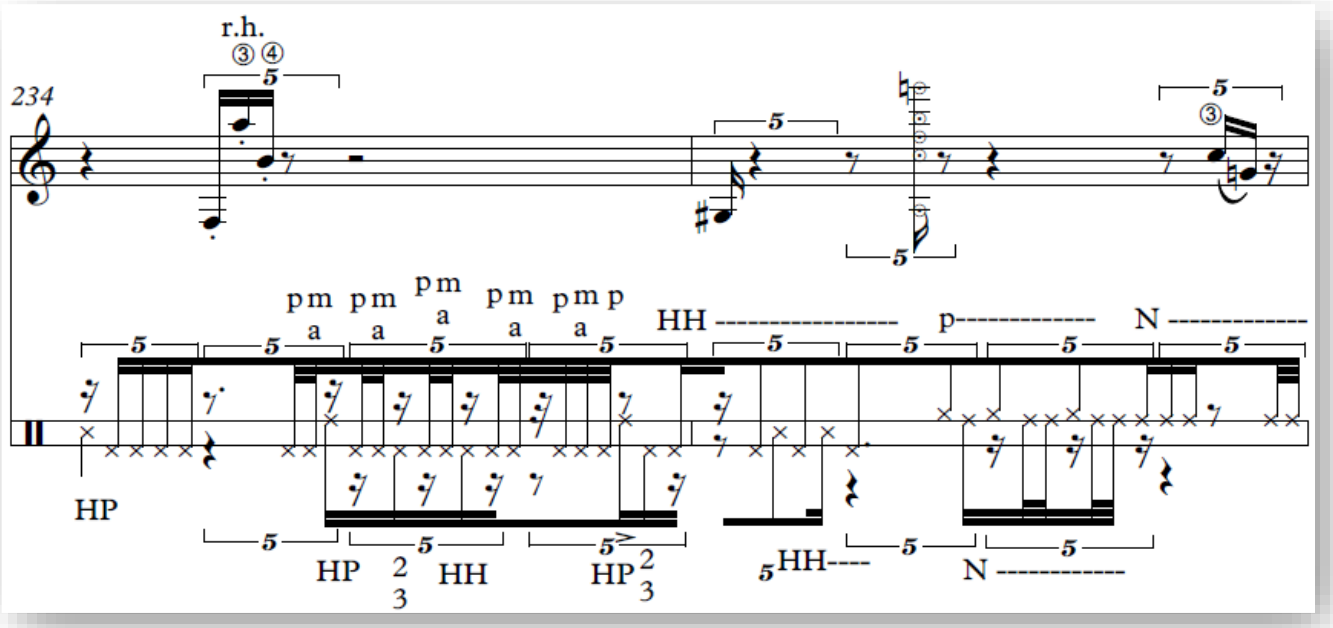


Figure 78*: A Japanse Saga: Laputa Variations*, bars 234-235.

Example 2: In *Gloucester*, the first movement of *Royal Winter Music I*, the composer and the editor establish 3 main hitting areas, whose concerns are mainly technical, and only secondarily timbral[128]. The PRs are used as a distinguishing (contrasting) element for the second part of the movement and have the programmatic function of expressing the rage of the portrayed character. Technically, they appear mostly combined with other TGs at different levels, at moderate speed, and also alone, in a long percussive period in the end. They are notated on a dedicated percussive two-line staff.

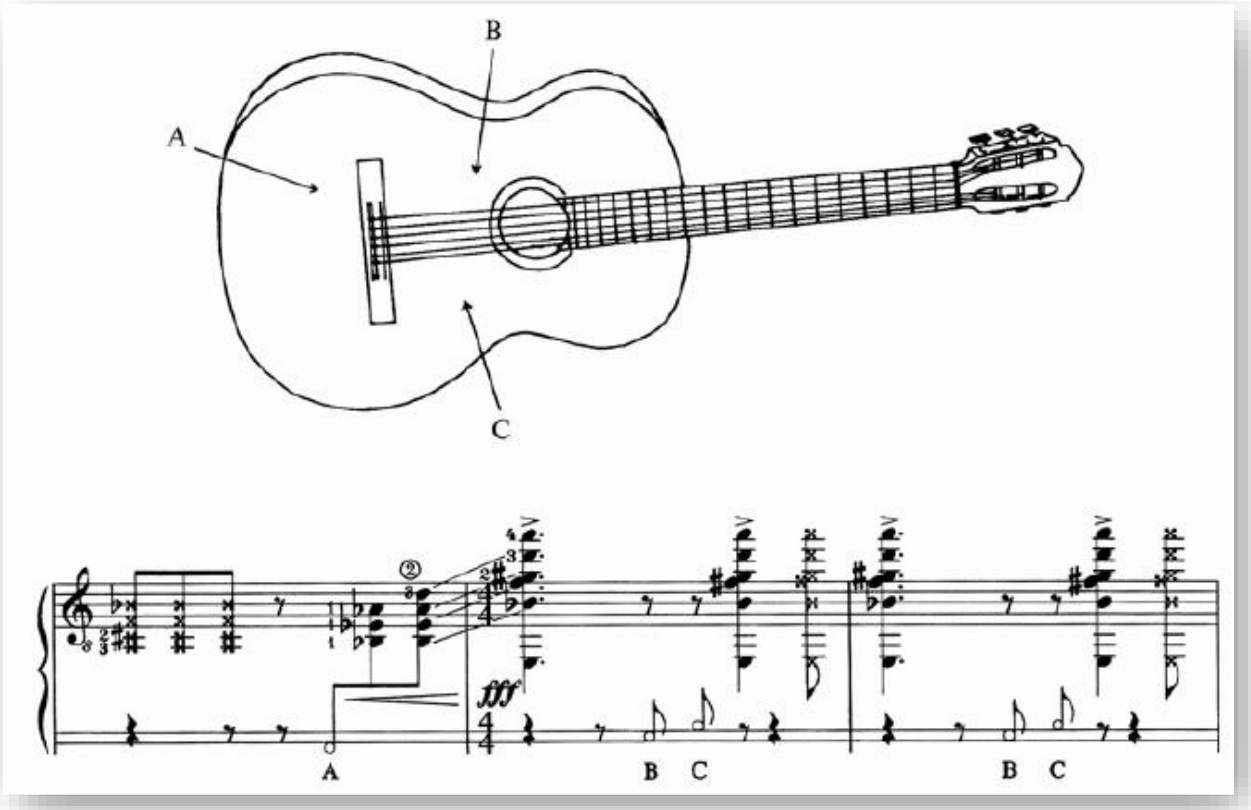


Figure 79: *Royal Winter Music I: I. Gloucester*, instruction note and excerpt from p. 11.

Example 3: In *Algo*, the PRs are restricted to a part of the second movement, in which they fulfill a clear contrasting, sometimes interpolative, function, occurring in a very differentiated dynamic plan from the rest of the texture. They are notated on the same staff as the notes, using the symbols below:

[128] It is very common that the performers expand the timbric range of this score.

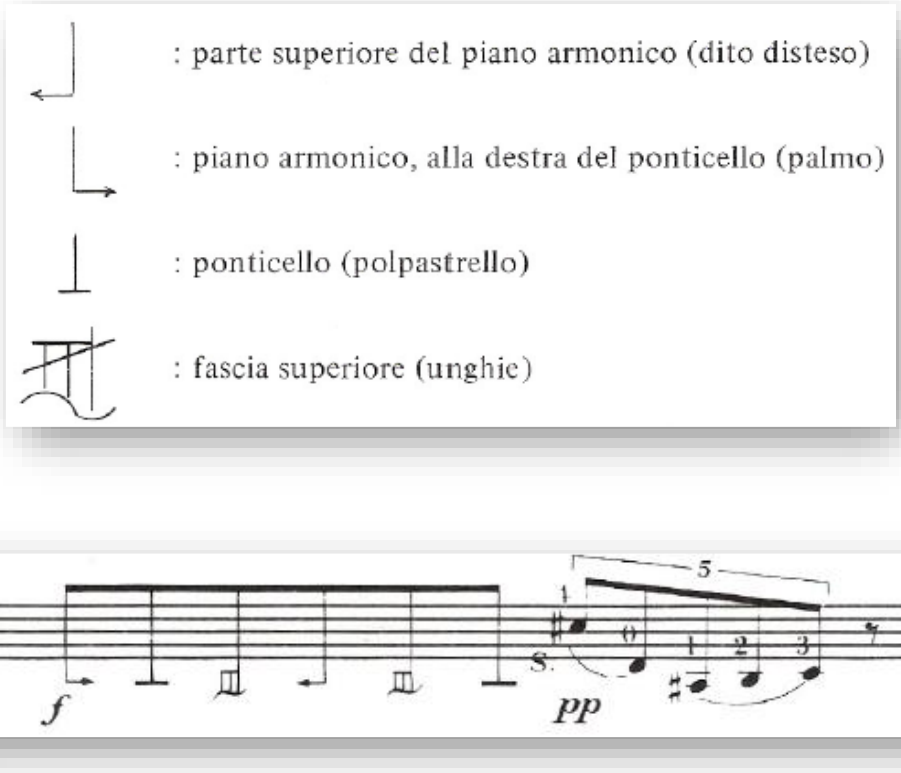


Figure 80: *Algo*, an excerpt from the instruction page and page 8.

4/A.Bgp	10,13%	**Taps on the side with the flesh of the fingers**, mid-low to mid-high range Woodblock-like sound

Video 02: *4/A.Bgp*

General Description

The second most used family in our sample and therefore also paradigmatic in percussive playing is somewhat surprising, as area **5** is more common than area **4** by a fair margin. That possibly explains why this SF is so superficially discussed in the literature. It consists of tapping the sides of the guitar with the anterior part of the fingers, producing short unpitched sounds of a mid spectrum range, broadening the timbral range of guitar taps.

The sides are naturally less sensitive than areas **2, 3,** or **5.** We agree with Hirschelman when he says that they are especially so when played with **A.B** (2011, p.78), probably because of their stiffness. That makes some technical care advisable (see below). On the other hand, they are stable enough to take very strong hits, preferrable with more "padded" hand parts such as **A.B**. With the correct technique, this can generate strong accents with a distinct color. Especially at these higher intensities, it can make the open strings resonate, but to a much lesser extent than area **2**.

This family offers not only timbral but also technical variety, especially for the l.h., since area **4.5** is quite accessible to it, even more than to the r.h.. Despite that, l.h. use on the sides is abnormally low (only **17%,** all of it concentrated in sub-area **4.5**). A curiosity is that the PR **4.2(B)/A.B(imac-MD)gp** alone responds for more than **80%** of the occurrences of this family in FG, which is probably due to the effectiveness of the "Mckee Combo" formula (see Sequences) and its variants.

The part **A** of the sides is inaccessible in lap position. While most of part **B** (except for **4.5**) is unavailable in traditional left leg position with a footstool, ergonomic supports[129] allow for extended use of that area (**4.4** and **4.1**), although with higher technical costs. Standing with a strapped guitar at an adequate hight might free the whole area for percussion.

Its uses are related to timbral variations and upbeats, and, less often, technical reliefs.

Figures 81 to 84 show some of the most important PRs in this family. It is important to observe that the taps are always made at the middle of each side sub-area, away from the junctions (with back and soundboard) and curves, and that the focus of the tap is not exactly the tip of the fingers but the more bony area of **A.B**, right below **B.C**.

Figure 81: 4.4(A)/A.B(ma-MD)gp

[129] Especially *Guitar Lift®* and *Ergoplay®* model *Trötster®*

Figure 82: 4.5(B)/A.B(ma-ME)gp

Figure 83: 4.2(B)/A.B(ma-MD)gp.

Notation: As usual, there is no standard notation, and conventions are even scarcer than they are in the soundboard context. "X" noteheads are an obvious choice, but, as the uses of this family are either improvised by the performer or concentrated in more specialized works – which require more sophisticated notation –, that will probably not suffice. Company (1965) suggests a functional solution in *Las Seis Curdas*, a simplified version of which was also used in *Algo* (see fig. 84 below). Unfortunately, the characters used – a graphic representation of the sides of the guitar – are not used in score editing software; that aside, the pictogram is very effective, being specific and eliminating the need for a dedicated staff, just requiring larger fonts to be properly read:

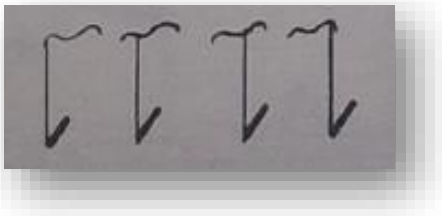


Figure 84: *Las Seis Cuerdas*, Performance Instructions. It represents family *4/A.Bgp* exactly.

Both *Percussion Studies (I and II)* limit themselves to the use of "x" notes on a single dedicated staff of one line, but the differentiation to other wooden strikes is made through a proliferation of characters. *Escutorium, Seringal,* and *As Entranhas da Terra* use specific lines and spaces on a dedicated staff to indicate the exact area of the sides, and characters (primary or auxiliary) to indicate the body-part/action. It is a more complex system, but it might be convenient if many different kinds of PRs are used, having the advantage of being systematic.

Parameters:

Range: from mid-low (**4.1**) to mid-high (**4.5**)

Duration: Very short. A subtle string resonance proportional to the intensity of the attack can be left ringing (up to circa 8 sec. at *ff*). Sub-area **4.1** produces more resonance.

Timbre: Wooden sound not unlike that of a dark woodblock played with very soft mallets. The timbral variation along area **4** can be significative, but mostly using the "nail"; in this area, it is often obtained by changing the sub-area, as going to the borders is not very effective.

Loudness: *ppp – ff*. The dynamic is hard to control below *p*, and the *ff* can only be obtained with precise vigorous strikes in the heart of area **4.1**, otherwise, *f* is a practical limit.

Technique

How to play: Because of the reduced responsiveness of the combination of area **4** with hand part **A.B**, special technical care must be taken to find the optimal spots in both, more than under other circumstances. Figs. 81 to 83 illustrate the hitting bone protuberance to aim at, located in the anterior part of the finger; as for the guitar, aiming at the middle of the subarea, as indicated, is also important. Although many percussive sounds can be achieved within **4/A.Bgp** with less technical effort, a better response, that produces rounder, clearer, and louder sounds, demands refining both the ear and the precision.

The sides are difficult to reach for the thumbs, except in two positions: a) retreated r.h. with the palm facing down in **4(A)**, and b) over the top or normal l.h. in area **4.5 (A_OR_B)**.

Care: Because the wood is resistant and stiff, both allowing for and requiring stronger strikes, extra care must be taken not to hurt the hands (especially with the variations that use harder, more impacting body parts, such as **B** or **C**).

Sequences, Integration with other TGs: This family generally takes the hand-arm complex significantly away from optimal positions for strumming and plucking, so the integration is difficult and must be idiomatically structured (involving alternation of hands to give each resting time to shift). Area **4.5** is within good reach for the l.h (especially varying hand part to **D**), making it a good option when the r.h. is occupied, as seen in *Comunhão* (Fig. 85):

Figure 85: *Comunhão*, bars 31-34, showing l.h. taps at *4.5* ("x" noteheads, in blue) integrated with plucking in a moderately fast (circa 84 bpm) passage. The time necessary for the movement is granted by open strings.

Sequences with the soundboard can be very effective (see, for example, Mckee Combo). In area **4.5** is also possible to *multi-tap* the thumbs in the back while the other fingers tap on the side.

Variations, Most important PRs and Families:

Families: **4.2(B)/A.B(imac-MD)gp** (FG only), **4.5(B)/A.B(ME)gp, 4.4(A)/A.Bgp**

Main Variations

With the nails: Despite less used than **A.B**, area **C.A** is still relatively often used in the repertoire combined with area **4** because it produces the brightest wooden sound in the instrument, very sharp and projecting.

With area **B**: Area **B** also mixes well with area **4** because of its sharper and brighter sound. It is, however, seldom used.

Tremolos: Tremolos are very effective in area **4**, as the lack of resonance and clear sound bestows them a good definition. That same characteristic makes them harder to control, especially rhythmically. Finger tremolos with one hand are more convenient, as they leave

one hand free. Convenient formulas are *p,i,m* and *3,2,1*. Forearm rotation and two-hand tremolos are also possible.

Multitaps with *a,m,i* are very common in sub-area **4.2** and quite effective in the whole of area **4**.

Examples from the literature:

FG: *Drifting, Hunter's Moon, Boogie Shred, The Impossible, These Moments, Dance of The Last Rhino, Telepathy, Passionflower*

CG: *Cenas Infantis, Las Seis Cuerdas, Percussion Study n.1, Kurze Schatten II, Algo, Cielo Abierto*

Original Works: *Escutorium, As Entranhas da Terra, Laputa Variations, Seringal, Comunhão.*

Commented excerpts

Example 1: In *Escutorium*, Thiago Diniz develops many textural works with the sides, using them isolated as micro-components in rhythmically complex textures (Fig 86) or as timbral masses evolving in timbre and dynamically (Fig. 83):

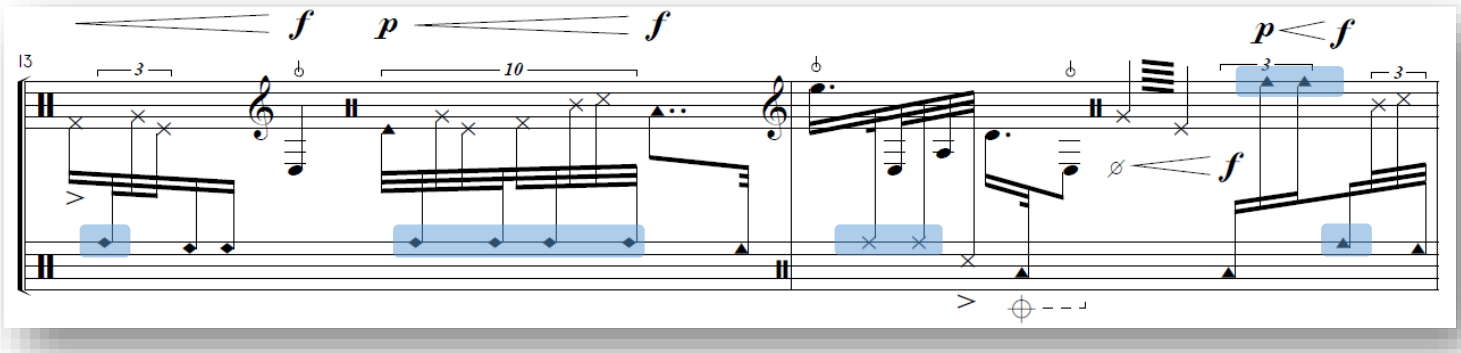


Figure 86:*Escutorium*, bars 13-14, evidencing the use of the side (area *4.5(A)*) in rhythmic textures.

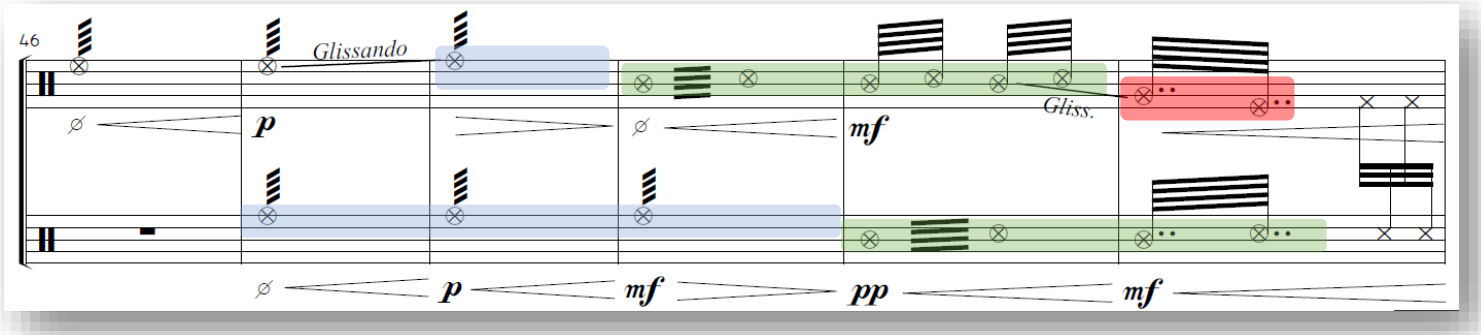


Figure 87: *Escutorium*, bars 46-51: use of area *4.5(A)* in a texture of evolution of timbral masses, going from bright (side) to dark (soundboard, *2.3* (green) + *2.1* (red)). The timbral and dynamic evolutions are linked, providing efficiency to the welding.

Example 2: In *As Entranhas da Terra*, the uses of area **4** in masses and rhythmic structures are similar, the innovation being the use of areas **4.1** and **4.4** and the use of improvisation:

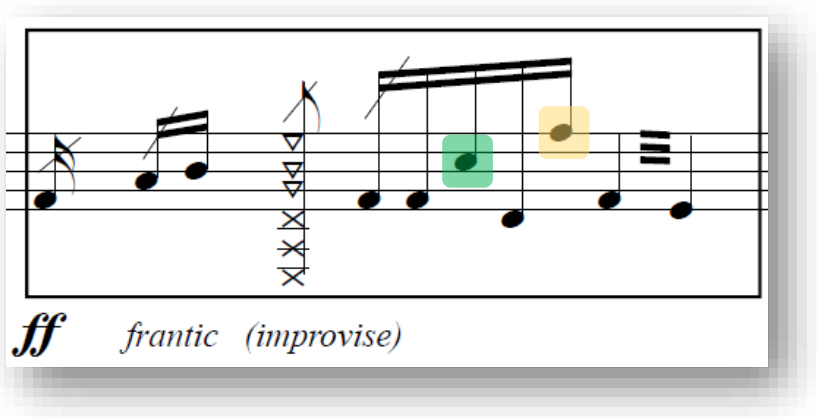


Figure 88; *As Entranhas da Terra*, p.8, second system. Areas 4.1 (green) and 4.5 (yellow) are used in fast improvised acciacaturas.

5.2/gp 8,19% **String slaps:** *Snap*, a strike with the fingers at the strings so that they hit the frets, producing a metallic hi-end sound; *slaps*; *tamboras.*

STRING SLAPS: SNAP, CLICK (DAWES, 2017), *CHASQUIDO* / SLAP (WOODS, 2013; DAWES, 2018, p.5) / *TAMBORA* / TAP HARMONICS

Video 03: **5.2/gp**

General Description

This broad SF encompasses all kinds of string slaps in area **5.2**[130], especially with hand part **A,** and secondarily **B.B, C.B,** and **D**. Three sub-groups can be therein distinguished from the combinations of three main parameters: resonance/pitch, presence of the metallic *snap* of the strings on the frets/fretboard, and the number of strings covered. They determine whether the result will be a *tambora*, a snap, or a slap.

The *Tambora* happens when the strokes produce a dark-sounding attack without snapping the strings on the fretboard and leave the strings vibrating afterward. **The Snap** happens when no resonance follows a strong unpitched attack, in which the prevailing sounds are the high (metallic) transients of the shock between the string and the frets. **The Slap** the middleground between the two above, consisting of a barely pitched, snapped attack that leaves the strings resonating.

Resonance is determined by the attack and the behavior of the hand after it. An attack that bounces back immediately produces the most resonance and pitch. Leaving the hand or finger resting on the

[130] Area **5.3** produces similar results but the pressure applied is different, as is the snapping threshold; moreover, direct contact of the finger with the wood produces a wooden tapped sound. All of that changes both the feeling and the sound result of the techniques.

strings reduces or eliminates them. The snap (a metallic sound), in turn, is produced by the interplay of two variables: attack strength and placement. The attack must be strong enough for the string to hit the frets/fretboard, producing a metallic sound. This bright sound component is, of course, more pronounced in the basses, which are wound in metal. The amplitude of the attack motion also contributes to the snap. The efficiency of the attack is, moreover, controlled by the placement: the looser the string, the lesser the "snapping threshold". As usual, strings are at their loosest away from fixations (12th fret when open). The string coverage defines how many strings are hit, involving hand extension, or, conversely, precision, when individualizing them. Figure 89 shows the different combinations of those variables and how they interact to form the different SFs described in this entry.

Slapping the strings at nodal points will produce the so-called *tap harmonics*, which are essentially *tamboras*. This technique is more commonly used over the fretboard and will be described in the corresponding entry ("5.3/A.Bgp").

General Notation: Because of their similarities, the three kinds of string slpas will many times use similar symbols ("x" noteheads are not unusual). The challenge is to distinguish between them. That could be made through the use of auxiliary characters (such as letters) or situating the *snap* in a line dedicated to unpitched sounds. The "x" noteheads tend not to be advisable in complex percussive contexts (in which other PRs with that notation might appear). The optimal solution is to use a dedicated character for the *snapping* sound and notating all slaps in the strings with another dedicated character. That alone, together with the number of notes requested, will suffice to differentiate between *tamboras,* snaps, slaps, and tap harmonics.

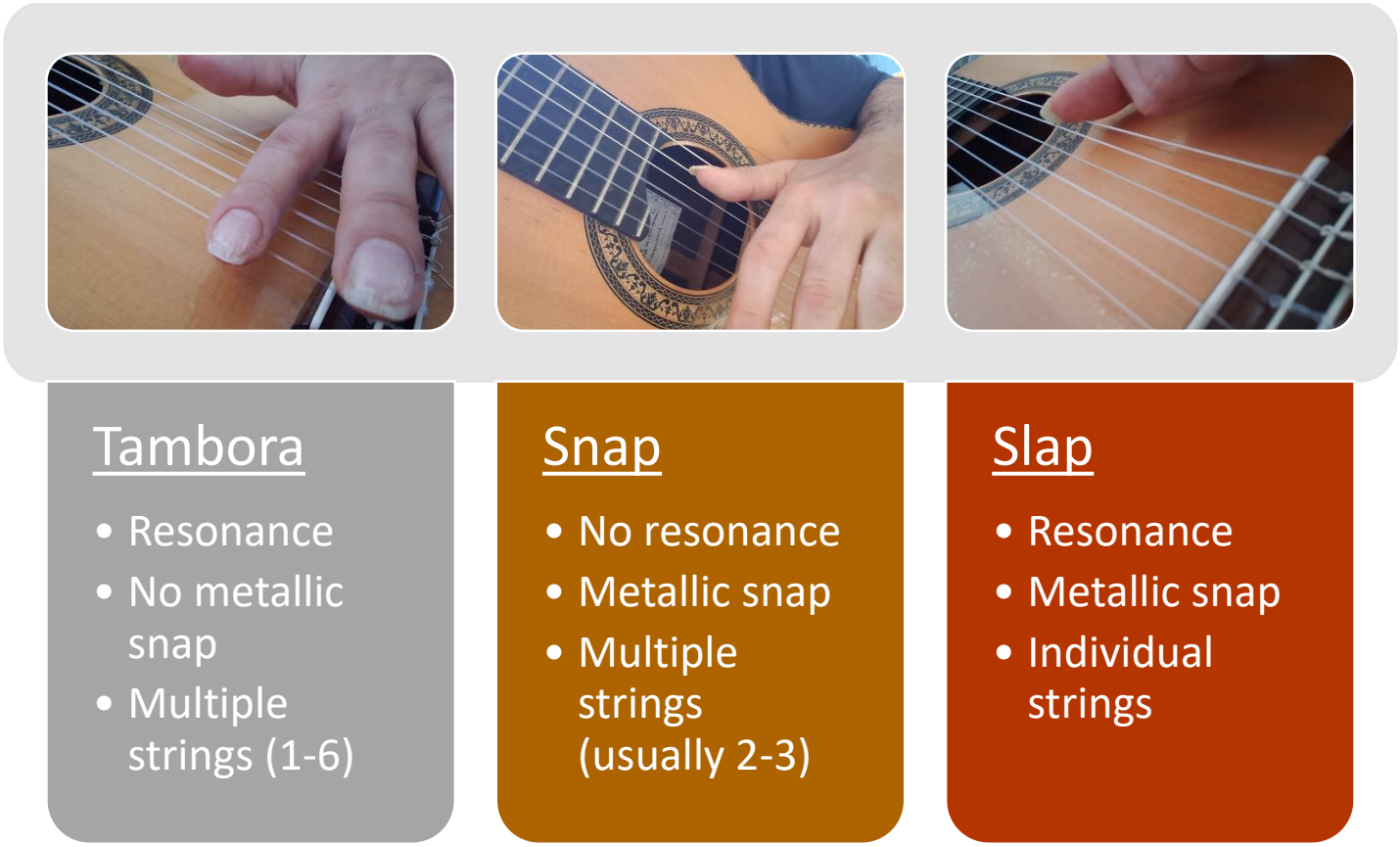


Figure 89: Differentiation of 5.2/gp entities, and the corresponding parameters.

Tambora

One of the oldest percussive techniques in the guitar, the *tambora* was possibly first described by Aguado, in the second version of his method:

> The tambora consists of playing the chords close to the bridge with the medium finger of the right hand, and better yet, with the thumb, in which case the hand is given a fast turn-around movement so that it falls over the strings. The wrist must not be stiff; on the contrary, it must return with great flexibility, so that the weight of the hand, and not that of the arm, makes the strings ring.[131] (AGUADO, 1843, p. 55) (in: BRAGA, 2020, p.111)

Early examples include Antonio Abre's *Menuet du Tambour* (181-), (JOSEL AND TSAO, 2014, p. 155) and Barrios's *Cueca* (circa 1925) and *Aconquija* (recorded 1928). But despite its early formalization and uses, it alone corresponds only to 3.23% of the *Use* in our sample; most of it in CG.

[131] *A tambora consiste em tocar os acordes perto do cavalete com o dedo médio da direita e, melhor ainda, com o polegar, neste caso, dando à mão um movimento de meia volta com velocidade para que caia nas cordas. O pulso não deve estar duro; pelo contrário, ele precisa retornar com muita flexibilidade, para que o próprio peso da mão, e não do braço, faça as cordas soarem* – Translation by the author

It is a SF that adds explosion to chord production, in general covering 4-6 strings. It participates in explosive culminations or subtle textures, and can even be used melodically. It has great flexibility of timbre and intensity, and can be agile to the point of generating tremolos and acciacaturas.

Notation: Both the "x" notehead (*Gloucester*) and its variations (*Las Seis Cuerdas,* Fig. 90), along with a "T" plus a line indicating duration (Berio's *Sequenza*; *Sonata op. 47* – Fig. 91), are common. Despite being more economic, the "x" can be misread as other kinds of percussion in a more complex percussive context unless those are used on a separate staff. In Fig. 91 we see Ginastera's symbols for different kinds of *tambora*, and in Fig.92, the notation Victorio uses in most of his works, including *Vril*.

If more specificity is required, placement indication can be given textually or, preferably, graphically, showing the distance to the bridge. Fingering can use the standard notation (*pimac*), and other body parts can be represented graphically (as in Fig. 77) or with letters (recommended for being more economic, and they could also be used for other PRs that use that body part).

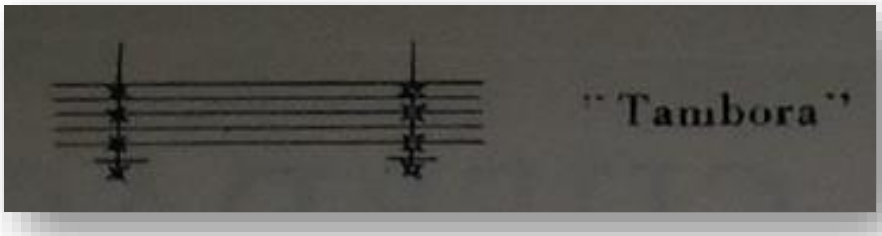


Figure 90: *Las Seis Cuerdas* ("*Simbologia Tecnica*").

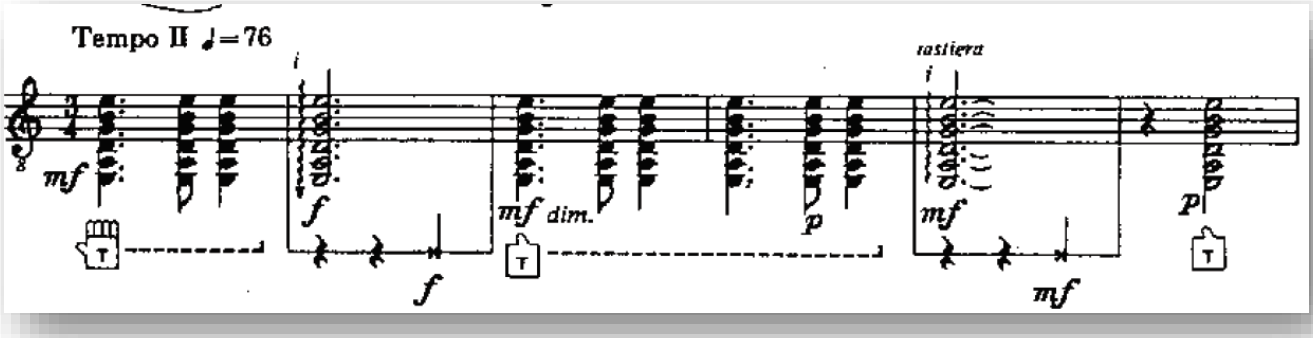


Figure 91: *Sonata op. 47, I. Exordio,* page 2, system 5. Sequential tamboras.

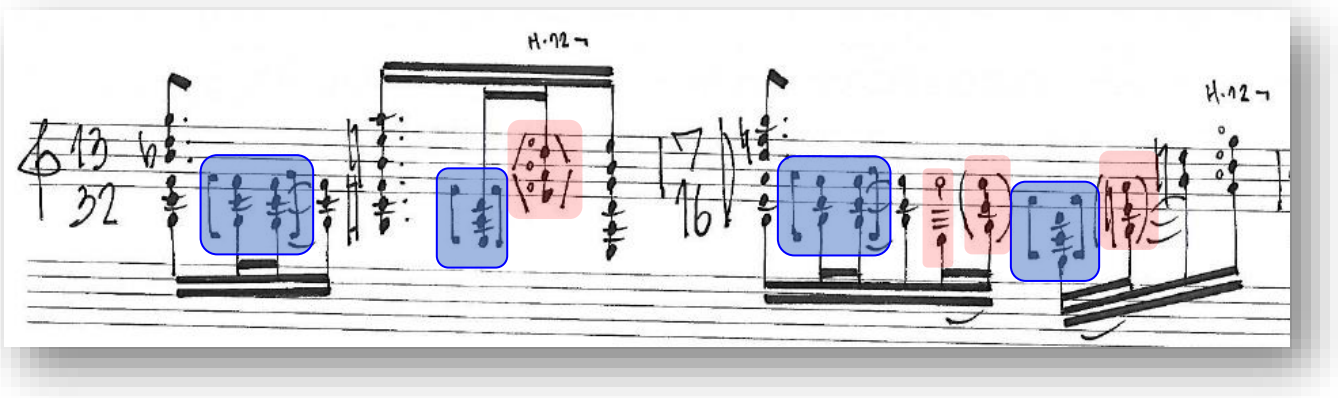


Figure 92: Roberto Victorio´s *Vril* (2020), page 5, first system. A fast-changing texture with several PRs on the strings (salmon), incorporating tamboras (blue), on only one staff.

Parameters:

Range/Pitch: As the strings, but with the presence of a dark "thump" sound.

Duration: Short attack with a prolonged resonance at a lower dynamic plateau, lasting as normally vibrating strings.

Timbre: The *tamboras* sound like the strings, but with the more muffled sound of the flesh and an explosive attack. They are especially flexible with timbre because they retain part of the timbral variety of the strings (*sul tasto <-> sul ponticello*). At the same time, they allow for a great control of the balance between the (relatively) inharmonic attack and the pitched resonance of the strings. That is controlled by approaching the bridge (less pitch, less resonance, more attack) or leaving it (the opposite). The *tambora* attack is accompanied by a very dark "thump" sound (similar to that of taps in area **1**).

Dynamics: *ppp – ff*

Technique

How to play: Slap a group of strings, or, less often, one individual string, with any finger[132], making the hand rebound immediately thereafter, so that the strings are left to vibrate. It might be necessary to mute unwanted strings with the other hand. The movement originates either from the shoulder, the forearm (using rotation in the case of the thumb), the **B.A** phalanxes (for quieter dynamics), or combines all of these articulations. Despite that origin,

[132] Inda (1984, p. 30) suggests using several fingers to strike different string parts, or even area **1**, at the same time, obtaing composite timbres. The use of other hand parts – **B, D** – is also possible, but they produce duller effects, albeit with a distinct timbre.

at the moment of the attack, only the weight of the fingers or hand should be felt in the strings, without any active pressure, exerted exclusively through the inertia of the motion, as described by Aguado. The strength used might not surpass the threshold of *snapping* for that particular string area. Close to the bridge, very strong slaps can be absorbed, allowing for higher dynamics with a darker timbre.

The exact positioning of the hand-arm complex is dictated by the desired timbre and the technical context. Because the snapping threshold is lower at *sul tasto*, *tamboras* in that area are limited to *mf*.

Care: avoiding unwanted nail and string contacts is important, as is controlling the strength to avoid unwanted snaps. The sound production is difficult on the trebles, so the stroke must be adjusted to guarantee some balance between them and the basses.

Sequences and TG Integration: *Tambora* cannot generally be simultaneously integrated with other TGs when using stopped strings, except in the very specific case of a *split* between *p/ima,* in which the first slaps the basses softly at *ponticello* and the fingers execute another action. Because it often takes the hand-arm complex far from optimal plucking/strumming positions, integration is not very agile (splitting the hand in *p/imac* and playing with finger motion diminishes the problem but at the cost of limiting the *tambora*).

Variations:

Area 1: *Tamboras* here consist more of a percussive attack with a secondary, distant resonance.

On the saddle: Exactly "on-the-saddle" slaps produce a specific balance of dark attack/pitches+resonance that is very percussive but retains identifiable pitches.

Damped *tamboras*: That is the pure sound of percussively slapping the strings, without producing notes or the snapping sound of the frets. It can be achieved also through *deadstrokes.*

Ginastera's hand-palm tambora: A case of *snapped tambora* (see below) with the palm. Despite the stronger attack, it tends to dampen the resonance, achieving a specific balance in that respect.

Tremolando *tambora*: Many forms of tremolando are possible, from multi-taps to finger tremolos ("The technique is easy to do and sounds like a quiet tremolo with a timpani." (LUNN, 2010, p.38)). Forearm tremolos are also possible, but less relaxed for the hand. Examples include *Si le Jour Paraît* (II), William Albright's 3rd Movement from *Shadows*, "Nights," measure 1 (LUNN, 2010, p. 38), and *Lamentación de la Muerte (Four Poems of García Lorca)*.

Thumb with nail: This approach tries to correct the unbalance between the trebles and the basses. It especially useful when the main content of the texture resides in the trebles (e.g., melodies), or to produce more sonorous tamboras in those strings alone. It consists of rotating the hand approximately 70 degrees so that the back of the thumbnail faces the strings, and then execute the tambora focusing on the desired string(s).

Snapped tamboras: They happen when a normal *tambora* surpasses a certain threshold and snaps on the fretboard, giving the sound a metallic, inharmonic attack, less pure in pitch. The threshold is determined by the distance to the bridge, being lower in the *sul tasto* area. They sound very similar to a slap. Over the fretboard (5.3), they also incorporate a tap on the wood, strengthening the inharmonicity of the attack and making it somewhat less bright.

Tap Harmonics: The "Tap" or "tapped" harmonics, as they are called in the literature, are tamboras or slaps executed over nodal points. Special care must be taken to shorten the contact point of finger and strings and to achieve optimal release time. That last goal is complicated by the need to avoid that the open strings sound as well, which requires pulling the strings further inward and, as a consequence, prolonging the contact time of strings and fingers.

Examples from the literature:

CG: *Sonata Op. 47, Las Seis Cuerdas, Cenas Infnatis, Si le Jour paraît..., Un Mismo Mí, A Sad Humoresque, Shadows, November Memories, Four Poems of García-Lorca (III), Cielo Abierto.*

Original Works: *Laputa Variations, Escutorium*, *Comunhão.*

Snap

The snap produces the metallic sound of the shock of the strings against the frets. It is traditionally used in the basses, 2 to 3 strings at a time, as the metal strings reinforce the effect. The sound is dull in the trebles. It has a distinct identity, as it contrasts with the predominantly wooden sound of the guitar: its sound is complex, penetrating, and projects well in any solo (and most group) textures. A dark "thump" exactly like a *damped tambora* also participates in the sound composition.

It is one of the most used single SFs in guitar playing (almost **5%** in our sample), as it is part of many forms of *levadas*, *riffs,* and r.h. patterns in pop and other music traditions.

It is overwhelmingly more used with the r.h. (93%) but, as Kampela has demonstrated in his *Percussive Studies,* and we in *Laputa Variations*, l.h. use is effective in sound and simple in technique. In any case, it is more easily produced close to (but not **on**[133]) the fretboard (*quasi sul tasto*), where the strings are looser. From there toward the bridge, one gets progressively more bass and less metal; at a certain point, the snapping threshold is so high that a *tambora* is all but inevitable.

Each string has a distinct sound; the thicker the string, the more pronounced the attack. It is possible, although difficult, to individualize the strings. In the literature, strings VI and V are the most used, although most players´technique is more approximative.

This SF is relatively inflexible, admitting little timbral and durational variance, and dynamically hard to control.

Its most frequent uses are in rhythmic textures, often occupying upbeats in the role of a *snare drum*; ostinatos are fairly common. In our sample, it was used also for timbral works, such as in *Percussive Study I* (Fig. 93) and *Cenas Infantis* (FERNANDES, 2011a) . It is also very effective for punctuation, as seen in *As Entranhas da Terra* (Fig. 61 under "Non-idiomatic Sitiuations", SEE VIDEO).

[133] On the fretboard, the wooden sound of the tap diminishes the distinctive character of the snap; besides, the metallic sound obtained there is of a different nature.

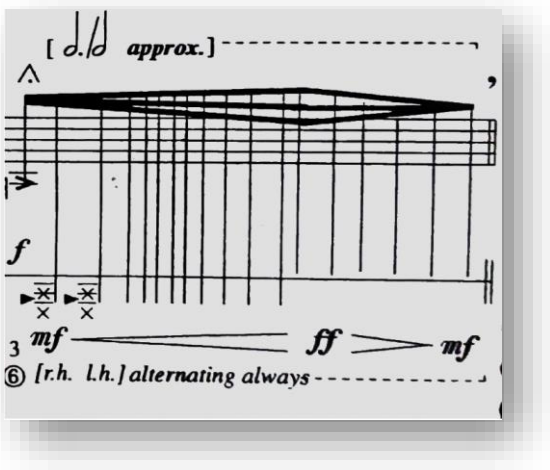


Figure 93: *Percussive Study I, bar 108*. A texture created out of snaps.

Notation: There is no conventional notation, but "x" noteheads are fairly common. Kampela situates them on the line dedicated to unpitched sounds (Figs. 89 above and 90 below); the advantage is that "x" noteheads can be used for another PR on the pitched-sounds staff. In *As Entranhas da Terra* we follow *Ko-Tha,* situating them on the string-dedicated staff (Fig. 95).

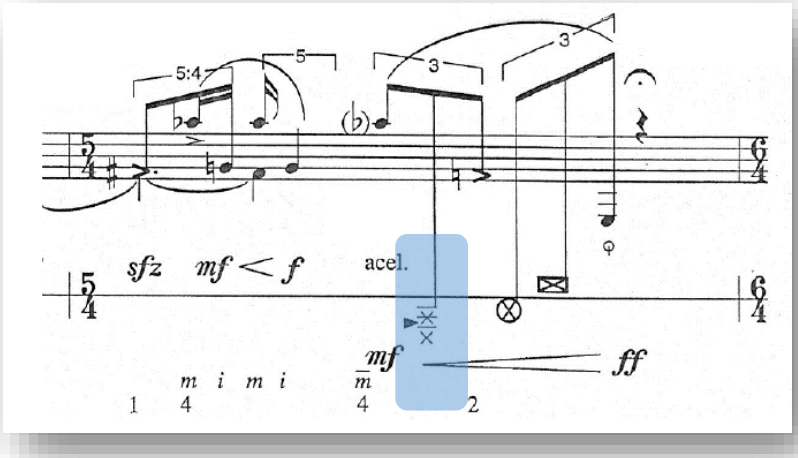


Figure 94: *Percussive* Study I, page 1, second system: notation of the snap.

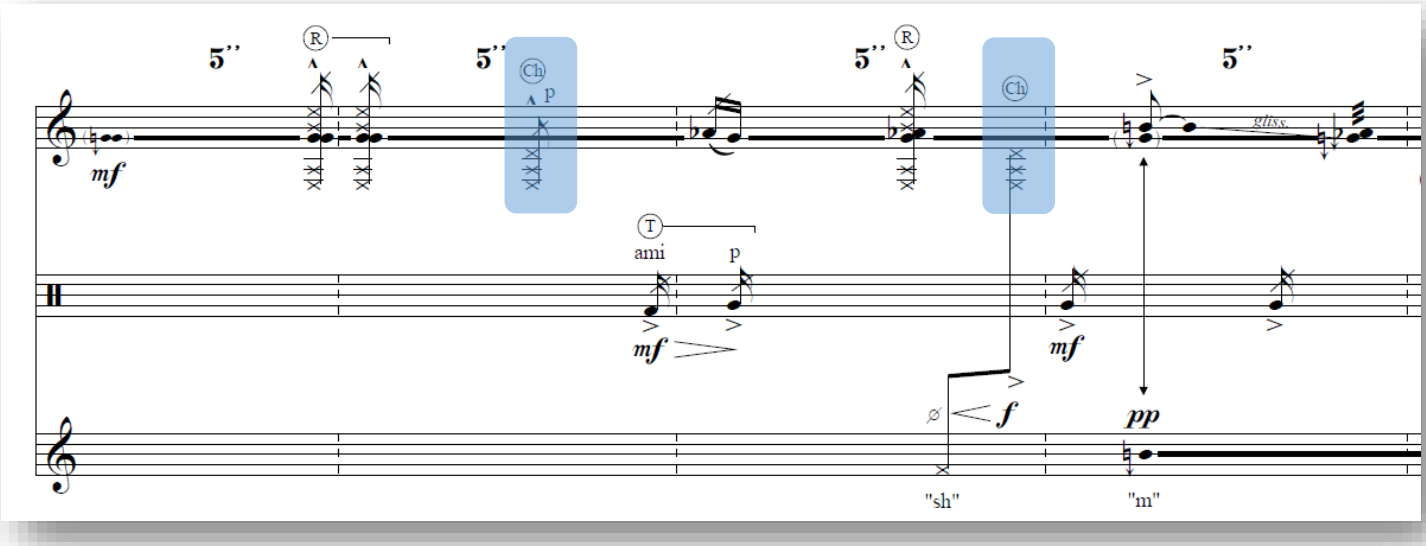


Figure 95: *As Entranhas da Terra*, page 7, first system: notation of the snap ("Chasquido").

Parameters:

Range/Pitch: High, metallic, having the brightest spectrum that can be produced in the guitar with the hands only.

Duration: Very short (but up to 0.5s in some extreme cases).

Timbre: Metallic and dry. Can be manipulated, to an extent, by moving the hand between the fretboard border and the bridge. There is an audible presence of the tuning frequency of the soundboard.

Dynamics: *mp-ff.* Dynamics are difficult to control, especially at *mp*, because the stroke must overcome the snapping threshold. When used in 2-hand-tremolos, such as in bar 108 of *Percussive Study I* (Fig. 93 above), it rises to be the loudest PR in the guitar, together with the *pizz.* Bartók.

Technique

How to play: Using mostly a rotation movement of the forearm, hit the bass strings with the thumb perpendicularly so that they clash with the frets and, secondarily, with the wood. *Imac* can also be used, with a wrist movement. The tapping finger must rest quickly on the strings, to damp the resonance.

Care: The snap is highly dependable on the state of conservation of the metallic strings. It is important to mute when hitting, and in more meticulous contexts, avoiding contact with unwanted strings, not to damp or play them inadvertently.

Sequences and TG Integration: It is very commonly used with *rasgueados* in pop music, and can be easily and fastly integrated with that TG. Integration with plucking, when following the snap, suffers from the snap impact and hand shift a bit more. It is very practical to be used in percussive sequences involving forearm rotation/thumb, or multi-taps with *ami/321*.

Most important PRs, Families, and variations:

PR: 5.2(VI-IV)/A.B(p-MD)gp / 5.2(VI-IV)/A.B(*ma*-MD)gp / 5.2(VI-IV)/A.B(*ma*-ME)gp / 5.2(VI-IV)/A.B(*a,m,i*_OR_*3,2,1*)gp

Variations:

Individual Strings: that broadens the available timbres, but at a higher technical cost. Using individual fingers for each string helps, but takes the hand away from the optimal playing position.

Controlled groups of adjacent strings: This is a more technically accessible variation of the previous, and louder. It works especially well in guitars with more basses (7 or 8-stringed guitars, for instance).

With a closed fist: Produces a drier, stronger sound.

Tremolos:

2 hands: this tremolo, introduced by Kampela in bar 108 of *Percussive Study I* (Fig 89 above), consists of alternating *ma* and *23* at the basses (conceivably also executable with the thumbs). It can get very loud and requires vigor.

Finger: Finger tremolos (*a,m,i*) are quite difficult, requiring a large distance between fingers, a built-up resistance, and loose strings (close to the 19th fret; a variation over the fretboard (around the 12th fret) would be significantly lighter to play).

P or *imac/ma*: *imac* tends to be discreetly brighter.

Examples from the literature:

FG: *Boogie Shred*, *The Mirror, These Moments, Dance Of The Last Rhino, The Impossible, Telepathy*

CG: *Cielo Abierto, Royal Winter Music, Algo, Las seis cuerdas, N-Dimensional, Sonata op. 47, Kurzen Schatten II, Cenas Infantis, Tellur.*

Original Works: *Laputa Variations*, *As Entranhas da Terra, Escutorium, Malambo Mulambo.*

Slap

This technique, originally developed for the electric bass, consists of "striking a string quickly with a plucking-hand finger or thumb to simultaneously produce percussion and pitch" (HIRSCHELMAN, 2011, p. 50); in other words, bouncing off the string(s) immediately after a *snap* to allow the string to vibrate. It only works in metal wounded strings. When executed over the fingerboard (area 5.3), the sound of the finger hitting the wood is incorporated (HIRSCHELMAN, 2011, p. 50).

Its execution in a classical guitar is complicated by several factors:

a) The difficulty to control unwanted resonance of other strings;

b) It is necessary to protect the nails, to preserve them (HIRSCHELMAN, 2011, p. 50);

c) The narrower spacing of strings (in comparison with the bass) makes it difficult to separate individual strings;

That makes the technique tricky and used predominantly in the 6th string with the r.h. thumb, as it provides more room for the movement (alternatives are discussed in "Variations"). No l.h. uses were found.

It is traditionally used in single strings to create percussive pitched accents, in all kinds of textures but especially rhythmic ones. It is also possible, however, to use this distinct timbre to build bass melodies, such as in *Laputa Variations,* bars 106-108 (Fig. 96).

Notation: Hirschleman (2011, p. 50) employs an auxiliary character (an "S"), while Woods (2013) uses "x" noteheads. As discussed, we recommend using a dedicated character related to slapping the strings. The "x" notehead should be avoided, as it can be confused with several other more common

notations for the strings (such as the “ghost notes”), especially the snap. No second staff is necessary for this technique.

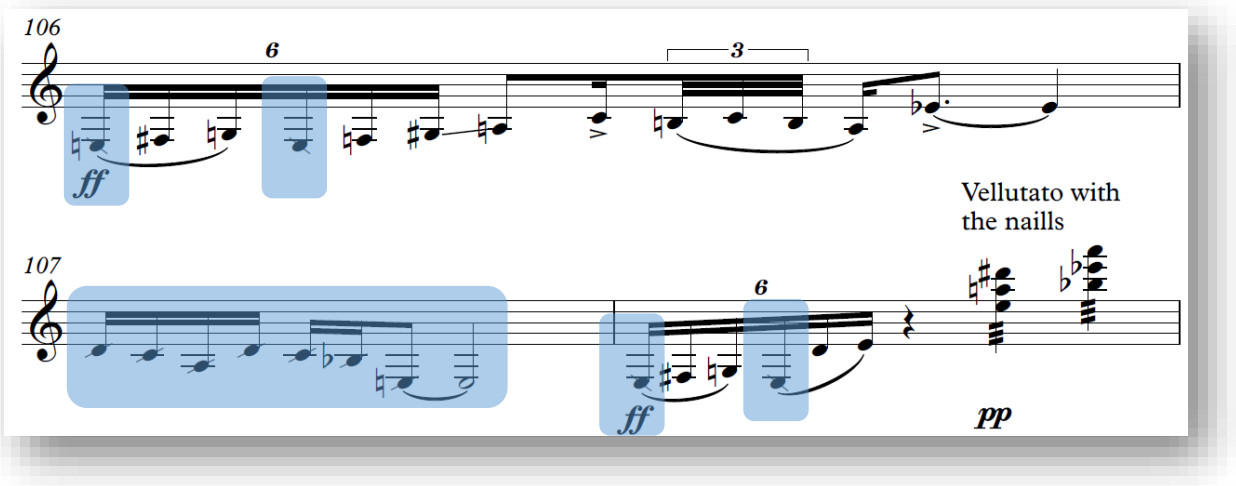


Figure 96: Laputa Variations, bars 106-107: melodies with slaps (crossed noteheads) and slurs (see in particular bar 107).

Parameters:

Range/Pitch: as the notes played plus the metallic snap.

Duration: the attack is very short, as in a snap, but the resonance is proportional to the intensity.

Timbre: It combines a snapped attack with the sound of the notes. Timbre variations are not easily achievable but *sul tasto <-> sul ponticello* offer some slight variety.

Dynamics: The attack reaches from *mp* to *ff+,* while the resonance accompanies that but is one level below (*p – f)*

Technique

How to play: For the thumb, the forearm rotation movement should be used (Woods, 2013, p. 15; HIRSCHELMAN, 2011, p.51). The knuckles should be positioned slightly more parallel to the strings than the normal plucking position (HIRSCHELMAN, 2011, p. 50), and the motion should aim at the tip-joint area of the thumb. The other fingers use frontal wrist movements and hit with the tips (A.A) (this takes the hand significantly away from the optimal plucking position).

Quick movement velocity (HIRSCHELMAN, 2011, p. 50) and immediate bouncing off (WOODS, 2011, p. 15) are requirements for the SF to function properly. Dampening non-targeted strings with the l.h. thumb above the fretboard or with other l.h. fingers is a necessity most of the time, as it is

very difficult to aim exclusively at one string at a time. Strings A and D are harder to focus on, because of their busy vicinity.

Care: String individualization, optimal finger spot for string contact, and muting unwanted resonance are the main technical hygiene demands. The strings must be relatively new for the snapping sound to be more effective.

Sequences and TG Integration: This SF lends itself perfectly well for integration with the other TGs, just as the snap. The use of the Dawes's Slap (see below), however, requires small changes in hand position that render the integration a bit more sluggish.

Most important PRs, Families, and variations:

Variations:

Dawes's Slap: Dawes (2017) introduces an interesting variation for hitting strings A and D: hitting them with the tip of the thumb (sometimes only the nail, if it is big enough) pointing downwards, while simultaneously hitting the string(s) above with the bulk of the finger. This produces a clean but percussive note in the targeted string enriched with the metallic snapping sound of the strings above it. While it is arguable that this sound is not 100% coincident with that of a regular slap, it is close enough, and the "pure" slap sound is extremely difficult to achieve in a complex musical context in these strings anyway – at least not without spoiling the texture with unintended resonances and noise.

This technique can arguably be used to reach the third and, in extreme cases, second strings as well. However, the further one departs from the sixth, the more that takes the hand away from the optimal playing position.

Examples from the literature:

FG: *Boogie Shred*.

CG: *Cielo Abierto.*

Original Works: *Laputa Variations*.

5.3/A.Bgp 7,76% Fingerboard taps: Strikes on the fretboard area of the strings with the flesh of the fingers

SNARE DRUMS (DAWES, 2017; Sariola in GUITAR ACOUSTIC, 2018), *CHASQUIDO,* TAPPING, HAMMER-ONS, TAP (TAPPED, SLAPPED) HARMONICS (DAWES, 2011; WOODS, 2013; SCHNEIDER, 2015, p. 206; DAWES, 2017; KELLIE, 2018), FRETBOARD TAPS.

Video 04: Fingerboard Taps

General Description

This family encompasses all slaps on the strings over the fretboard. Depending on the strength, spot, movement depth, and duration of contact, it generates different sounds: percussive bass notes, fretboard taps, snaps, "snare drum" mixtures, or tapped harmonics.

This family is the twin of the previous **5.2/gp**, both forming a more general category of "slaps on the strings". Their separation is related to the position and use of each hand, the role of the fingerboard and frets, and the distinguishing sound of each: a wooden tap in this case, opposed to the bass sound of **5.2/gp.**

5.3/A.Bgp can take advantage of the fretboard to create percussive *tapping* sounds on the basses, such as in the famous introduction to Mckee's *Drifting*. Differently from usual tapping techniques, this kind of usage employs body part **A.B** instead of **A.A** because it hits several strings simultaneously.

It is also possible to extract subtle wooden sounds by tapping the wood. As avoiding the strings is not practical, one aims at the trebles because their sound is softer. Inverted l.h. position helps in that endeavor. It is also possible to hit the fretboard diagonally at its edges, completely avoiding the strings, but that is generally less useful with TG integration in mind.

Snaps are also a possibility. They differ from the **5.2** snaps because of the inevitable wooden sound and the different frets and string lengths involved (timbre gets darker as one progresses toward the nut). Harmonics (or multiphonics) generally accompany this sound, but that can be controlled.

The "snares" are essentially a variation of fingerboard snaps and are performed within the area of the soundboard (12th fret on). That produces a brighter timbre than otherwise. They are often used in mixtures, as seen in the "Variations" ahead.

Tapped harmonics happen when the slaps are performed over nodal points, unveiling a lasting harmonic after a rough attack. It requires, of course, the string not to be muted.

These SFs have an enormous variety of uses, such as punctuations, adding rhythm to harmonic contents, opening and closing gestures, forming independent textural layers, etc. They can be used in rhythmic, pointillist, timbral, or mass textures.

In our sample, we found a prevalence of r.h. usage (73%/27%). That is noteworthy, as area **5.3** is within better reach for the l.h.. FG presents no less than **82,6%** of the registered occurrences because CG percussive use of area **5** focuses on sub-area **5.2** (64%), with *Bártoks* and snaps.

Figure 97: Two different fingerboard taps: a slapped 6-strings harmonic with *a* and a multitap with *ami*.

Notation: Normal tapping notation suffices for the percussive tapped notes: "+" for l.h., a T above the note, an "x" crossing the note stem (Fig. 98), or the classic wedge-shaped notehead that indicates a "hammering" action, such as in Fig. 99 (FRENGEL, 2017, p. 101; SCHNEIDER, 2015, p. 194; KAMPELA, 1990)[134].

Snaps can use similar notation on a dedicated staff for unpitched sounds, such as in *Percussive Study 1*. They can be notated as the open strings they encompass, with roman numerals indicating their placement on the fretboard if needed. That requires a special character or indication (for example, "S") to differentiate them from pitched and plucked sounds. The same is valid for "snares" and fretboard taps (the latter should specify the trebles).

Tapped harmonics should be notated as regular harmonics with an indication for the action of slapping/tapping (for example, crossing the stem of the note with an "x" – Fig. 98 - or using a "T"). That is also valid for the **5.2/gp** described in the previous entry.

[134] We must disagree with Josel and Tsao (2014, p. 171) when they suggest using an "x" to notate l.h. tapping, as the "+" is more standardized and the "x" can be easily confused with other SFs.

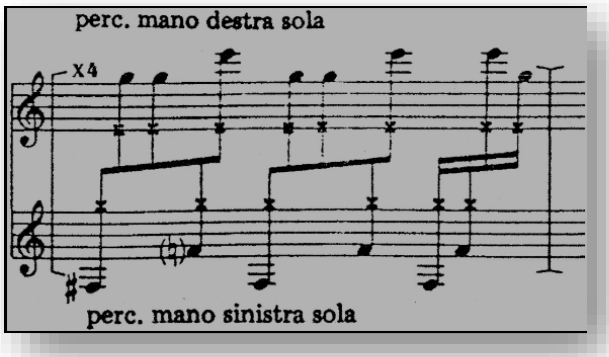


Figure 98: Leo Brouwer's Paisaje Cubano con Campanas (1986), showing the use of crossed stems as an indication for tapping/slapping (source: FRENGEL, 2017, p. 101).

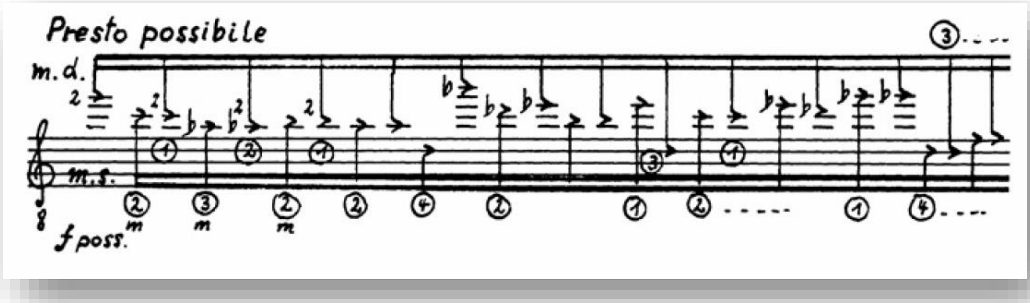


Figure 99: Wedge-shaped noteheads indicating tapping action in G. Kröll's *Estampida* (1968). Source: SCHNEIDER, 2015, p. 194)

Parameters:

Range/Pitch: The characteristic sound of the family (see timbre ahead) is situated approximately between the low and mid registers.

Duration: Very short attack. The occasional resonance will follow the intensity of the attack at a lower dynamic level.

Timbre: The unifying timbre quality of the many sounds within this family, and its distinctive feature, is the accentuated attack with its wooden component. The presence or not of the metallic snap and the resonance (normal notes or harmonics) differentiate the individual SFs/PRs within it and are not characteristic.

Dynamics: Percussive notes: *mf(+)-ff.* Low "thump": *pp-mp*. Snaps: *mp-ff*. Fingerboard taps: *mp-ff*. Tapped harmonics: *p* (individual strings) – *mf* (string groups) – *f* (individual strings) – *ff* (string groups).

Technique

How to play: The percussive tapped notes are achieved with vigorous movements hitting two or more strings. Not only should the movement accelerate fast, but the impulse must be maintained until the finger touches the wood – that is what differentiates it from the 5.3 snaps. If the l.h. has no *punteado/rasgueado* functions, the inverted l.h. position is very comfortable to that, being the reason for its continued use in FG. While this variation is generally played on the basses, the trebles can also produce relatively percussive notes.

The wooden taps are produced avoiding the basses and their snapping properties and bringing the fingers in contact with the wood in the trebles area. The finger(s) must rebound immediately in the wood, not keeping the string stopped, to avoid producing pitches.

The snaps can be played with one or several fingers, the latter enabling more vigor and damping. To avoid producing hammer-ons, the snap movement must depart vigorously but hit the strings only with its inertia. Stretching and separating the fingers enables their full strength, and for that reason, snaps are less suited for inverted l.h. position, as stretching would take them away from optimal playing position. Avoiding nodal points, extending the contact, and using more than one finger can reduce or almost eliminate undesired harmonics and multiphonics. Below the snapping threshold (*pp-mp*) a muted, dark "thump" is produced.

Care: Good preserved basses are required for the snapping sounds, and make the other SFs easier. Avoiding unintended strings is a technical refinement to strive for. This Family presents no risks to instrument or performer.

Sequences and TG Integration: Because of its particular placement, this Family lends itself better for TG integration with the l.h., as the r.h. is slightly out of its standard position. With that hand, normal *punteado* or *rasgueado* can be played while some free finger taps the strings/fretboard. Both hands can, however, achieve good alternation speeds and have many possibilities for simultaneity.

Many sequences can be formed with these PRs, especially those using finger multitaps.

Most important PRs, Families, and variations:

Variations:

Left-hand fretboard tap: If percussive playing aims at better use of the left hand, using areas **6** and **5.3** is of paramount importance. For that purpose, extensive use of unpitched finger-taps on the strings is especially practical, as they leave the fingers almost exactly in position for plucking/strumming, thus allowing for one of the most agile forms of TG integration possible. Extensively used in *Hunter's Moon* and *Laputa Variations*, this SF consists of tapping the basses, and rarely, the trebles, with **A.B** of l.h fingers. The results are not too loud (*p* to a moderate f) but efficient. The biggest problem is controlling unwanted pitches, which requires either dampening – with the other hand or the other fingers – or a highly controlled tap, leaving the finger an instant longer in contact with the strings after the attack and not pressing it too much against the fretboard.

Sariola's snare (SARIOLA, 2018, p. 28)**:** This is the sound of a regular guitar "snare" together with a soft tap of a finger (generally *i*) on the soundboard. It requires, thus, a hand-split (*i-mac*). It is achieved with the right hand-arm complex parallel to the fretboard.

Sariola's snare 2 (SARIOLA, 2018, p. 28): This variation leaves the *imac* split whole, using the opposing thumb to hit the soundboard more fiercely.

Multitaps: This technique is especially effective with multitaps of up to 3, or at most 4 (the use of *c* is more complicated) fingers.

Examples from the literature:

FG: *Drifting, Hunter's Moon, Boogie Shred.*

CG: *Ahnk*, *A Whisper in the Desert*.

Original Works: *As Entranhas da Terra, Vril*, *Seringal, Laputa Variations, Escutorium.*

Commented Excerpts

Laputa Variations: In this piece, fingerboard snaps with both hands are idiomatically used to create running masses of percussive sounds (Fig. 100) or to achieve fast integration with other TGs or PRs, as seen in Fig. 101. In both cases, they are textural as well as rhythmic, and occupy the first or second textural layers.

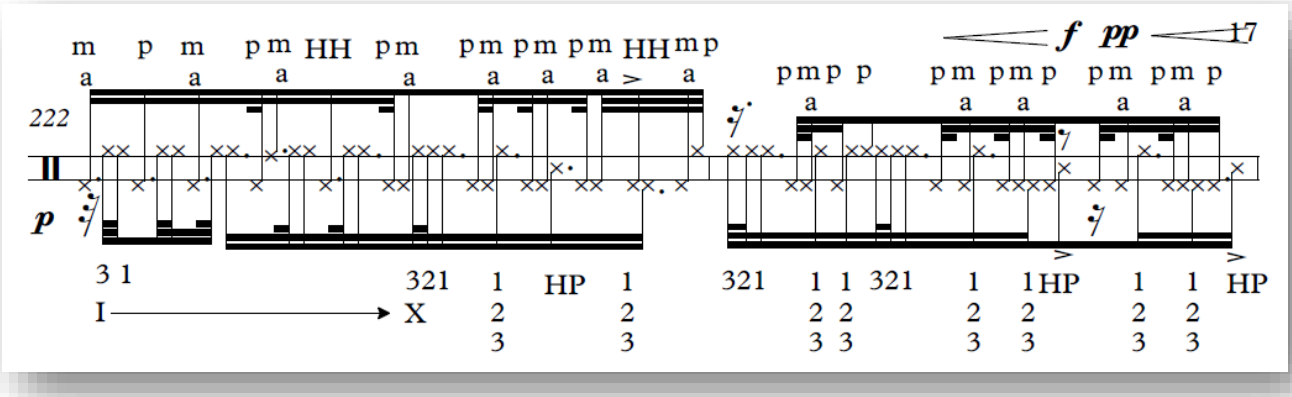


Figure 100: *Laputa Variations*, bar 222, showing the use of snaps with both hands (the uppermost x-headed notes) forming a very fast, idiomatically constructed percussive passage.

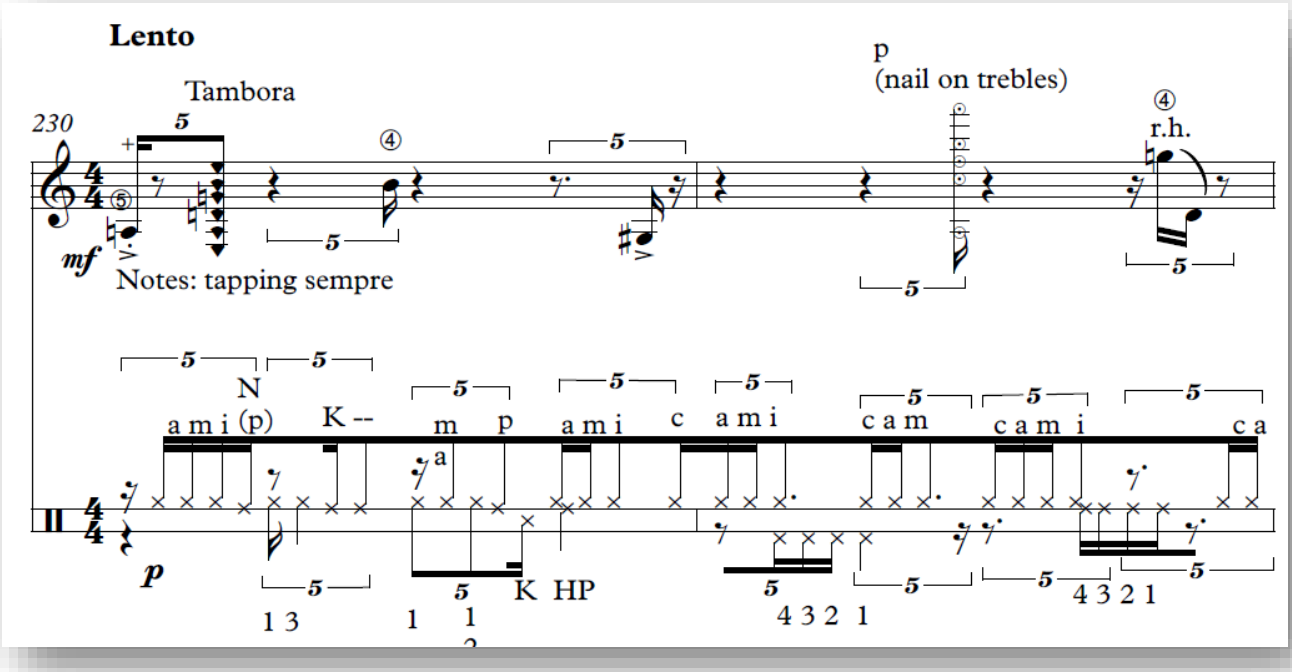


Figure 101: Laputa Variations, bar 230, showing the incorporation of left-handed fingerboard snaps (the uppermost x-headed notes) into a relatively fast and rhythmic texture intercalated with pitched sounds.

Hunter's Moon: In this piece, Andy Mckee uses a variety of fingerboard taps to create groovy rhythmic passages. Subtle fretboard taps are used inside the percussive lines to contrast them with more vigorous slaps (at the soundboard or sides). The basses, while arguably having harmonic-melodic functions, are also very percussive. Tapped harmonics are used as accents.

Figure 102: Andy Mckee executing a l.h. fingerboard tap in *Hunter's Moon*. Source: Greenfield Guitars ().

2/Egp 6,47% **Strikes with the heel of the hand on the soundboard, with kick drums function.**

KICK DRUMS (DAWES, 2017 and 2018; KELLIE, 2018, p. 85); BASS HIT (RAUSCHER, 2017, p. 10)

Video 05: **2/Egp**

General Description

This Family is used only in FG, and is one of its greatest contributions to percussive playing. Not only did they "discover" this very dark sound – the darkest among the most used techniques -, they developed it and the forms of effectively using this hand part to combine it with other PRs and TGs. Another source for this Family revealed by our research was the *pandeiro* technique.

It consists of hitting areas **2.1** or **2.2** (rarely **2.3**)[135] with body part E, producing a bass sound resembling a kick drum. The exact positioning varies according to player preferences and musical

[135] Dawes (2017) is very specific about the placement of the technique in a folk steel guitar: around 4 cm above the 6th string, between the edge of the soundhole and the bridge. Of course, that is flexible during actual playing and is different in the classical guitar due to its different proportions.

context, but the vicinity of area **1** is fuller and more resonant. The sound produced is not loud[136], so it is necessary to play it vigorously to achieve good results. That is not a problem, as area **E** allows for the use of more strength.

It is used to emulate kickdrums in area **2.1** (area **2.3** appeared only once in our sample). Its potential goes beyond that, however, as it can be used to enlarge a texture's timbral tessitura, as a contrast to other PRs, or to characterize passages in the lowest range of the spectrum (see commented excepts ahead).

It was used 100% of the time with the r.h. in our sample, but our artistic research showed that it can be used, and effectively, with the l.h. as well, such as in the excerpts and variations presented ahead.

It can be transported to all guitar areas to generate related Families, but less effectively on area **4**.

Figure 103: Execution of a kick drum highlighting the contact area (in this case, *2.1*).

Notation: Their sources being all from FG, they tend to simplify notation and solve the problem at hand, not aiming at a generalized use. We would recommend notation on a dedicated staff for percussion or unpitched sounds, with the use of a dedicated character to area **E.**

[136] Despite the low response to the human ear, the stroke actually produces much more energy, which a microfone or piezo can capture. That requires attention in amplification and recording.

Parameters:

Range/Pitch: Very low, with an added resonance in the pitch in which the soundboard is tuned.

Duration: Very short to short (attack) and up to medium (soundboard resonance)

Timbre: Among the darkest producible in the guitar. It has, however, some bright components that help it to be heard and define the rhythm and a pitched component in the tunning frequency of the soundboard.

Loudness: *pp - f*

Technique

How to play: One can use everything from the area closer to the palm to the end of the hand, according to preference and context. The fleshy area of the metacarpus of the thumb can also be used to good effect, being recommended for passages with slaps, snaps, and other actions on the strings, as it enables the use of forearm rotation.

Deadstrokes are very effective. They eliminate the pitched resonance of the soundboard and leave a dry, inharmonic, and very dark attack.

Care: It is important to hit with sufficient strength, and to guarantee that the occasional amplification is well-positioned to capture it. This resource enables the use of much strength, but it is always advisable not to exaggerate.

Sequences and TG Integration: As discussed for body part **E,** this Family does not use the fingers and can be executed very close to the strings, therefore lending itself perfectly to TG integration, in sequence or simultaneously. Common combinations are with bass notes, strummed chords, snaps, and slaps.

Variations:

7.3/Egp, 6.2/Egp: Both variations allow for participation of the left hand in the “bass drum” function, producing timbre variation and liberating the r.h. The sound is not as full and resonant, however.

Deadstrokes: Differently from many **gp** actions, the contrast of timbre and resonance obtained with a deadstroke is in this case significant.

Guitar Sub-Areas **A** or **B**.

Use of body part **F**: Rarely used, this body part produces sounds that fulfill the same function as **E**. They are recommended when the positioning of the arm somehow favors it in spite of area **E**, such as when playing two-handed tapping while muting with the right hand at the 12th fret.

Use of area **1**: This is, undoubtedly, the darkest sound the guitar can produce. The difficulty is the shape of the bridge, which can hurt the hand, and the fact that the sound produced lacks definition, requiring even more strength or a favorable musical context.

2-hand tremolos: The only available tremolo is that using the two hands.

Double strokes: Up to two fast strokes with one hand can be performed securely, much like a paradiddle technique. More than that is generally risky and prone to sound irregular and confusing.

Examples from the literature

FG: Most of the music from 2010 on, such as *Passionflower, Boogie Shred, These Moments, Dance of the Last Rhino, The Future, The Impossible, The Mirror, Telepathy.*
Original Works: *Escutorium, As Entranhas da Terra, Laputa Variations, Quantos violonistas são necessários para desconstruir um piano?.*

Commented excerpts

As Entranhas da Terra: The resource is used to form and emphasize the culmination of a non-linear conduction from medium-high registers on the beginning of the piece to an arrival point at a very low register and dark timbres, with the rhetorical suggestion of the deep vaults of abandoned mines. It is used with both hands, showing a rare employment of the l.h.:

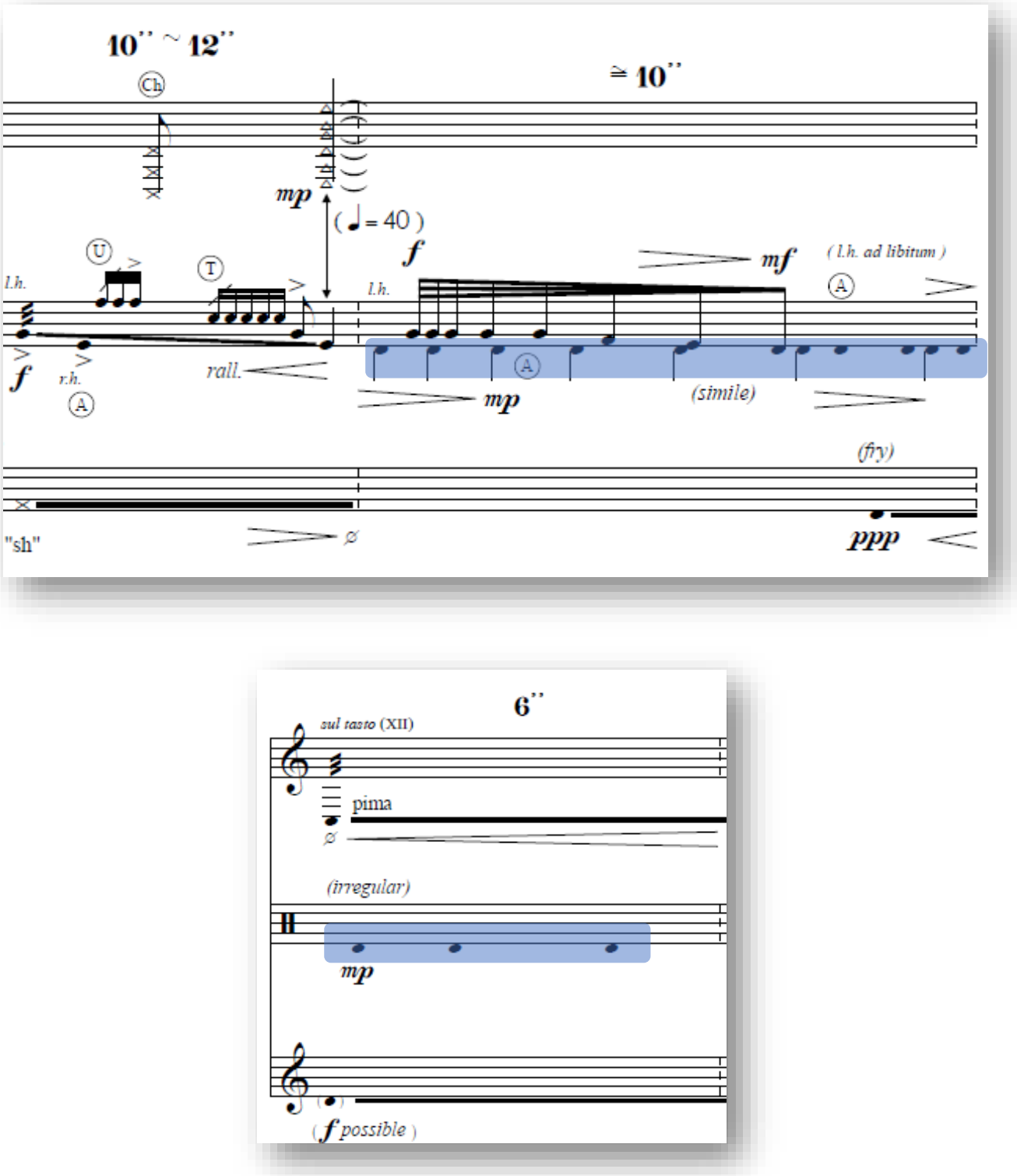


Figure 104: [As Entranhas da Terra](), pages 4 (second system) and 5 (first system). Textural evolution towards dark bass sounds, culminating in the *2.1/Egp* played with both hands, followed by TG integration (overlap)

Escutorium: The distinct low timbre of this resource helps to establish an identity to the second big section in the work, characterized precisely by a dark, empty character that closely resembles that of *As Entranhas da Terra*:

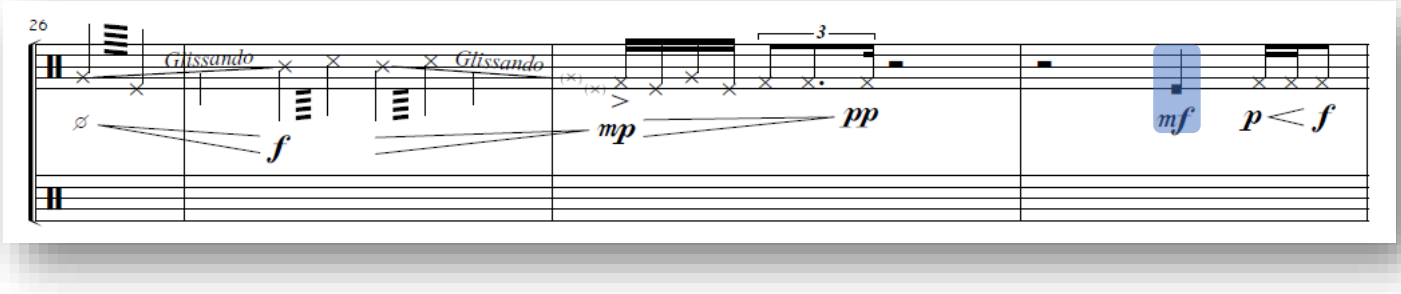


Figure 105: *Escutorium*, bars 26-29, showing the end of the previous section and the use of *2.1(A)/Egp* to signal the beginning of the next. It will be further invoked in the following bars to establish the dark timbral mood of the new work that begins.

2/Bgp	5,17%	Strikes with the finger joints on the soundboard. Similar to 2/A.Bgp but with a slightly higher technical cost and a more focused wood-drum-like sound.

Video 06: 2/Bgp

General Description

This SF is akin to **2/A.Bgp**, but both its sound and technique present idiosyncrasies. The sound is more focused and brighter, while its production requires more effort due to the curvature of the fingers.

Area **B** is seldom used in percussive playing, and for that reason, it is surprising that a General Family including it has made it to the Main Group, even if It is the least technically developed SF there.

It consists of using the knuckles (**B.B** and **B.C** are fit for the task) to hit the soundboard at various points, to obtain timbral variation from the main soundboard techniques. Its sharper sound makes it particularly good for rhythmic passages, despite it being, for the very same reason, more difficult to control. The contrast to regular **A.B** techniques is effective. The sound is also loud but lasts less than **2/A.Bgp**.

It offers good dynamic control and is more area-sensitive in its timbral variations than **2/A.Bgp,** besides offering the possibility of body-part variation as well. Adding guitar area and body part timbral differences result in a broad timbral range between **2.3/B.Cgp** and **2.1/B.Bgp.**

They take the fingers out of optimal playing presentation for other TG and are, therefore, cumbersome for integration. Because the fingers are curved, they have a smaller reach, requiring the hand to shift to compensate for that, which further complicates the integration.

Balance between hands is 73% r.h / 27% l.h. in our sample.

It is used in rhythmic textures and as timbral variations, especially at higher registers – it is not as effective in the role of bass drums.

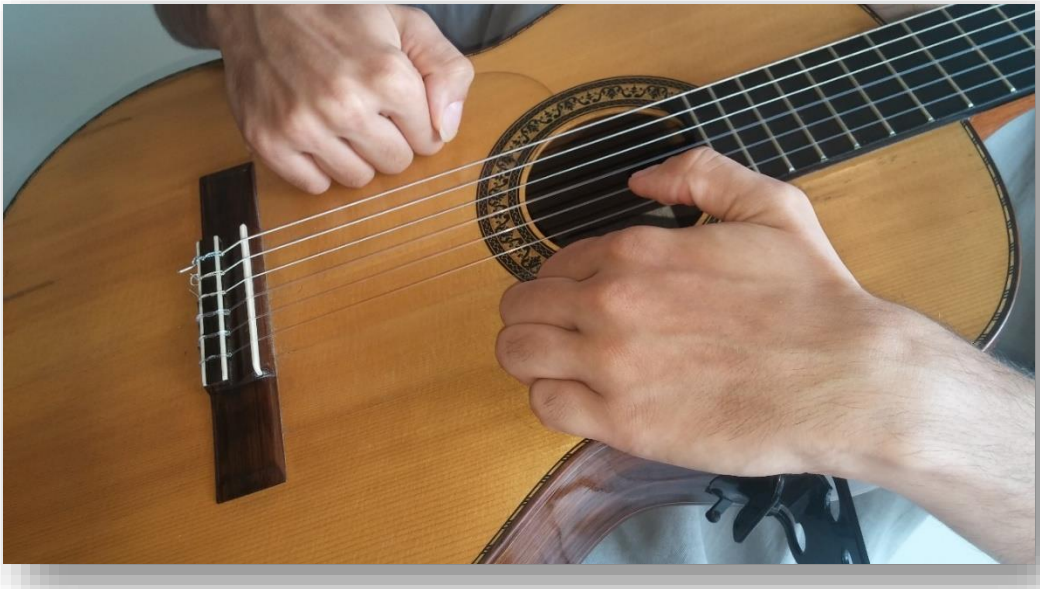


Figure 106: Taps with the proximal (*2.1(A)*) and distal (*2.2(B)*) knuckles.

Notation: There are no standards. In *Sonata op. 47* they appear with "x" noteheads in an auxiliary line (Fig. 77), but that will not suffice for more percussive contexts (which tend to be the rule when this SF is employed). A proven alternative is indicating hand part **B** with a dedicated character or textual symbol (fingering), representing the exact area in the soundboard through placement on a second staff dedicated to unpitched or percussive sounds, or actions in the guitar body.

Parameters: *Range, control, how to manipulate*

Range/Pitch: Low to mid.

Duration: Very short to short.

Timbre: A sharp wooden sound similar to knocking on a door, or on a dark temple block.

Loudness: *pp - ff*

Technique

How to play: curve the fingers to show the knuckles, using them to hit various parts of the soundboard, with both hands. This curvature is bigger for **B.B** than for **B.C**, augmenting technical costs. The motion comes mostly from the arched wrist frontal movement, using the elbow for stabilization at higher intensities and speed.

Care: One must be careful not to hit the guitar too hard. On stiffer areas (for example, the edges, or 2.3) that can hurt the hand as well. When using B.C it is necessary to be careful not to let the nails (C.B) participate in the stroke.

Preliminary tests suggest that it could be used with moderation in double top guitars. That has yet to be confirmed by further experiments.

Sequences and TG Integration: The hand positions necessary for this SF are too distant to standard playing positions to be used in long fast sequences alternating TGs. However, the hand can be split and kept in an "in-between" position, so that the fingers are responsible for one TG, and the thumb, for another.

Variations:

Body sub-parts and guitar sub-areas.

Area 3: In left-leg position, the back is partially accessible to area B, making this variation possible for both hands. It is a good opportunity to use the rare timbres to be found there. These variations are shown in video 06 as well.

Rolling multitap: Multitaps are not effective with area B, but "rolling" the knuckles in a round hand movement can produce a small attenuated multitap.

Examples from the literature

CG: *Ko-Tha, Sonata op. 47, Cenas Infantis, Ella, La Toqueteada.*

Original Works: *Escutorium, As Entrnhas da Terra, Laputa Variations, Quantos violonistas são necessários para desconstruir um piano?.*

Commented excerpts

Sonata op. 47 is one of the few specified uses of this SF in the literature. Here, Ginastera creates a dialogue with a chord progression, with the character of an answer. That is a diminution and transformation of a previous dialogue in which *tamboras* have a similar function. This diminution and the pauses create the effect of a *liquidation*, functioning as a coda. This use in low dynamics and with time for the resonance of the taps to be heard bring their sonority forth.

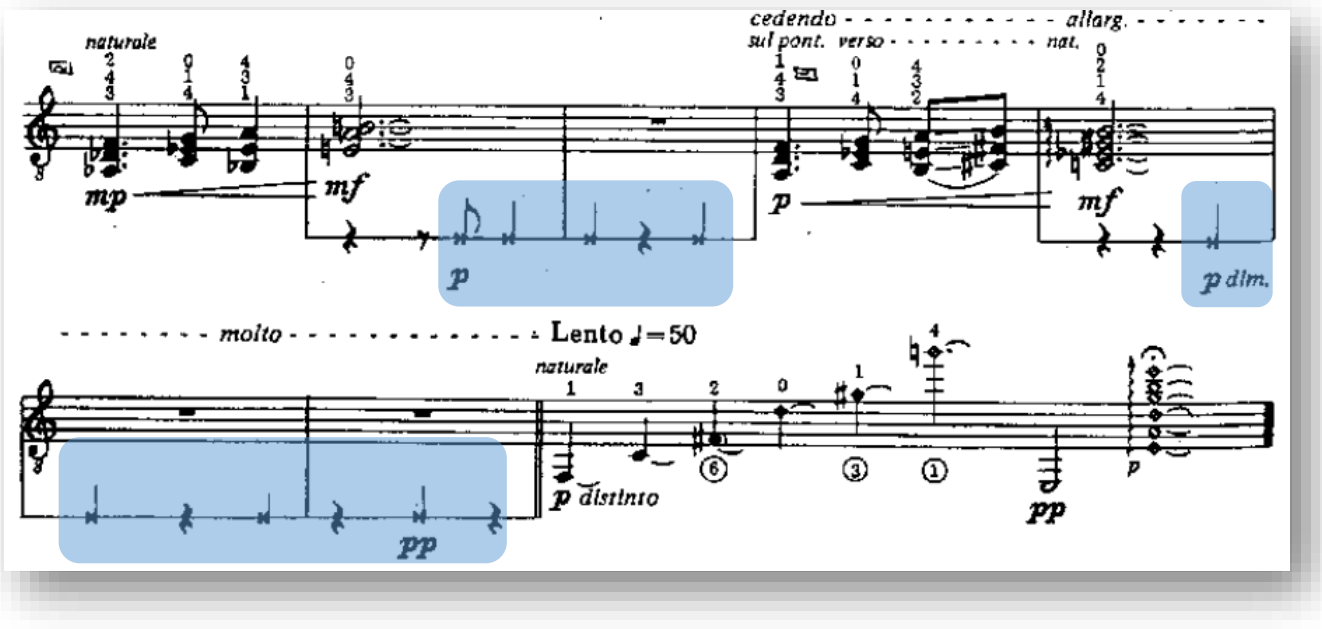


Figure 107: *Sonata op. 47*, page 2, last two systems, showing taps with the knuckles at the soundboard, dialoguing with melodies of chords.

5.2/A.Apin 3,02% Pull and release one or more strings to produce a snapping sound from the strike against the fretboard.

PIZZ. BÁRTOK (JOSEL AND TSAO, 2014, p.82; SCHNEIDER, 2015, p. 71; FRENGEL, 2017, p. 83); SNAP PIZZICATO (FRENGEL, 2017, p. 83); POP (DAWES, 2017, p.6).

Video 07: *pizz. Bartók*

General Description

Figure 108: Pizzicato Bartók (r.h. accumulates energy just before releasing the string).

This SF consists of pulling a string outward, accumulating energy for a forceful release. That will make the string clash against the fretboard, producing a snap with salient inharmonic components followed by an ordinary string resonance. The snap has a metallic ring derived from the shock with the frets. That is emphasized with the use of metallic strings. The attack stands out at a dynamic level clearly separated from the resonance (high At/Rs rate). That makes the result very similar to *slaps*, which the attack closely resembles. These are two of the loudest sounds the guitar can produce.

Pizz. Bartók is no strange to the TG *punteado* and is relatively common in the classical repertoire at least from 1960 on[137], so it is to be expected that most guitarists are familiarized at least with its basic uses. 100% of the occurrences in our sample were located in CG works, in which it is the third most common SF, indicating that it strongly characterizes this genre. However, that does not mean that its sonority is unheard in FG: despite the occasional conscious (structured) usages, the low *scordaturas* and string action common in the genre make many notes snap spontaneously, especially when played in conjunction with ***E*** techniques**,** in a way that is stylistically integrated.

It is very effective with the basses, and most occurrences use the *p* finger on the bass strings, especially the low E, for maximum percussive effect. It functions on the trebles as well, however, with a different timbre.

Its uses are generally related to punctuations in the musical discourse, be them exclamations (*Eclusas*, Fig. 109) or culminations (*Gloucester*, Fig. 110), but it can easily be used to compose different textures, from rhythmic (*Laputa Variations*, Fig. 111) to sound masses (*Paisaje Cubano con Lluvia*, fig. 112):

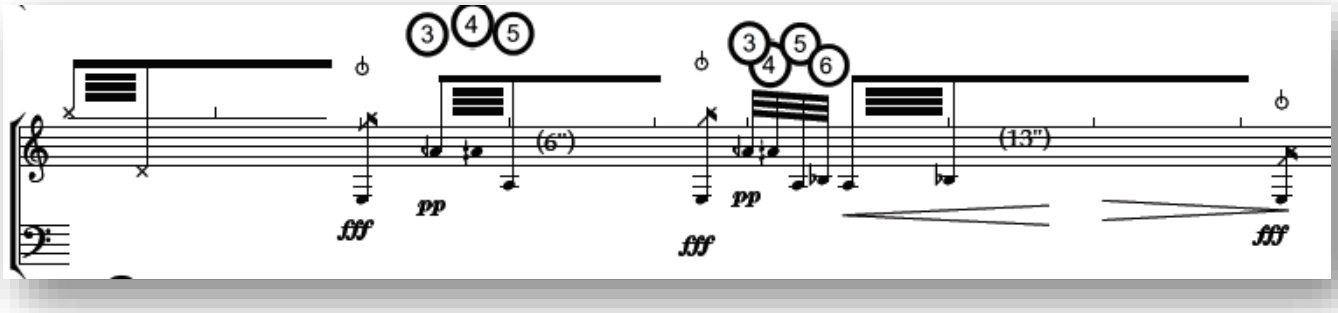


Figure 109: *Eclusas,* p. 3, fifth system. Interpolated *pizz*. Bartók with exclamative functions.

[137] The first recorded use dates back to 1867, in *La Macarena* from Tomás Damas, according to Josel and Tsao (2014, p. 82)

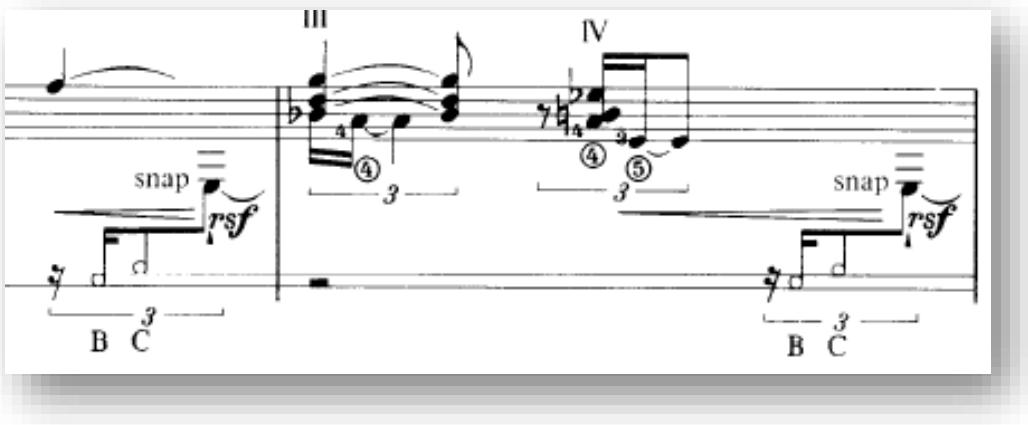


Figure 110: *Gloucester*, p. 10 fourth system: *pizz*. Bartók as culminations of crescendos.

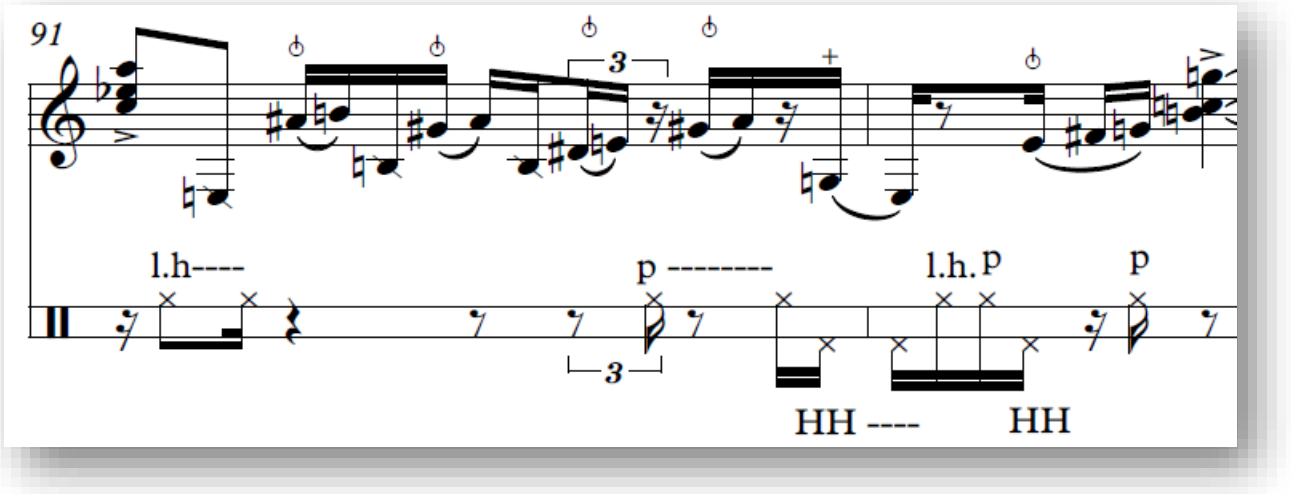


Figure 111: Laputa Variations, bars 91-92: pizz. Bartók used with snaps, slaps, and soundboard taps to build a funky, rhythmic passage.

Notation: Unlike most PRs, the notation is standardized, as seen in the previous examples, and consists of using the symbol ⏻ above or below the intended note. The textual indication accompanied by lines is also possible (Fig. 112) and recommended for prolonged uses to avoid polluting the score.

Parameters:

Range/Pitch: As ordinary notes.

Duration: The characteristic snapped attack is short but lasts longer (in milliseconds) on the lower, metallic strings, and lower positions or (especially) open strings. The resonance is proportional to the intensity of the attack.

Timbre: It differentiates itself from normal notes mostly by its explosive attack with more inharmonic and metallic components. The high-pitched starting transients are a prominent feature. Timbre can be manipulated through the variation of the pulling angle (see "Variations") and string type (metallic/nylon).

Loudness: *mp* to *ff*. It is difficult to control dynamics, especially below *mf*.

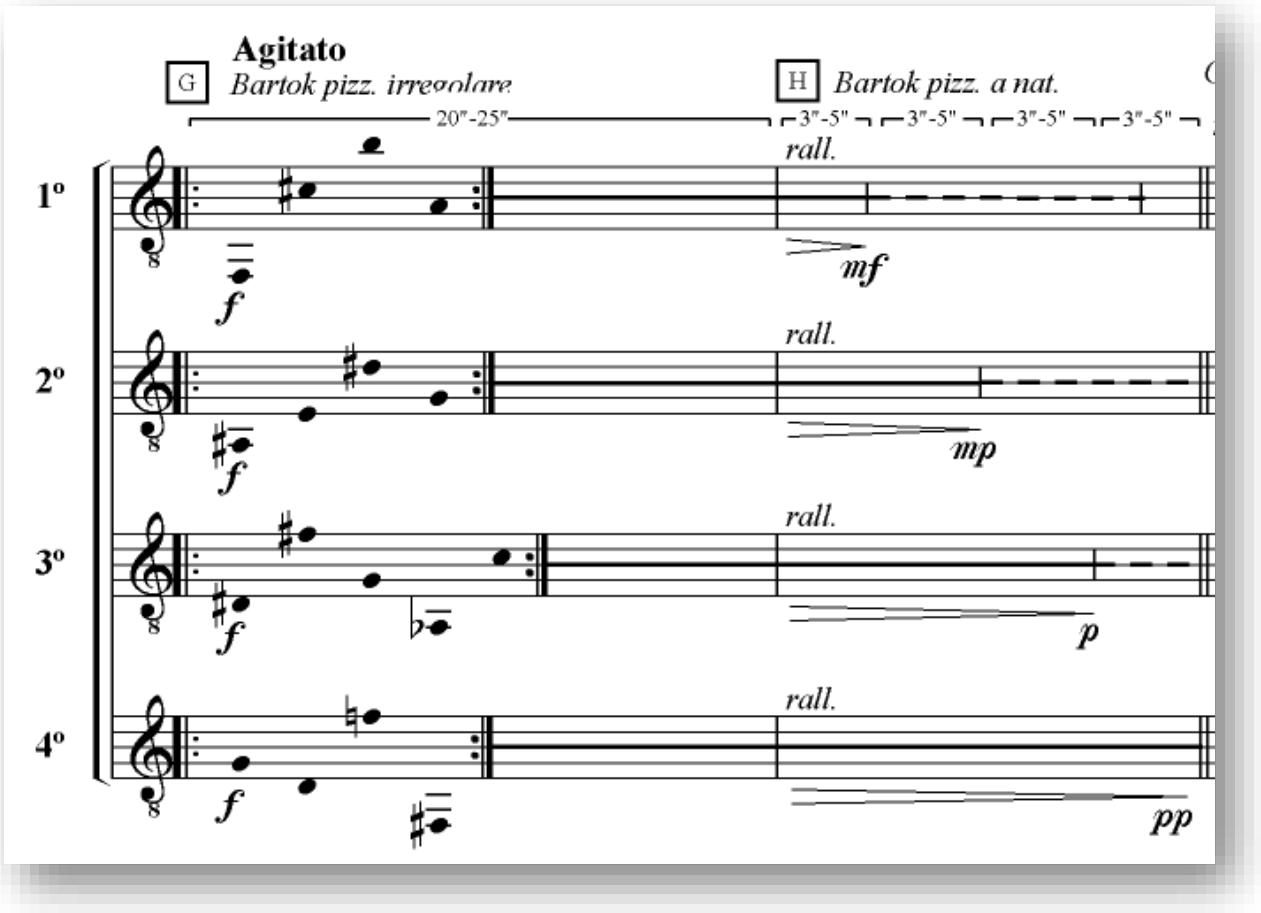


Figure 112: *Paisaje Cubano con Lluvia*, section G: pizz. Bartók used to construct a kaleidoscopic, agitated texture.

Technique

How to play: The string is pulled perpendicularly outward with a (generally but not necessarily r.h.) finger and quickly released to produce an explosive attack. The easiest way to do it is using two fingers in a tweezer-like manner, but with proper training only one finger can be

used (normally *p* or *i*), giving the hand more freedom. In those cases, forearm rotation (especially for *p*) or a bending motion (for *imac*), associated with bending the proximal phalanx (**B.B**), can help to strengthen the movement and give perpendicularity to the release.

As with the snap, it benefits from the looseness of the string and is therefore easier performed closer to the middle of the vibrating segment (normally in the *sul tasto* area).

Care: The repeated use in strong dynamics will untune the strings; if that is unavoidable, mechanisms to check the string tune "on the run" after a particularly demanding passage are advisable. Special care is to be taken to avoid unintended snaps in notes played in conjunction with **2/Egp**, as the motion of the hand reduces control over the string pull.

Sequences and TG Integration: Can be used like most plucked techniques (harmonics, chords, *gliss.*, etc.). It can be easily integrated with *punteado*, its origin, and with *rasgueos* as well. The integration is effective and relatively agile (until around ¼ beat in 90 bpm, depending on the context). Common sequences include preceding *snaps* or soundboard taps, both with *p*. Right hand snapping arpeggios are also possible (limited to moderate speed).

Most important SF/PR and Variations:

Multiple Bártoks: It is possible to play several *pizz.* Bartóks at the same time, using different fingers or hands.

Damped Bartók: Dampening the strings is effective, resulting in a sound similar but not identical to a *snap*, louder, and with some distant reminiscence of pitch. Dampening with the l.h. prioritizes the *snap*, while r.h. muting produces more recognizable pitches.

Different r.h. fingers: Despite prevalent use of *p* and residual use of *i*, other r.h. fingers can be used if necessary.

Left hand: as it does with normal notes, l.h. can be used to produce *pizz.* Bartók. However, this technique is best left to open strings only.

"Soft" or "Koto" *pizz.*; *Quasi-Bartók* (SCHNEIDER, 2015, p. 190; JOSEL AND TSAO, 2014, p. 83; FRENGEL, 2017, p. 83): instead of pulling the strings perpendicularly, they are tensioned at an angle, softening the snap in the attack.

Examples from the literature

FG: Occasional use, deliberately improvised or left to spontaneity.

CG: *Si le jour paraît…, Sonata op. 47*, *Algo, Las Seis Cuerdas, Percussion Studies, Cenas Infantis, Kurze Schatten II, Gloucester, Tellur, Ahnk, Salut für Caldwell.*

Original Works: *Laputa Variations, Escutorium, Eclusas, Seringal, Quantos violonistas são necessários para desconstruir um piano?.*

Commented excerpts

In *Laputa Variations* (Fig. 114) we took advantage of the similar sounds of the *snap, pizz.* Bartók and *slap* to create a "groovy" texture along with several taps at the soundboard (with the heels of the hand and fingertips), in which melodic lines lead and react to chords. The *pizzicati* Bartóks come always associated with l.h. *ligados* to form the upper plane of a melody in virtual counterpoint with a more stationary lower voice in *slaps*.

In *Eclusas*, this SF is used both as punctuations in kaleidoscopic pointillist textures (Fig. 113) or as reminiscences of them, dividing small sections in the very repetitive passages (Fig. 109) that are used as a contrast with the former.

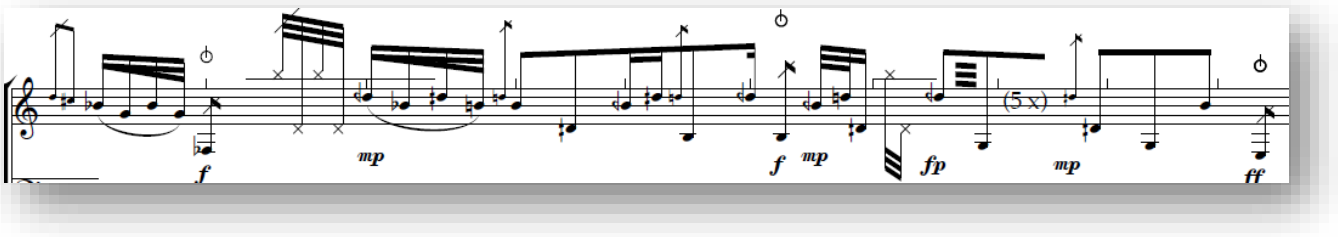


Figure 113: Eclusas, p. 3, fourth system. *Pizz.* Bártok used as one among many components of a kaleidoscope built in a line (along with soundboard taps – "x" noteheads -, acciacaturas, tremolos, and a microtonal melody).

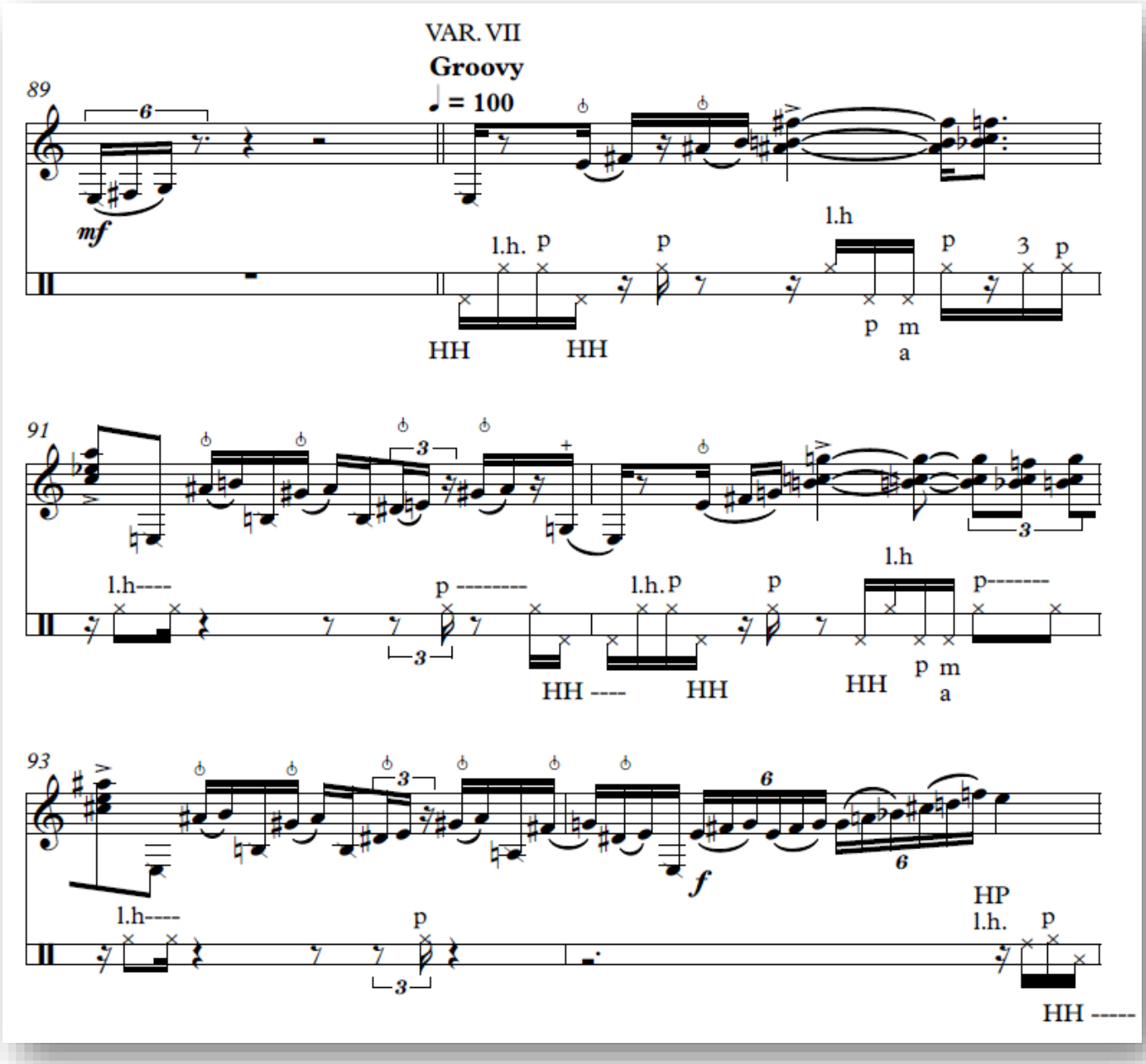


Figure 114: Laputa Variations, bars 89-94, "Groovy": *pizz.* Bartók as building material for melodies in rhythmic textures. The dedicated percussive staff includes taps at the soundboard (lower notes) with the heel of the hand (HH) or finger-tips, and snaps (upper notes) The dashed notes in the melodies are slaps.

2.3/C.Agp 3,02% Taps with the nails of the right hand on the higher-pitched area of the soundboard.

Video 08: 2.3/C.Agp

General Description

This could be considered a variation of **2/A.Bgp**, but its appearance as an individual category is justified by the specificities on the use of the nail on the soundboard, and its association with sub-

area **2.3** specifically. This has timbral and structural reasons, as **2.3** is brighter and at the same time more resistant than the rest of the soundboard, being safer for nail use[138]. Technical implications also bring this SF apart, as **2.3** is within good reach for the l.h., creating a different hand balance than in other soundboard parts. The result is that, abnormally, the balance between hands is 60% r.h./40% l.h. in our sample.

It consists of taps with the tips of the nails on the brightest areas of the soundboard. As discussed, the nails are seldom requested there, because of the inherent risk to the instrument. However, this SF opens a new front of timbral possibilities, with attacks that are projected and strong bright, with more resonance than their correlates of area **4**.

The nails offer a more restricted dynamic control because the sound is too sharp, bright, and with a high At/Rs ratio. This also makes them very sensitive to rhythm, requiring redoubled concentration.

The difference in hands is a major factor affecting this SF, as most players will have longer nails in the r.h. That changes intensity (r.h. nails are louder), timbre (r.h. is brighter), and required attack angle (l.h. must curve itself more, which is a bit more difficult). L.h. tends to mix flesh in the strokes, making them darker and duller. All of that makes two-handed textures (for example, a two-hand tremolo) less homogeneous.

The thumbs (especially the left) are less ergonomically practical than the other fingers.

It is used as timbre variation and bright sounds to enlarge the percussive range of a piece. They normally participate in rhythmic constructions but can be easily employed in textural masses, with tremolos or punctual strokes.

Notation: There are no standards. If it is being conceived from the compositional phase, we are probably dealing with a more complex percussive context, requiring more robust notational systems with notational spaces and characters able to distinguish between different guitar areas and body parts. A dedicated staff (for percussion, guitar area, or unpitched sounds) is recommended. In cases in which this SF only integrates a more restricted selection of PRs, a simple dedicated character, or "x" notehead placed on a specific line on a single staff might suffice.

[138] As discussed, that is valid for solid wooden soundboards. More modern, thinner projects might be a lot more sensitive to nail piercing.

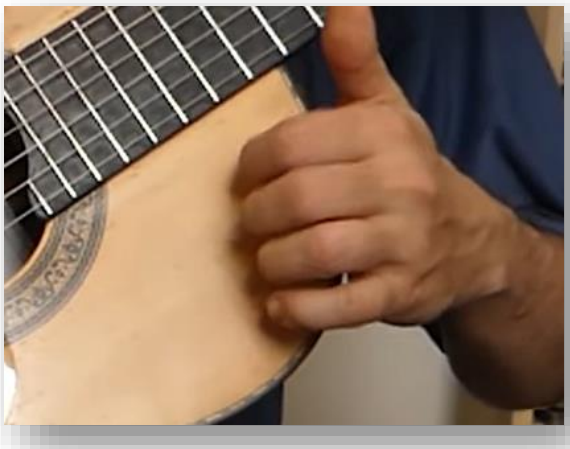


Figure 115: Tapping area *2.3(B)* being played with the tips of the left hand nails.

Parameters:

Range/Pitch: High.

Duration: Very short. Can trigger a faint string resonance.

Timbre: Can be manipulated with nail angle (see "Body Part C"), eventual mixture with flesh (especially for the l.h.), and with the distance to the borders, as the nails enable more timbral response from the soundboard[139]. The timbre is relatively bright and projecting.

Loudness: *pp-f.* Difficult to control below *mp*.

Technique

How to play: Hit sub-areas **2.3** with the tip of the nails using the muscular groups responsible for moving the fingers.

Care: The strength of the hit can hurt the fingers and damage the varnish; as a rule, only the motion of the fingers should be used (Wrist, forearm, and arm should be used sparingly and carefully). In any case, constant use of the nails at dynamics above *mf* will necessarily damage the polishing and, in the long run, might wear out the wood itself.

The use of plastic protection is highly recommended[140].

[139] At the very borders the sound is duller and darker because of the internal structural reinforcements.
[140] In area **2.3** the influence of a thin plastic protection on the ordinary guitar sounds (notes) is all but neglectable.

This SF is **not** recommended for double top guitars, as the nails will most certainly pierce the thin wood in the intervals of the inner reinforcement chambers. It must be noted that many luthiers will preserve solid wood in area **2.3** even in DT constructions, in which cases it will be safer to use this SF.

Sequences and TG Integration: From *mp* and below the arrival of the movements demands precision, so at higher speeds only *mf* or *f* taps should be expected. It is well-positioned for the l.h., especially when it is playing plucking or strumming at higher positions. The r.h. plucking os strumming at *sul tasto* is also well positioned for integration.

Variations:

L.h./R.h.

Areas **A** or **B**.

At other sub-areas of area **2**.

With action **ar**: Rubbing the nails on the soundboard can produce interesting sounds, especially when the surface is rougher, as in the case of scratching pads.

Tremolos: Finger and two hand tremolos are effective. The reduced ergonomy of the thumb makes forearm rotation tremolos not so practical.

Multi-taps.

Examples from the literature

FG: *Boogie Shred, The Future, The Impossible, The Mirror, Passionflower, Telepathy.*
CG: *Ko-Tha, La Toqueteada*.

Commented excerpts

Ko-Tha: Scelsi employs different characters ("x" noteheads, square brackets) to denote different PRs, having a dedicated staff (the lower) for actions on the "soundbox". The instructions are unspecific, however, as they leave the exact location of the stroke, as well as details of the tap and body part, to the performer. *Ko-Tha* also uses the resource simultaneously with string actions (with the other hand) and, on occasion, composes new timbres out of combinations such as with a tap with **A.B** on the soundboard, as seen in the first occurrence of Fig. 116:

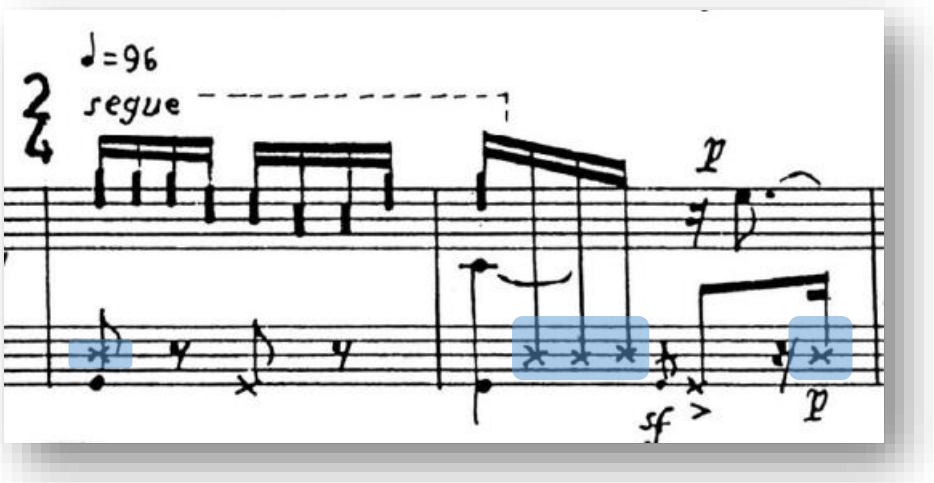


Figure 116: Ko-Tha (II): bars 7-8. Nails used on the soundboard (blue).

La Toqueteada: Thiago Colombo uses the PR **2.3(B)/C.A(*ima*-MD)gp** in the upbeats of the introduction and main theme, remembering the percussion instruments *maracas* or *caxixis* used in south-American and Caribbean rhythms. They form a separated instrumental extract in the background of a bi-layered texture. The PR is sometimes interchanged with *snaps*, highlighting their affinities as two very bright SFs (the *snap* is brighter, though). He uses very soft wrist movements to give momentum to the strokes – safer for the rhythm, risky for the soundboard. The notation uses an "x" notehead placed in a specific high space, which denotes its bright timbre; the staff is single.

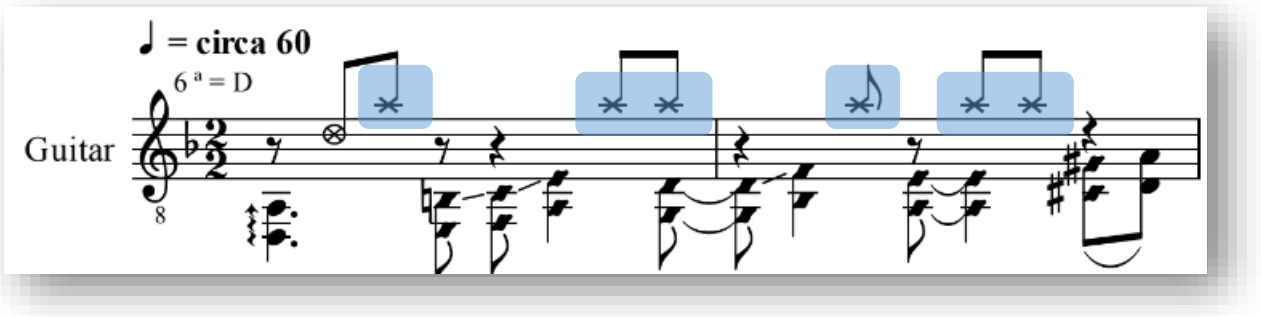


Figure 117: *La Toqueteada,* bars 1-2, showing the use of *2.3(B)/C.A(ima-MD)gp* in a rhythmic ostinato.

B - ADDITIONAL SUBJECTIVE SELECTION

EXPLORATION OF SUB-AREA 5.4

Video 09: Exploration of area 5.4

This area is generally used with fast r.h. *rasgueados* to produce high-pitched microtonal chords, with a very pronounced attack and short resonance, sounding much like chimes.

In it, the strings are limited to a small very tense segment between the nut and the rollers in which the strings are winded. Therefore, the tones produced are very high, varying according to both the string and the size of the segment. This size is, within a certain error margin, standardized and corresponds approximately to 1:5,5 (strings D and G), 1:8 (strings A and B), and 1:13 (both E strings) of the nut-sadlle distance for a standard 650mm scale length. The resulting notes and their relation to open-string tuning are given in Table 15[141]:

REGION OF STRING SET	STRING	SEGMENT/SCALE RATIO (approx.)	RESULTING NOTE AND INTERVAL (approx.)
Central	D_3	1 : 5.5	$G\#_5$ – Diminished Fifth + 2 octaves
	G_3		$C\#_6$ - Diminished Fifth + 2 octaves
Intermediate	A_2	1 : 8	A_5 – 3 octaves
	B_3		B_6 – 3 octaves
External	E_2	1 : 13	$C\#_6$ – Major Sixth + 3 octaves
	E_4		$C\#_8$ – Major Sixth + 3 octaves

Table 15: Strings and their 5.4 Segments, along with their resulting pitches and intervallic relations to open strings.

The segment notes order, from top to bottom, generates an interesting microtonal reentrant tunning with some very close pitches, which corresponds approximately to:

[141] When wound in the most usual fashion, with the external E strings occupying the closest rollers, followed by the pair A/B, and the internal strings D/G wound in the more distant ones.

$C\#_6 - A_5 - G\#_5 - C\#_6 - B_6 - C\#_8$

It is not worth specifying the microtonal deviations since they are inconsistent between guitars, but they create a palpable "out of tune" feel, especially between close pitches (those with the same color in the list above).

Some factors complicate performance in this area: precious little space available for playing, the irregular spatial distribution of the strings and the consequent varying distance and angle between them, and the aforementioned high tension. That results in severe limitations to timbre and intensity control, speed, and duration.

Required care includes careful performance (there can be several guitar parts in the way and the stiffness of the strings could also eventually hurt the performer) and an intelligently devised placement of the strings: they must be winded in a way that avoids contact with the headstock wood[142], and loose ends must be cut away, so they do not touch the vibrating strings.

Notation: The literature does not show much consistency in notating this relatively unusual SF. Because it has definite pitches and is played in the strings, we recommend notating it on the occasional staff dedicated to these elements, using dedicated noteheads placed in the space or on the line that represents that particular open string. This solution can be seen in the *Laputa Variations*, in Fig. 118. A variant is used in *Escutorium,* in which Diniz indicates area **5.4** with an auxiliary instead of a dedicated character (Fig. 119). Alternatively, the sounding pitch can be notated, but that can be confusing, as the resulting pitches are all in an uncommon register for the instrument. Less precise usages of the technique, such as in *Sonata op. 47*, can simply employ a general dedicated character representing all strings, as seen in Fig. 120.

[142] Winding them away from the side closest to their nut channel generally brings good results.

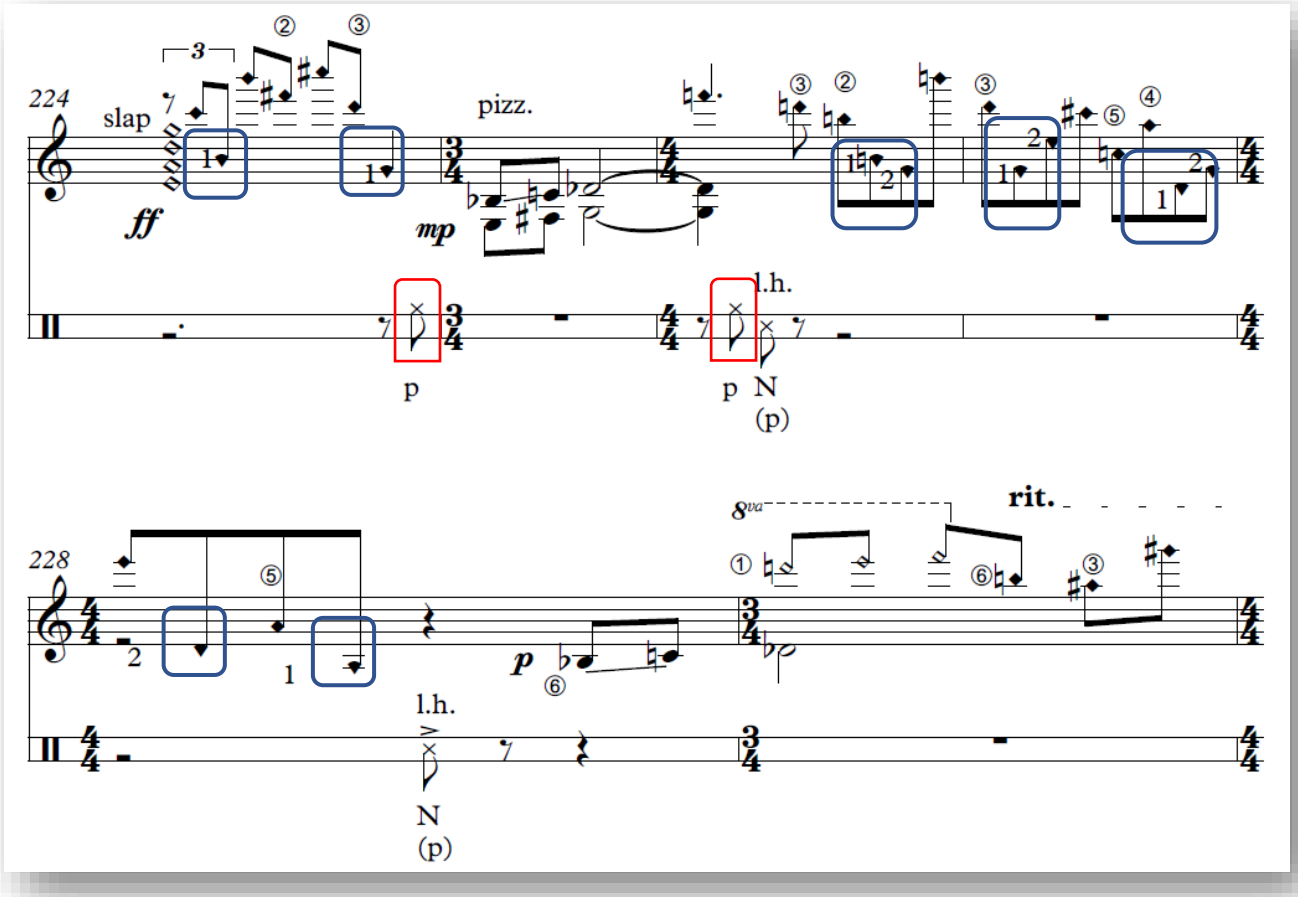


Figure 118: *Laputa Variations*, bars 224. Behind-the-nut notes (the wedged noteheads), notated at open string sounding pitch, are interspersed in a texture with harmonics, some unpitched percussive elements, and interpolations from other textures (basses, *pizz.*). Additionally, *emergency neck taps* were marked in red.

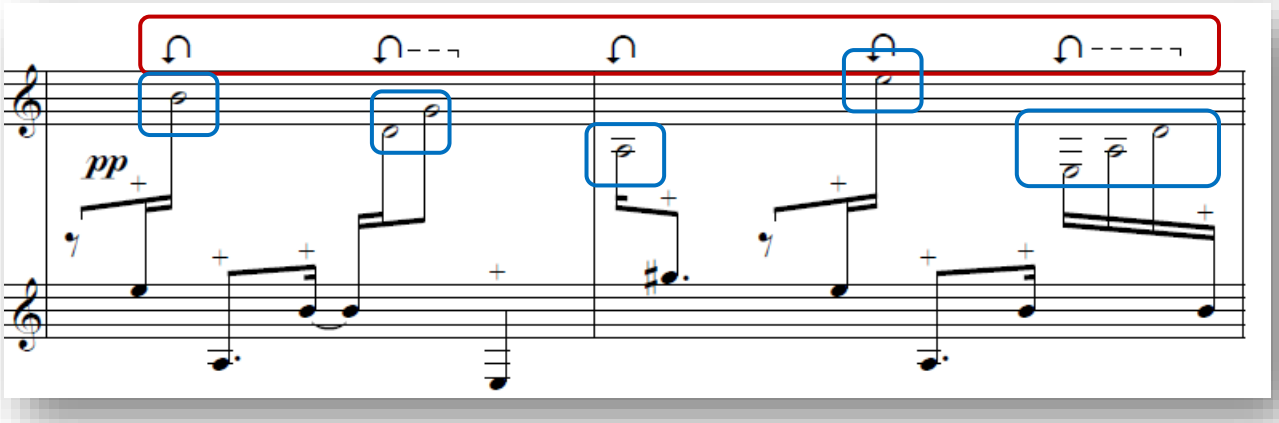


Figure 119: *Escutorium*, bars 93-94. The texture alternates r.h pin actions in individual strings at *5.4* (superior staff), notated in the pitches of the open strings (blue) with an auxiliary character (red), with l.h. pin actions (lower staff) executed on muted open strings with the left hand.

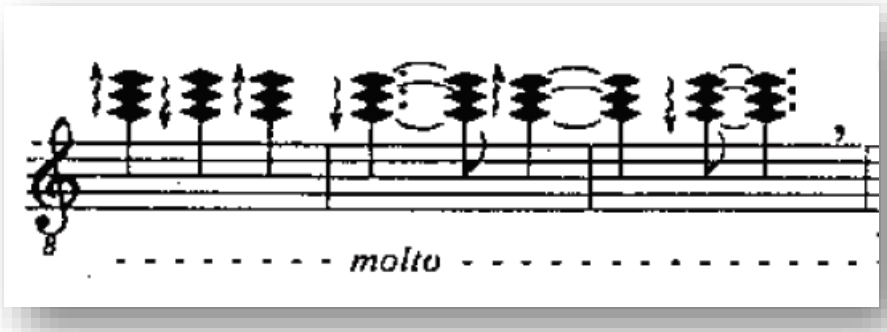


Figure 120: *Sonata op. 47*, 2nd movement, page 7. *Rasgueados* played at the headstock.

Variations:

Left hand: As exemplified by *Escutorium* and *Seringal*, the l.h. can also successfully play in the 5.4 sub-area. Differently from what happens with the r.h., it generally comes from the bottom of the headstock. Additionally, *Laputa Variations* shows that normal plucking fingering on the fretboard can be combined with playing in 5.4, using finger 1 (arguably also others) there while the others step on the frets.

Plucking techniques (individual fingers, chords, arpeggios, tremolos, etc.) employed in the area – one could argue, however, that in some situations, harmonic content might take precedence over the percussive effect.

Vellutato – This is a variation of *rasgueado*, and as such, the above comment is also valid for it.

Tambora – The tambora is also effective here. The general limitations of area 5.4 apply, so there is less ergonomic comfort and less responsiveness: the strokes must be energic, resulting in a subtle bassed, attacked sound with an attenuated and short harmonic resonance of the vibrating string segments.

Examples in the literature:

FG: *The Impossible, The Mirror.*
CG: *Sonata op. 47, Cenas Infantis, A Whisper in the Desert.*
Original Works: *As Entranhas da Terra, Escutorium, A Japanese Saga: Laputa Variations*.

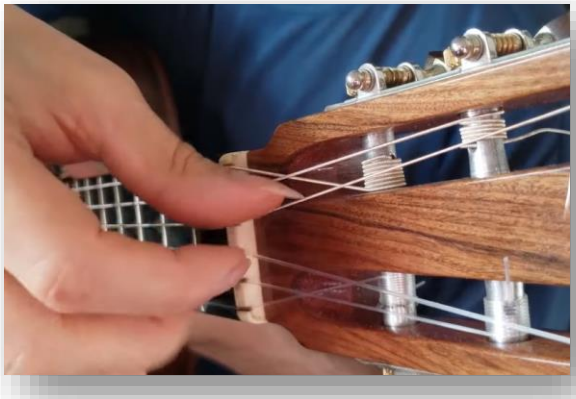


Figure 121: .h. playing in *5.4* area, executing an imac quick rasgueado from top to bottom, as seen in *Sonata Op. 47*.

CROSSED STRINGS – [5.2/C(MD)PIN OR RG + 5.3/A.A(ME)EST(CROSS)]

TAMBURO [143] , SNARE-DRUM (JOSEL AND TSAO, 2014, p. 164; SCHNEIDER, 2015, p. 392, "Preparation"), TAMBORIL (BRAGA, 2020, p. 139)

Video 10: *Crossed Strings*

The earliest known documented example of this SF appears in *Gran Jota* (Tárrega, 1872)[144]. It consists of pulling a string over an adjacent string below it, effectively crossing them, and then playing with the r.h. using any standard plucked or strummed techniques, from free or rest strokes to glissandi, *pizz.*, Bártok *pizz.*, vellutato, pulls-offs, and hammer-ons, etc. The resulting sound is distorted, resembling a mix of *Zinger* with multiphonics and close to that of an open snare drum, but with strong harmonic content, including prevailing pitches. These, because of the pulling, are located somewhere close to one semitone above the fretted note of each string. The trebles lack the metallic ringing of the basses.

It is easier to cross the strings where they are looser, that is, close to the 12th fret, and almost impossible on the 1st. In any case, it is taxing to keep the strings crossed (especially more than one pair, see "Multiple pairs" below).

Variety in pitch and timbre can be achieved both by changing the fret or the strings crossed. However, it is difficult and tiring changing the l.h. position once the strings are crossed, especially backward (in

[143] The term "tamburo" is not advisable, as it generates ambiguity with *tamboras*.
[144] According to Josel and Tsao (2014, p. 164) the authorship of this piece is disputed, and it is likely divided between different artists in Tárrega's circle.

the direction of the headstock). Free fingers can, however, press the crossed strings in any fret in range.

The combination with regular notes or chords is possible. It is also possible to develop the ability to cross the strings quickly and silently using only the l.h finger that will hold them; that can be useful in fast passages or to cross multiple pairs at the same time (see "Variations" below).

Figure 122: Crossed strings, with a close on the left hand and a panorama of a multiple string crossing.

Notation: Uncommonly, the notation used in *Las Seis Cuerdas* (or variations) has become somewhat standard for this SF. It consists of opposing triangles signing **the frets to be stepped**, accompanied by an indication of the **strings with which to do it** – this last information **is not optional**, but can be conveied using the traditional circled numbers, auxiliary staves, or any other system. In the first movement of *Las Seis Cuerdas*, each string has its dedicated staff (and that is why the selected passage in Fig. 123 does not exhibit strings indication). Notation of sounding pitch is optional and can be made with *auxiliary staves* – important: these should **not** be used in substitution of l.h. fingering and strings. Fig. 123 illustrates this notational proposal:

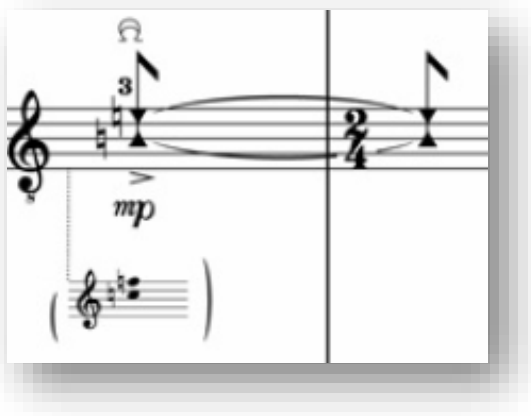


Figure 123: Crossed strings notation in *Las seis cuerdas*, showing the dedicated characters indicating the stopped frets and the auxiliary staff with sounding pitches – string information appears in the context of the full score and cannot be seen here (source: SCHNEIDER, 2015, p. 395)

Tablature notations could also be very practical, for example, by joining crossed strings with some kind of bracket. Other notations, such as this by Pujol (BRAGA, 2020, p. 140) are too unspecific for complex percussive contexts and should be avoided (Fig. 124):

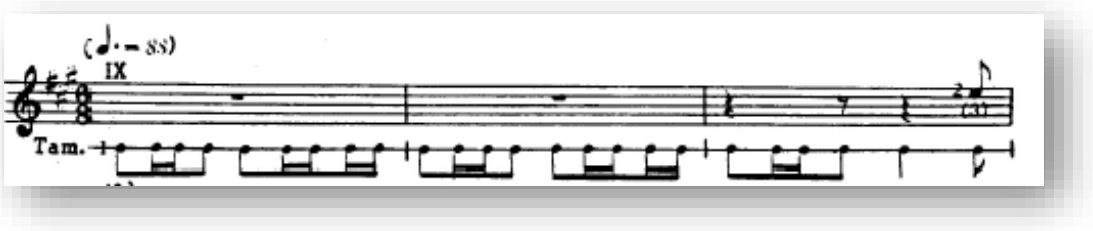


Figure 124: Crossed strings notation by Emilio Pujol, circa 1971 (Source: BRAGA, 2020, p.139)

Variations:

Individual picking: Once crossed, the strings can still be individually picked. That preserves the feel of the PR but emphasizes the pitch of the plucked string.

Different string combinations.

Multiple pairs of crossed strings: Rafael Nassif utilizes multiple simultaneous crossed strings in his quartet *Silhuetas de uma dança Imaginária (2011)*, up to 3 crossings with all six strings of the guitar, with fret changes and various r.h. techniques, which is a development of the experiments of Alvaro Company in *Las Seis Cuerdas*, in which he used up to 2 simultaneous pairs. Multiple pairs require a lot of effort from the left hand that can be softened by the use of looser *scordaturas*.

Crossed strings Bi-Tones: The fretboard side of the crossed strings can also be of effective use in a bi-tone fashion. As such, it produces a fainter sound. Individual strings are also usable.

Crossed strings release: With single or multiple pairs of crossed strings, it is possible to exercise silent or sonorous releases, the latter sounding pretty much like a very short inharmonic attack followed by standard "guitar chord" resonance of open strings. The resource is employed in both *Silhuetas de uma Dança Imaginária* and *Las Seis Cuerdas.*

Examples in the literature:

CG: *Las Seis Cuerdas, Silhuetas de uma dança imaginária, 11 Studies (Home is here), Shadows, Quattro Pezzi.*

PLAYING BETWEEN A STOPPED NOTE AND THE NUT

[5.3(BEHIND L.H.)/C.A(MD)PIN]

LEFT-HAND PIZZICATO (SCHNEIDER, 2015, p. 192), BI-TONES (SCHNEIDER, 2015, p. 192; JOSEL AND TSAO, 2014, p. 147), AUXILIARY PITCHES (JOSEL AND TSAO, 2014, p. 147). BACKTONES (idem, p. 149, FRENGEL, 2017, p. 79)

Video 11: *Back tones*

Stopping a string on a fret divides it into two portions. The right one, that goes to the bridge, and its opposite, that goes to the nut and away from the guitar body and can also be used to generate sounds. The sounds it produces are much more percussive, resonance-lacking, and fainter when compared to the other segment, but still present definite pitches; these do not, however, obey the equal temperament of the fretboard. The sounds resemble the ones found in the string segment between the nut and the rollers (5.4), especially because of their usual high-pitched frequencies and "chime" quality. They can have either melodic, harmonic, or percussive functions.

In the literature (SCHNEIDER, 2015, p. 192; JOSEL AND TSAO, 2014, p. 147), the sounds of both string segments are described together as a ***Bi-tone***, which is, *strictu sensu*, the resulting perceptual aggregate of their simultaneous performance together with some metallic noise, produced when the strings are tapped (hammer-ons). Josel and Tsao (2014, p. 147) go a step further and isolate the

sounds from the nut segment under the useful concept of ***auxiliary pitches*** (or ***backtones****, op. cit.*, p. 149)[145].

The back segment can be excited through many different techniques (nail or flesh, glissandi, *rasgueados*, vellutato, tamboras, *pizz*. Bartók, etc.), but their production always falls into one of 3 main groups (JOSEL AND TSAO, 2014, p. 149):

a) Playing with the r.h. (or occasionally the l.h.), while the other hand stops the string;

b) stopping and playing the string with the same hand (generally done by the l.h, the plucking action undertaken by the index finger);

c) muting the main pitch (normally with the r.h.) while tapping (with one or both hands)

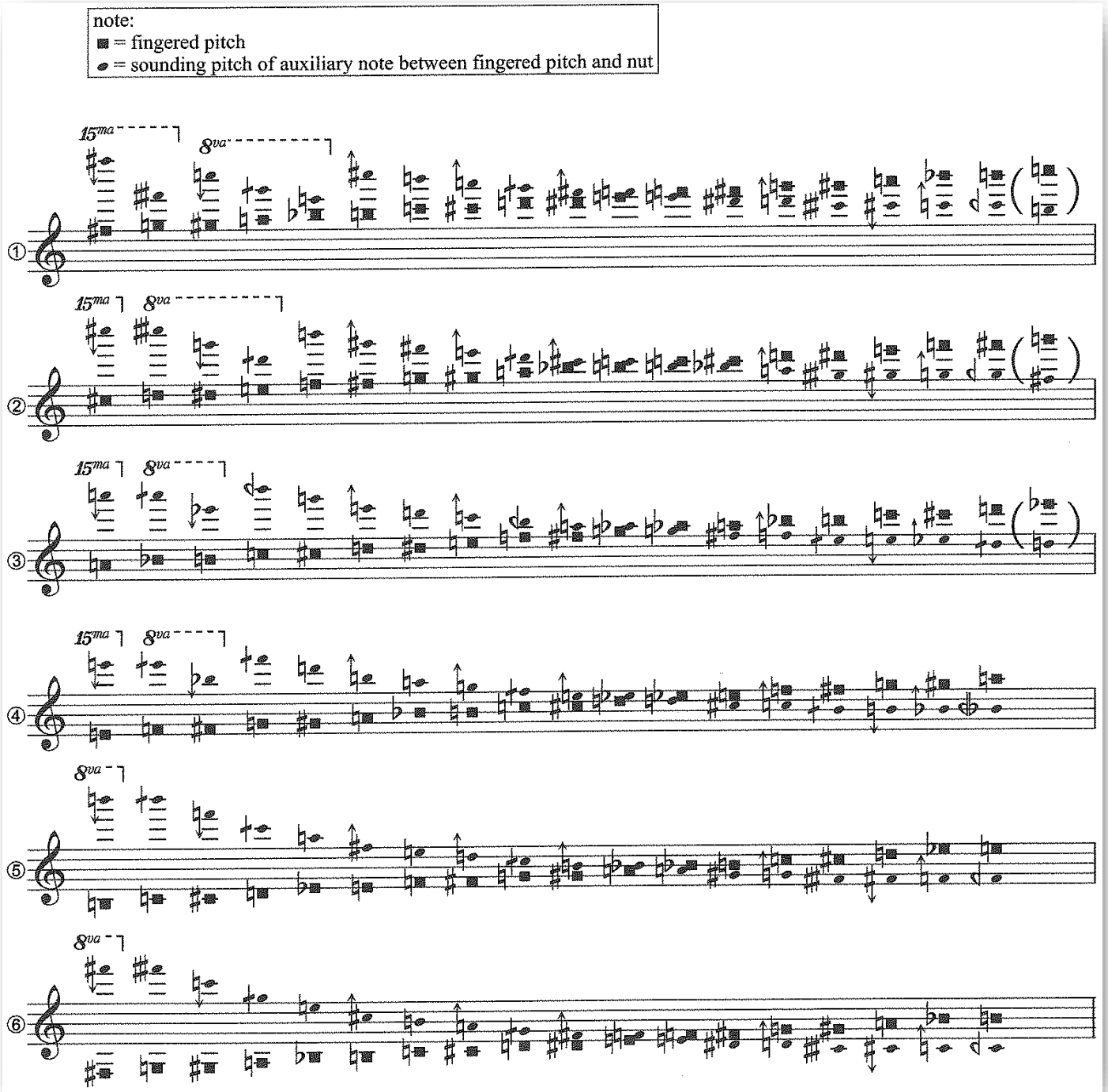
The response of the backtones is not regular along the fretboard and is dependant on the adjustments of the guitar: string height, fret evenness, and other construction characteristics. It is normally useful to rise the nut slightly, which can be acheived by positioning a small stripe of paper or wood below it. It does not go stronger than *mf* in any circumstance, and it is generally restricted to *pp* or *p*. Dynamic control is difficult.

As for the exact tunning of the auxiliary pitches, SCHNEIDER (2015, p. 192) offers a very precise explanation:

> The fret-to-fret relationship between the upper bi-tones is not the standard equal-tempered chromatic scale as it is for the normal vibrating portion of the string. To determine the distance between the frets, a luthier takes a certain percentage of the length of the vibrating string in order to raise the pitch by an equal-tempered semitone. To find the distance of the first fret from the nut, the whole (650 mm) length is divided by 1,059. . . ($\sqrt[12]{2}$). To find the location of the second fret, the new string length (between the first fret and the bridge) is divided in the same proportion, and so on. This explains why the distance between the frets diminishes from the nut to the end of the fingerboard. For the upper bi-tone, however, the shorter its string length becomes, the further apart the frets become, producing a rather uneven scale with microtones at one end and large macrotonal intervals at the other(…)

Additionally, Josel and Tsao (2014, p. 148) observe that the exact response and tunning of the auxiliary pitches depend fundamentally on the length of the scale. Therefore, the following table is valid only for the standard 650mm scales:

[145] The authors also classify the notes produced in area **5.4** as auxiliary tones. Because of the constructive differences of the hand and the freboard, which also imply on several technical differences, we prefer to dissociate the two situations.



𝄲 = one eighth-tone flat, 𝄳 = one eighth-tone sharp, 𝄾 = one quarter-tone flat, 𝄿 = one quarter-tone sharp, 𝅀 = three quarter-tone sharp, 𝅁 = three quarter-tone flat.

Figure 125: Bi-tones per string. (source: JOSEL AND TSAO, 2014, p. 148)

A chromatic auxiliary pitche scale would be as follows:

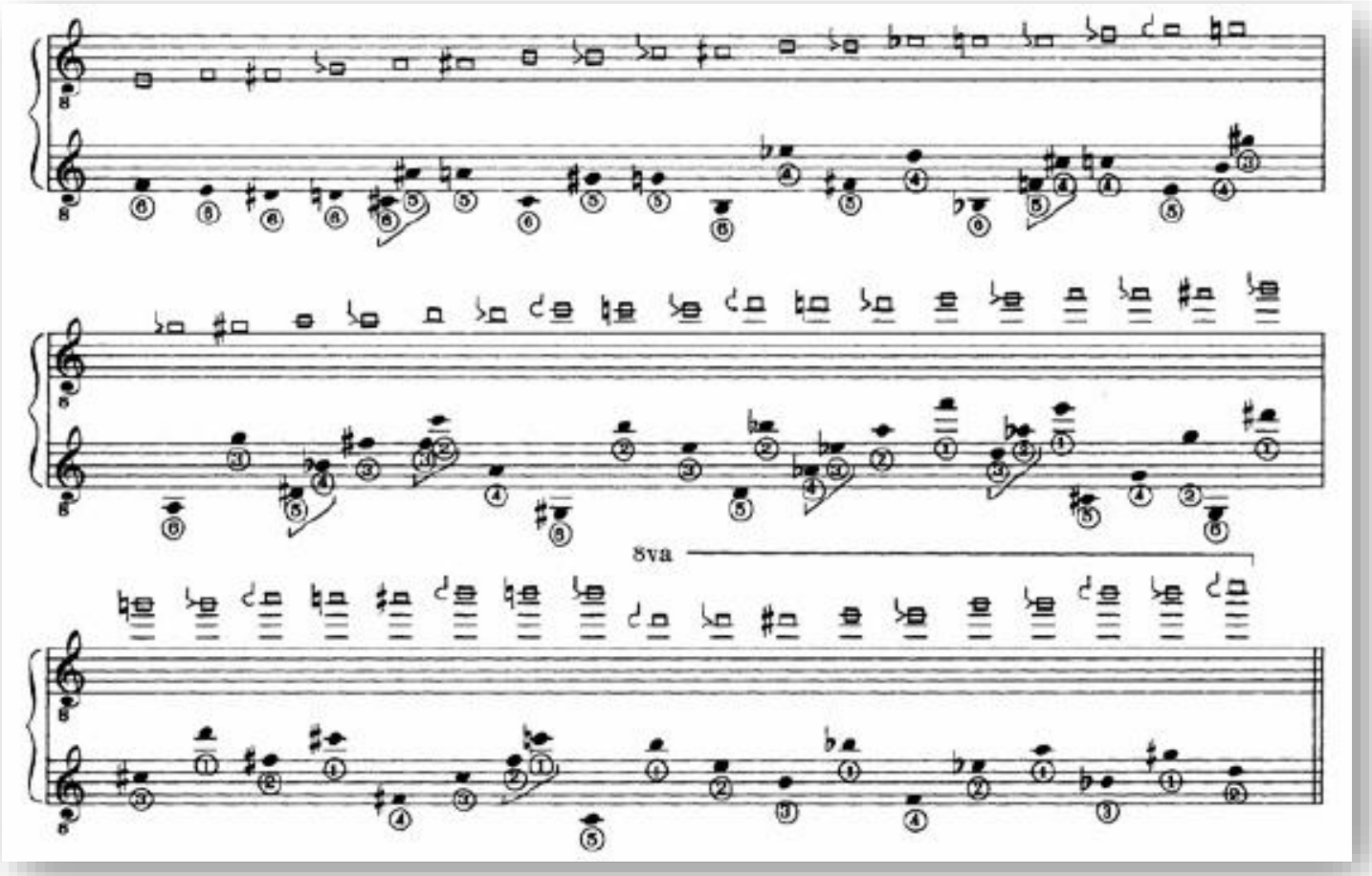


Figure 126: Bi-Tones scales (source: SCHNEIDER, 2015)

Based on the above discussed, Figure 127 shows Bi-tone deviations from standard notes in cents.

1 (E_4)	x	$F\#_8$ -13.77	$F\#_7$ +35.51	C_7 -17.65	G_6 +32.63	E_6 -5.85	$C\#_6$ +25.86	B_5 +5.87	A_5 +21.10	$G\#_5$ -36.89	$F\#_5$ +26.16	F_5 +6.13	~
2 (B_3)	x	$C\#_8$ -13.77	$C\#_7$ +35.51	G_6 -17.65	D_6 +32.63	B_5 -5.85	$G\#_5$ +25.86	$F\#_5$ +5.87	E_5 +21.10	$D\#_5$ -36.89	$C\#_5$ +26.16	C_5 +6.13	~
3 (G_3)	x	A_7 -13.77	A_6 +35.51	$D\#_6$ -17.65	$A\#_5$ +32.63	G_5 -5.85	E_5 +25.86	D_5 +5.87	C_5 +21.10	B_4 -36.89	A_4 +26.16	$G\#_4$ +6.13	~
4 (D_3)	x	E_7 -13.77	E_6 +35.51	$A\#_5$ -17.65	F_5 +32.63	D_5 -5.85	B_4 +25.86	A_4 +5.87	G_4 +21.10	$F\#_4$ -36.89	E_4 +26.16	$D\#_4$ +6.13	~
5 (A_2)	x	B_6 -13.77	B_5 +35.51	F_5 -17.65	C_5 +32.63	A_4 -5.85	$F\#_4$ +25.86	E_4 +5.87	D_4 +21.10	$C\#_4$ -36.89	B_3 +26.16	$A\#_3$ +6.13	~
6 (E_2)	x	$F\#_6$ -13.77	$F\#_5$ +35.51	C_5 -17.65	G_4 +32.63	E_4 -5.85	$C\#_4$ +25.86	B_3 +5.87	A_3 +21.10	$G\#_3$ -36.89	$F\#_3$ +26.16	F_3 +6.13	~

~	E_5 ±0.00	$D\#_5$ +5.46	D_5 +20.73	$C\#_5$ +44.39	$C\#_5$ -24.71	C_5 +12.52	C_5 -44.72	(B_4 +2.93)
~	B_4 ±0.00	$A\#_4$ +5.46	A_4 +20.73	$G\#_4$ +44.39	$G\#_4$ -24.71	G_4 +12.52	G_4 -44.72	($F\#_4$ +2.93)
~	G_4 ±0.00	$F\#_4$ +5.46	F_4 +20.73	E_4 +44.39	E_4 -24.71	$D\#_4$ +12.52	$D\#_4$ -44.72	(D_4 +2.93)
~	D_4 ±0.00	$C\#_4$ +5.46	C_4 +20.73	B_3 +44.39	B_3 -24.71	$A\#_3$ +12.52	$A\#_3$ -44.72	
~	A_3 ±0.00	$G\#_3$ +5.46	G_3 +20.73	$F\#_3$ +44.39	$F\#_3$ -24.71	F_3 +12.52	F_3 -44.72	
~	E_3 ±0.00	$D\#_3$ +5.46	D_3 +20.73	$C\#_3$ +44.39	$C\#_3$ -24.71	C_3 +12.52	C_3 -44.72	

Figure 127: Auxiliary pitches deviation from standard tunning in 650mm scale (Source: JOSEL AND TSAO, 2014, p. 149)

As for notations, there is no consensus in the artistic literature, and theorists offer conflicting recommendations. Unless the recognition of pitch is fundamental to the performance, we recommend only a clear indication of where to play: a dedicated character for playing on the back segment notated as the fingered fret. Tablatures can also be very effective. In any case, fingering and string indications are essential. In the case of a more systematic exploration, it could be worth using more robust devices, such as a dedicated staff, be it a normal one or a tablature. That is done, for example, by composer Sergio Freire in *Escambo*. Here, the guitar neck is divided in two by a capotasto placed in the 10th fret, and thus all the notes played to its left (from the player's perspective) are backtones, notated on sounding pitches and with string indication:

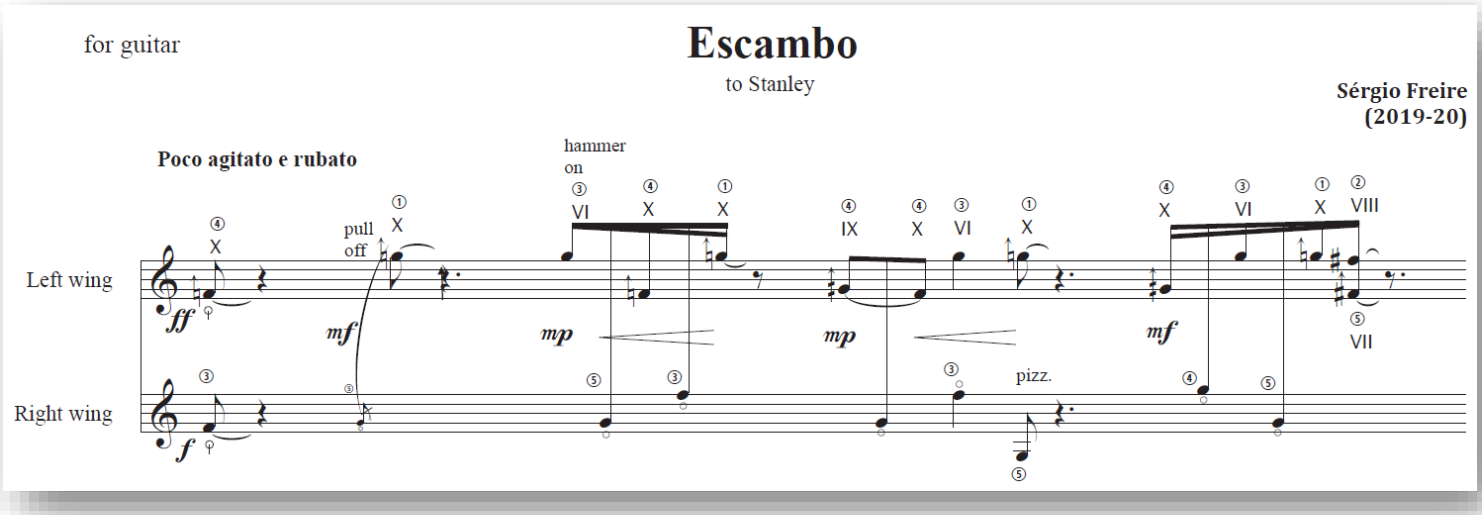


Figure 128: *Escambo*, p.1, showing the dedicated staff ("left-wing") for auxiliary tones.

Despite an early example from the second decade of the 20th century – the end of Villa-Lobos's *Éstude n. 2*, in which the auxiliary tones have melodic/harmonic functions – and bi-tones exploration in the post-war repertoire – from composers such as Leo Brower and Mauricio Kagel –, an in-depth use of the auxiliary pitches was not to be seen until more recently, in the last decades of the previous millennium.

Examples in the literature:

FG: *The Impossible.*

CG: *N-Dimensional, Cenas Infantis, 11 Studies, Silhuetas de uma dança imaginária, Los Caprichos (n. 61, Volaverunt)*

Original Works: *Escambo*

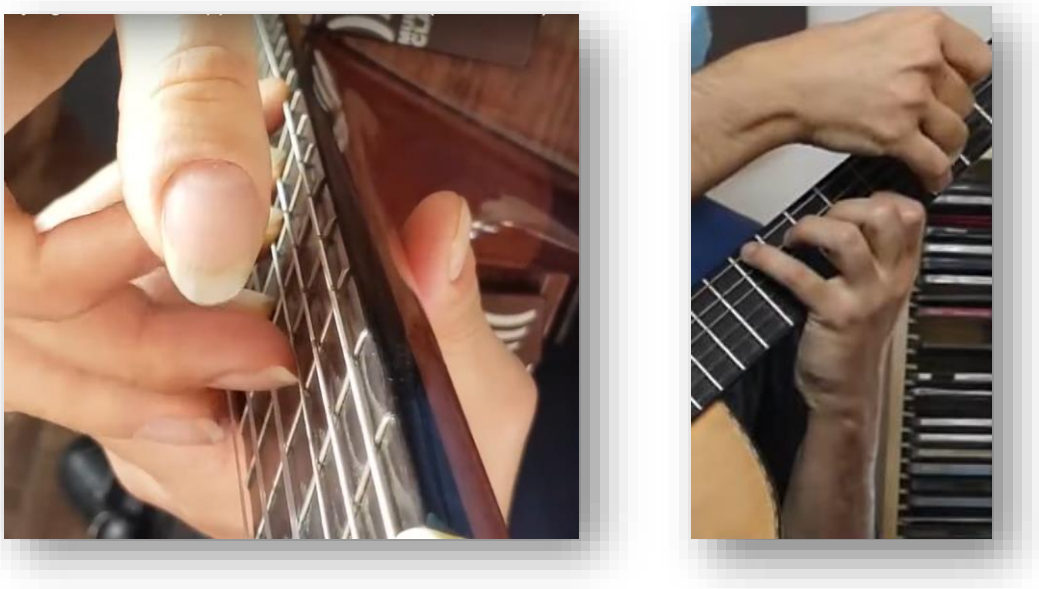


Figure 129: A Back-tone chord being arpeggiated

LONGITUDINAL STRING-RUB – [5.3<->5.2(VI-IV)/C.AORA.AORDAR]

BRUSHING/SCRAPING/WHISKING (JOSEL AND TSAO, 2014, p. 166), STRING WHISTLE (SCHNEIDER, 2015, p. 232; FRENGEL, 2017, p.109), SCRATCH-GLISS (SCHNEIDER, 2015, p. 232), SON-SIFFLÈ (GINASTERA, 1976).

Video 12: *Longitudinal String Rub*

Longitudinally rubbing the wound bass strings with the different body parts produces a distinct "zipping", whistle-like sound, flexible enough to be manipulated in its intensity, duration, articulation, and timbre. It belongs to the very restricted group of continuous sounds producible with the guitar.

This is generally done with the fingernails but is also effective with the flesh, albeit resulting in a duller sound. One can use the different fingernails of both hands or the flesh of any part of the hand. The nails can be used in different angles, opposing the harshness of the strings more softly or directly, with timbral consequences. It is possible to activate two strings with a single nail. The flesh can be simultaneously used to mute the normal vibrating mode of the strings. In the literature, the right hand (fingers *p* and *i*) and the hand palm – whenever flesh is requested – prevail.

As noted by Josel and Tsao (2014, p. 166), the string, if not muted, still vibrates softly in the normal modes. The consequence is that one can hear a soft glissando when rubbing it along. This phenomenon can be controlled using longitudinally stationary tremolos to generate fixed pitches,

which can in turn be employed melodically. Pitch is also created by the scratch itself. In that case, the determining factors for pitch formation are the speed of the movement and the string(s) used.

Dynamically, control is exerted through the speed of the longitudinal movement[146], the pressure on the string(s), the string used (the thicker, the louder), and the number of strings used.

Timbre can be varied through the angle of nails, the use of flesh, nail or their combination, the string(s) used, the speed of the movement, and, to a smaller extent, the spot rubbed.

This SF became widely known thanks to its occurrence in two cornerstones of the repertoire: *La Espiral Eterna* and *Sonata op. 47*. Nevertheless, a consistent introduction dates back to the 1960s, in works by Mauricio Kagel (*Sonata,* 1960), Alvaro Company (*Las Seis Cuerdas,* 1963), Geoge Crumb (*Songs, Drones, and Refrains of* Death, 1968), and others.
String rubbing is more common in CG than in FG.

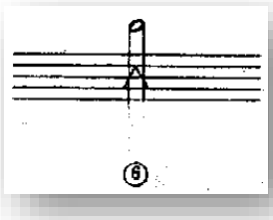
Figure 130: Longitudinally rubbing the 6th string toward the bridge.

[146] But not the speed of the alternation of directions in a tremolo!

Notation: As seen in the examples below, the characters used for this Family are remarkably diverse, but none has been able to capture the subtleness and many possibilities of the resource. Tablature notation makes it easier to identify the string, and lines along the staff, for the duration of the movement, are a good graphic analogy of the movement. When pitch is important, we recommend notating it on the normal staff. When not, using a dedicated staff (for percussion or unpitched sounds) is clearer. In any case, a good textual explanation of the intended results and technical execution is essential, especially in the case of more detailed usages.

Salut für Caldwell

La Espiral Eterna



Sonata op. 47

Figure 131: Different notations for the Longitudinal string rub.

Variations:

With the flesh (fingers, hand palm).

Different strings.

Multiple strings: it is possible to cover two strings with the same nail, and the player can use several nails at the same time on different strings.

Same string at several points: it is also possible to produce different effects by rubbing one string on several points, with two hands, different fingers of one hand, or both.

Continuous or discrete: rubbing can be a continuous action along the strings, whose duration is limited by the speed of the movement and length of the string. That limitation can be

overcome, however, with welding the movement of the hands (one begins shortly before the other finishes). It can be also discrete, and when so, rendered rhythmic.

Tremolos (finger, hand): a special case of discrete rubbing that approaches continuity, tremolos can be performed with any rubbing variation (fingers, hands, strings) and are effective at different speeds. Tremolos whose movement amplitude is sufficiently small, and are executed without dampening the normal vibrational modes of the string, can produce fairily discernible definite pitches, and it is possible to derive a melody from them, as seen in *Eclusas* and at the end of video 12.

Examples in the literature:

FG: *Boogie Shred, The Impossible.*

CG: *Sonata op. 47, La Espiral Eterna, Las Seis Cuerdas, Kurze Schatten II, Cenas Infantis, Un Mismo Mí.*

Original Works: *Eclusas, Seringal.*

LONGITUDINAL FRETBOARD RUB – [5.3/A.AAR]

GÜIRO (Josel and Tsao, 2014, p. 169; DAWES, 2017)

Video 13: *Longitudinal Fretboard Rub*

The are several sounds with the "tremolo" characteristic of the percussive instrument "güiro", and that were thus named in the literature:

a) The fretboard "guiro" (SIC; JOSEL AND TSAO, 2014, p. 169)
b) A linear scratch over certain scratchpads that resemble güiros (DAWES, 2017, video 21)
c) A transversal glissando in the strings at area **5.1** (JOSEL AND TSAO, 2014, p. SCHNEIDER, 2015, p. 199)
d) A glissando over the string knots in area **1**

They are, however, very different in their technical nature, *a* and *b* being kinds of rubbing/scratching actions, while *c* and *d* are more similar to **rg** or **pin**. That means that their classifications in our model differ significantly. We decided then to focus on the fretboard guiro and present the others as variations.

When one slides the tips of the fingers between strings and along the fretboard, the successive shocks against the frets produce an effect analogous to that of the corrugations of the güiro. The resulting sound carries a little of the sound signature of the fretboard, not as deep as the soundboard, and is sensitive to body part, speed, pressure, and placement. One can emphasize the flesh or include the nails while rubbing; the nails produce a louder, sharper sound. Speed can affect dynamics and, slightly, pitch; pressure varies dynamics; and placement varies timbre (brighter when closer to the nut, darker towards the bridge). A "pure fret" sound can only be achieved between two treble strings. It is also possible to involve wounded strings to add a remembrance of the longitudinal string-rub to the "güiro" (that would be a case of APR (*Associated PR*). In that case, using the finger in a transverse presentation (in relation to the strings set and length, that is, with the back of nail facing the bridge (l.h.) or the nut (r.h.)) can maximize the string-rub (between strings V and VI, especially with new strings, that can overcome the fret sound).

Dynamics can go from *p* to a weak *f*. Accents are possible.

Duration goes up to approx. 3 sec.. An irregular continuity can be achieved when the hands alternate welded movements. Quick and sharp, rhythmic movements are also effective.

Figure 132: A longitudinal rub between strings II and III

Notation: A glissando or arrow, such as seen in *Not Reconciled* (Fig. 133) and *Un Mismo Mí* (Fig. 135), is recommended. Indication of strings, in between which the finger(s) will be placed, is necessary; Germán Brull creatively appropriates the staff to make every line represent one of the five spaces between strings (Fig. 135). It is also necessary to specify the duration. In the case of faster rhythmic usages, in which glissando notation is not practical, a special notehead is recommended, possibly accompanied by a small graphic suggestion of movement (gliss. line, arrow). It is generally not necessary to indicate the frets, unless important to conjugation with other TGs. The direction of the movement can be important for technical reasons and/or timbre. For the arpeggiated variations (see ahead), acciacaturas with pitches indicating the open strings (Fig. 134), or notes with no head with a glissando line (Fig. 133), are recommended.

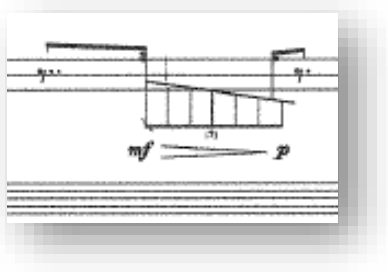


Figure 133: *Not Reconciled*, measure 80 (Source: JOSEL AND TSAO, 2014, p. 169).

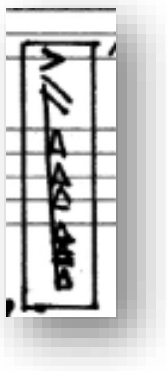


Figure 134: Cenas Infantis (Segunda Parte, p.8): arpeggio in area *5.4*

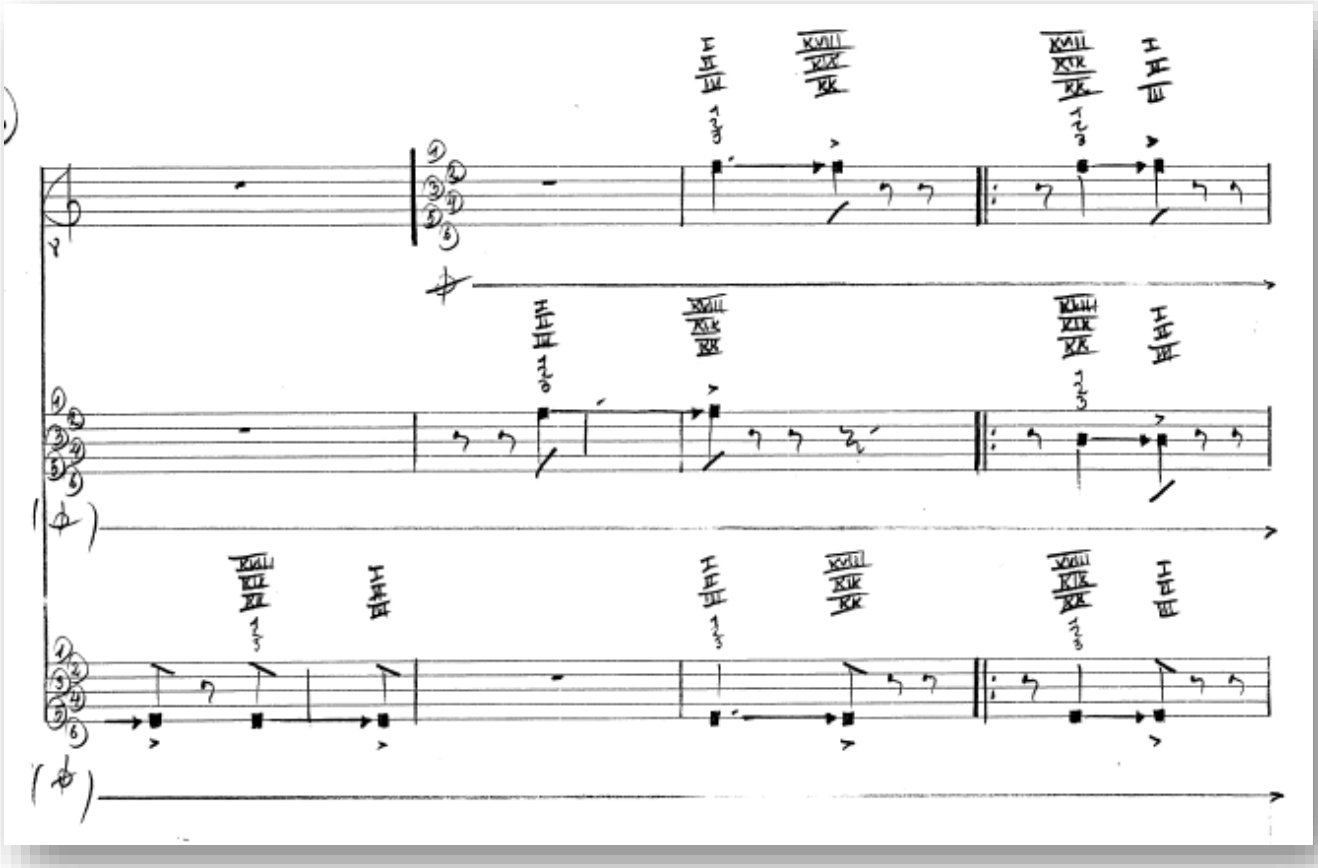


Figure 135*: Un Mismo Mí*, bar 116. Normal figures indicate the duration, and arrows suggest the movement. The crossed circle indicates that the staff is converted in a special kind of tablature, where strings are represented by the spaces between lines, and these represent the inter-string spaces (see staff 1, second bar). The length of the movement is indicated by the frets, in roman numbers.

Variations:

Scratchpad guiro: Some scratchpads have corrugations, irregularities, that resemble or reproduce that of a güiro. In those cases, a longitudinal or transversal – according to the pattern of the wood – scratch can produce analogous effects. The activation of this resource is normally made with the nails (C.A), for optimal results. They tend to be more responsive to speed (the faster, the more brilliant the timbre) and produce a distinctive, unique sound.

Arpeggios in area *5.4*: Sliding the back of a nail (generally with *i* or *c*) through the strings in area 5.4 also produces a güiro-like effect. The result resembles quick taps on the soundboard (2.1/A.Bgp): because the string segment is so small, only in the basses can subtle, very high pitches be heard; the bass sound of area 1 predominates. Space is also very restricted to make it practical to play the strings individually; while that remains a possibility, it is generally more

practical to tap the bridge itself. Some guitars, in which this string segment is a little longer, can have a more pronounced pitch presence and be easier to play.

Scratch on string knots in area *1*: That is executed over the "castle", besides area 5.1, where the strings are knotted. The sound result is very close to that of area 5.1. The difference is the playability: the area is more easily accessible. It does not produce pitches.

Examples in the literature:

CG: *Cenas Infantis, Movementi für Gitarre, Un Mismo Mí*, *Not Reconciled*.

SOUNDBOARD SCRATCH/RUB/BRUSH – [2/AR]

Video 14: *Soundboard rub*

Scratching is possible in all guitar areas, but, apart from the strings, only on the soundboard does it produce any meaningful sound. It can be done with the flesh, for an eerie, "hissing, s-like" effect, or with the nails, with the potential to create more penetrating sounds when the scratched surface is sufficiently rough. In both cases, the resulting sounds have complex unpitched spectra. This SF consists of continuous or discrete movements following the surface of the soundboard. It is used to emulate the snare-drum brushing from jazz music (FG), to build or enforce cadences or interjections (FG, *Laputa Variations*), or as main components in subtle textures (ex. *As Entranhas da Terra*). It can also be used rhythmically.

The polishing and the finish of the guitar both influence this SF. As a harsher surface is more responsive, thinner layers of finish over less polished surfaces work better[147]. Many FG guitarists employ a kind of scratching with the nails on which they either scrape out the varnish and undo the polishing of the wood (also gradually wearing away the soundboard material itself) or glue a *scratchpad* - a thin wood plate with a rough surface – over area 2.3, restricting the scraping to that place[148].

Despite the prevalence of the r.h., both hands can be used to scratch or rub the soundboard. They can be used simultaneously to enforce dynamics or to help maintain continuity.

[147] In our tests with a new guitar model, when the finish is sufficiently thin, or inexistent, and the natural irregularities of the wood are preserved, even the sides can have a usable response to scratching.
[148] If the wood pattern in the scratchpad is sufficiently regular, and the cavities deep enough, the result can approximate that of a *guiro.*

The subtleness of the effect allows for only limited timbral, dynamic, durational, and articulatory control. Pressure and placement influence dynamics, the latter following the usual progression of responsiveness of the soundboard (2.3 → 2.2 →2.1). A continuous sound can be produced with circle movements or by welding alternating movements with both hands; discrete sounds can be rendered rhythmic and go all the way from a perfect legato (constructed with accents in a continuous sound) to a sharp staccato. Timbre is better controlled by changing the excitators (nail/flesh) or the scratched surface (eg, scratchpad/soundboard). Unlike the strings, polished surfaces do not respond well to speed, but harsh surfaces – such as the scratchpad – do, with the usual effect: the higher the speed, the higher the spectrum.

The use of hand area E or the phalanxes between B.B and B.C instead of the whole hand or hand palm helps to save precious space, since the required amplitude of movement and body parts involved are relatively large. Integration with other TG is complicated due to the soft sound[149] and the fact that the hands are completely taken out of the strings; therefore, fast micro-alternations should not be expected, and simultaneity is restricted to resonances, open strings (r.h.), or tapping (l.h.).

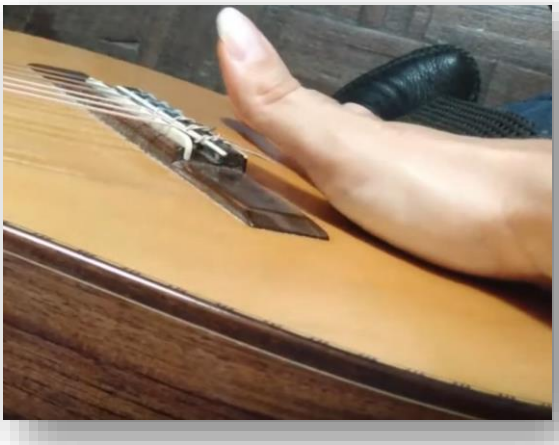


Figure 136: Rubbing at area *2.1* with hand part *D.* This hand part would be impractical on the other side of the bridge, where *E* would be more efficient.

[149] In FG the balance is generally electronically corrected.

Notation: Soundboard scratchings, especially with the nails, are much more common in FG than in CG. It follows that specific forms of notation are lacking. *Laputa Variations* (Fig. 137) uses "x" noteheads with textual explanations. *As Entranhas da Terra* (Fig. 138) has a more specific notation for rubbing, textually specifying only which strings to rub. It uses a system similar to *Ko-Tha,* with dedicated staves separating strings and "percussion" (in this case, in addition to a staff for vocal actions). It is noteworthy to observe the overlaps and timbral metamorphosis between string and soundboard rubbing.

Variations:

Nail or flesh.

Soundboard sub-areas.

Scratchpad.

Continuous or discrete: Differently from the strings, continuity here can be achieved with circular movements, in addition to the weldings. The flesh rub can be a bit more cumbersome, and therefore not so rhythmically agile. Since tremolos are essentially fast repetitions of discrete movements, the same is valid for them, but they are still possible.

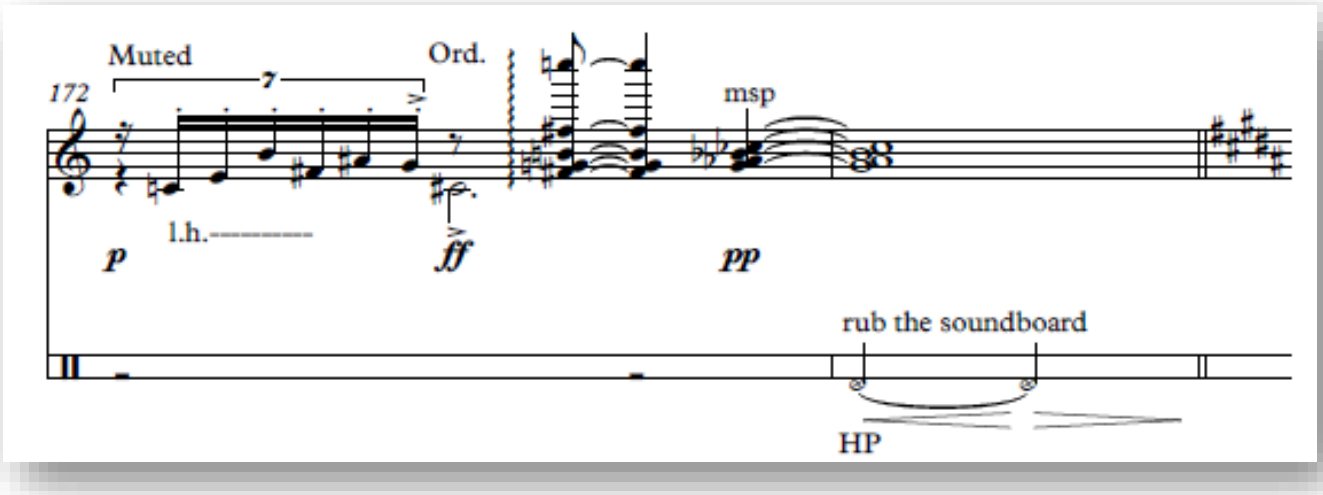
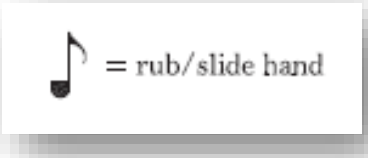


Figure 137: Laputa Variations, bars 172-173



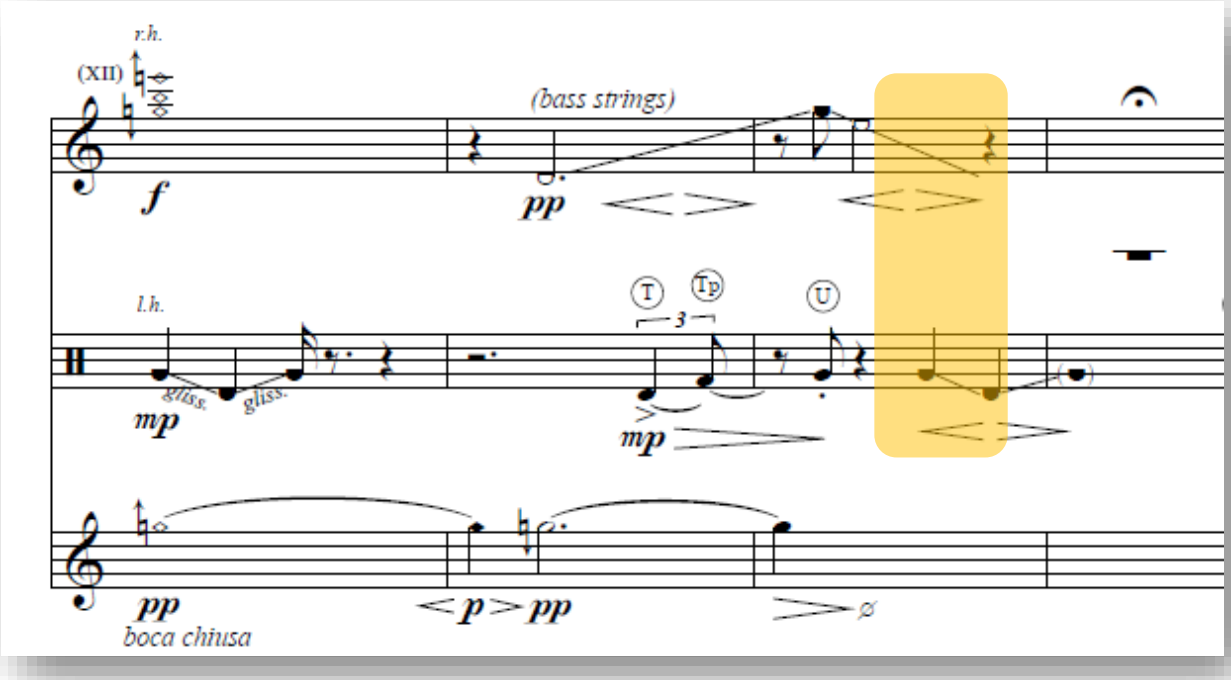


Figure 138: *As Entranhas da Terra*, page 1, 2nd system, highlighting the timbral transformation from string to soundboard rub.

Examples in the literature:

FG: *Passionflower, Telepathy, Dance of the Last Rhino, Boogie Shred, The Impossible*
Original Works: *As Entranhas da Terra, Laputa Variations*.

STRING BUZZ – [5/C.B OR A.AAB]

STRING BUZZ (Josel and Tsao, 2014, p. 170), ZINGER (Nassif, 2010)

Video 15: *String Buzz*

This SF consists of a buzz generated by a soft touch, with any hand, on a vibrating string, in a way that preserves as much as possible the vibration from dampening, but that allows for quick, successive shocks of the string against the touching surface. It is more effective with the nails (C.B is better than C.A) than with the flesh (A.A, although, theoretically, any hand part would work), and on the bass strings than on the trebles, but all combinations are effective to a certain extent. The lower the pitch of the vibrating string, the longer the duration, clarity, and control offered. Open strings work better than stopped ones.

A very practical way of producing the buzz is rest-striking a string with the thumb, and, keeping the finger rested on the string below, quickly turning the hand so that the back of the nail touches the vibrating string, and then slowly bringing the nail closer as the vibration diminishes (that is shown on video 15). Josel and Tsao (2014, p. 170) also describe a similar sound produced by progressively releasing the pressure of the l.h. over a stopped fret, and that can be done at any moment in the duration of a note, including the attack. This way of creating a buzz demands a great sensibility of the l.h.

This Family requires a great deal of control of the touching hand/finger, and one should expect a few discontinuities in the buzz, or even interruptions, during its execution. Arguably, that can be almost extinguished with specific training, that, unfortunately, almost no player possesses.

The initial excitation of the string is, strictly speaking, not a part of this Family, and could be generated in any way desired – plucking, tapping, *rasgueado*, with a bow, with the right or left hand, etc. But it tends to work better with plucking, because the finger can, immediately after the attack, touch the string, and because plucking is more controllable. In practice, both actions appear often technically and musically linked.

The buzz never exists isolated from a note sounding from the vibrating string that produces it. Therefore, this Family is in reality a perceptual aggregate. It is hard to aurally determine the pitch of the buzz alone, which means that the prevailing pitch heard will always be that of the normal vibrational mode (the note). Nevertheless, the timbre of the buzz can be manipulated both by changing the string used, stopping a note (the fact that the string is stopped generally affects this Family more than where exactly the action of stopping it happens), where the string is touched, and touching with nail or flesh.

There is an inescapable trade-off between dynamics and duration because touching the string converts the energy – and therefore the sound – of the normal vibrational modes in energy – sound – of the multiple shocks. So, if the shocks are more intense, the sound of the buzz will be so as well, but that decreases the string vibration. That also means that both the duration and the intensity of the buzz, in whatever proportion one chooses, depend on the strength of the initial attack.

The maximum duration (for an open low E string in a guitar with good sustain) would be around 9 seconds, or 4, for the l.h. buzz described by Josel and Tsao (on the low E string, 1st fret), but those are optimistic limits. Normally, durations of, respectively, 3-5 or 2 seconds are easier and more realistic,

especially in more complex musical contexts. There is a natural, irregular *decrescendo* accompanying the duration of the buzz – untrained players will often play a *crescendo* at the beginning as well. Control of dynamics is extremely unpractical, and one should consider the dynamics of the buzz to always be proportional to that of the note.

The resource is better controlled when the string vibrates with bigger amplitudes. For that, both the plucking spot and the point at which the nail subsequently touches the string are important. For the longest possible vibration, both actions should take place at the middle of the vibrating portion of the string (e.g., the 12th fret, when the string is not stopped). The plucking point affects the control more than the touching point.

This resource is much more used with the r.h. and in CG.

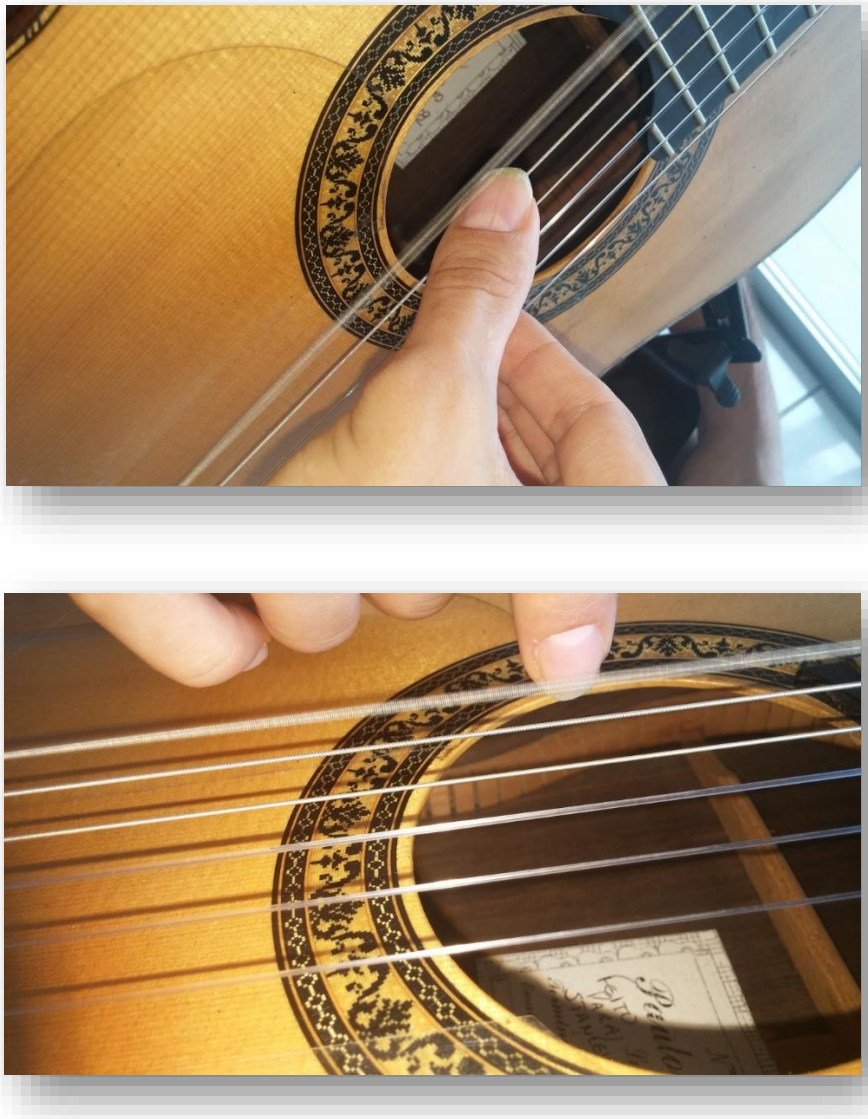


Figure 139: String Buzz with p and i, respectively.

Notation: The first notated use of the buzz we could locate was in *Ko-Tha* (1963). Being a relatively unfrequent requisition, we cannot affirm that subsequent appearances tended to use the same notation, as did Rafael Nassif in his *Silhuetas de uma Dança Imaginária*, in which the symbol also suggests a kind of dynamic arch that is common in unpractised executions. This notation can be very easily mistaken for that of different kinds of *vibrato*. We, therefore, recommend the use of clearly differentiated lines accompanying the duration, possibly with a different character for the buzzed note, and a textual indication.

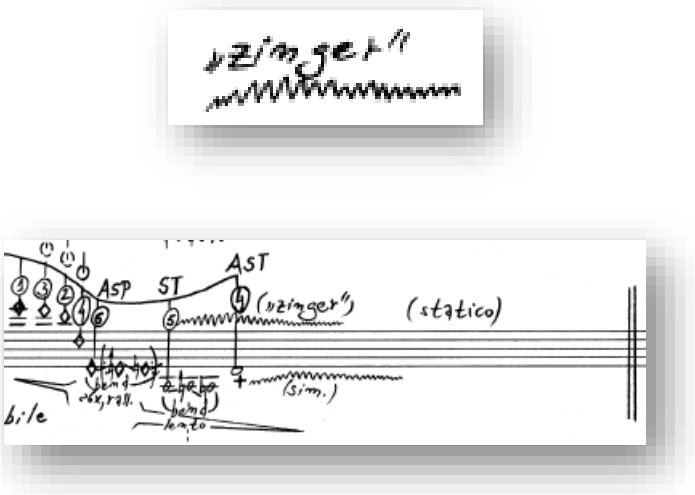


Figure 140: *Silhuetas de uma dança imaginária*: name, notation, and Guitar 2, last measure.

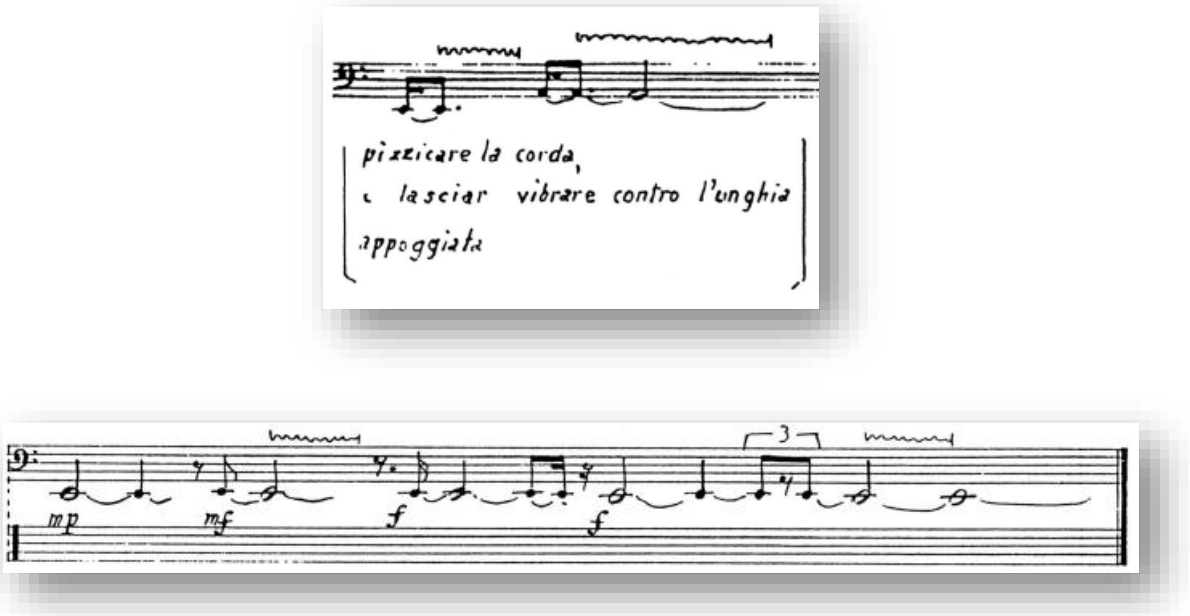


Figure 141: *Ko-Tha*: notation proposal, and p. 4, last system

Variations:

Multiple strings: After playing a chord it is possible to bring the hand, or specific fingers and/nails to touch many strings at a time. Since each string has its vibrational pattern, the control is only approximate, and as consequence, the buzz is irregular through the strings, and its global duration is reduced. That can be mitigated by the use of only two strings, one per hand.

Flesh/Nail.

Buzzing with the stopping l.h. finger: As described, this is also a controlled touch on a vibrating string, but in this case, it is made with the finger (generally, but not necessarily, from the l.h.) holding one of its fixation points. The movement is, however, inverted: if in the mid-string buzz the flesh or nail must gradually pursue the shrinking edges of the vibration of the string (so, an inward movement), here the finger must progressively release the string, also proportionally to its vibration. This extremely delicate balance between normally stopping and dampening the string is very difficult to reach and demands great concentration.

Buzzing with r.h. thumbnail - 5.3(VI-IV)/A.A(ME)pin + 5.2(VI-IV, just beside 1)/C.B(p-MD)ab: Slightly touching the string near the bridge with the back of the r.h. nail while tapping with the l.h. generates a mix of a tapped note and a buzz, a more percussive sound than a normal "zinger" and with a fast decaying resonance. Effective only on the basses.

Examples in the literature:

CG: *Ko-Tha*, *Silhuetas de uma dança imaginária, Kitara, RAP*.

THIAGO'S SLAP – [6/B.B(IMAC-ME)GP]

Video 16: *Thiago's Slap*

As discussed, the percussive use of the l.h. is very difficult in musical contexts in which the l.h. is used to modulate pitch on the fretboard. A creative solution was invented by guitarist Thiago Colombo in his *La Toqueteada*. To obtain a very specific percussive timbre, maintain the position of the r.h., and at the same time position the l.h. for a hammered-bass melodic line, he executes an uncommon strike on area 6. He takes advantage of a l.h. shift to bring it completely to the back of the guitar neck (Fig. 142 and 143a), and, on the way to reposition it in front of the fretboard, slaps the neck with the back

of the hand, using the fingers but especially the knuckles (**B.B**, see Fig. 143a). He then completes the movement by bringing the hand back to the usual plucking position (Fig. 143b and c).

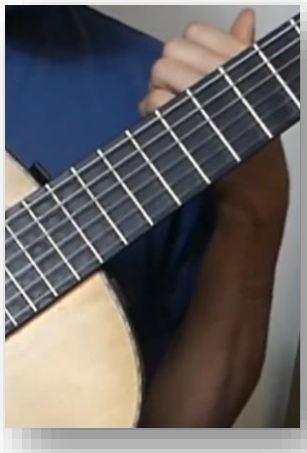


Figure 142: Thiago's Slap: the moment of the strike

Figure 143: *Thiago's Slap*: Using a l.h. shift to position the hand behind the guitar neck (a) and slapping with the back of the hand (knuckles, *B.B*); bringing the hand to the fretboard following the slap movement (b); hand repositioned for standard fretboard action (c).

The fast integration with the other TGs is made possible by using the same movement to hit the guitar and reposition the hand; that requires the slap to be executed necessarily with the back of the hand, otherwise, other movements would be needed.

Because this PR is specifically designed to deal with contexts of *micro-alternation* between TGs, it will generally involve fast movements that reduce the control over the sound. It is effective throughout the whole extension of the guitar neck, ranging from *p* to a discrete *f*. Timbre is relatively consistent along the neck, and that is convenient, considering that the placement of the slap will normally obey the technical demands of the passage rather than a planned tone color.

Notation: Thiago opts for a pragmatic notation for the percussive resources in this piece. He designs no special system to accommodate the percussion, directly inserting them onto the normal staff. For that, he chooses several characters, whose placement on the staff determines the exact sound/technique [150]. He assigns them for each fixed PR he uses. Somewhat nonsystematic, it resembles the notation for *Percussive Study n. 1* in that respect. The character for the neck slap is shown in Fig. 144:

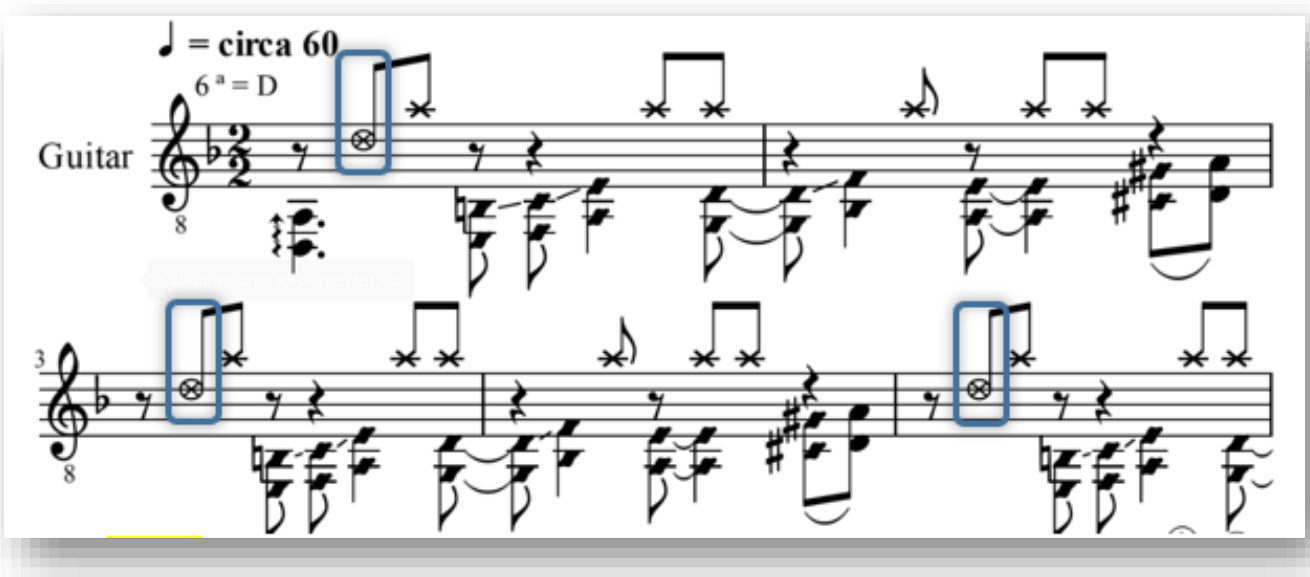


Figure 144: La Toqueteada, measures 1-5, showing the notation for the slaps on the guitar neck.

Variations:

B.A or B.B

Examples in the literature:

La Toqueteada.

[150] But only in some cases; in others, placement is not a factor. It is, therefore, a non-systematic notation.

KAMPELA'S OFF-STRING BUZZ

5(VI OR I)/A.A(321-ME)EST+5.2(VI OR I)/C.A(P,A,M,I-MD)PIN

Video 17: *Kampela's Off-string Buzz*

This PR has an aural affinity with the string buzzes and a technical affinity with the crossed strings. It consists of pulling the first or last strings of the guitar outwards, holding them above (last string) or below (first string) the fretboard with a l.h. finger or (optimally) group of fingers, and plucking them with the r.h. The string then vibrates against the wood of the neck and especially against the metal of a fret, and at the same time, it also vibrates in the normal mode. That result is a strong attack full of noise, followed by a distinct buzz simultaneous to a definite pitch, all lasting about 2 seconds (the resonance is much softer than the attack).

Pitch can be defined by the placement of the pull on the neck, together with the length of this pull. Dynamics range from *ppp* to *f.* Timbre depends on the plucked or strummed technique used by the r.h, the string used, and on how far the pull goes.

The pull can be controlled to generate a variety of timbres and pitches. While the exact effect depends on the specificities of the guitar, a subtle pull, taking the string only slightly out of position, favors a more buzzed and resonant sound, while larger pulls favor a more muted, percussive, unpitched attack. There is a very small continuum to be manipulated, requiring training and concentration.

The pull is easier where the string is at its laxest (12^{th} fret). Position shifts while pulling are possible. They are easier when going towards the 12^{th} fret, and conversely more difficult in the opposite directions, just like with the crossed strings.

The PR can be easily combined with other TG, in alternation or simultaneously.

It can be performed with many plucked or strummed techniques. Kampela uses it with tremolos, but it also admits *pizzicatos* (whose effect is to dampen the pitch, leaving only the attack and the buzz), Bartók *pizzicatos* (only with the last string), and moderately effective tamboras.

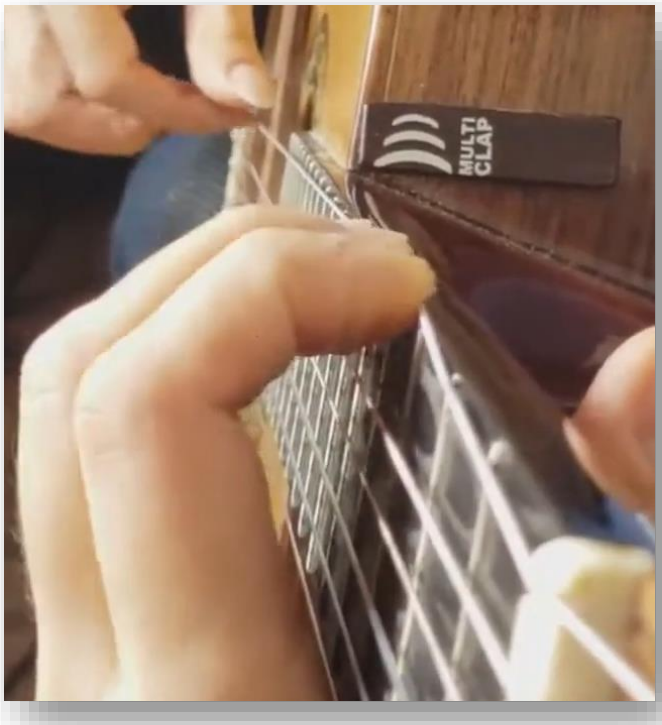


Figure 145: Kampela's off-string buzz.

Notation: Despite the pronounced inharmonic transients of this PR, Kampela avoids the staff for unpitched sounds (one-lined staff), writing it on the regular one. He uses the character highlighted in Figs. 146 and 147, followed by a wavy line that shows its duration. The interruptions seen in Fig. 146 are not strictly necessary to play the notes, they are a compositional decision.

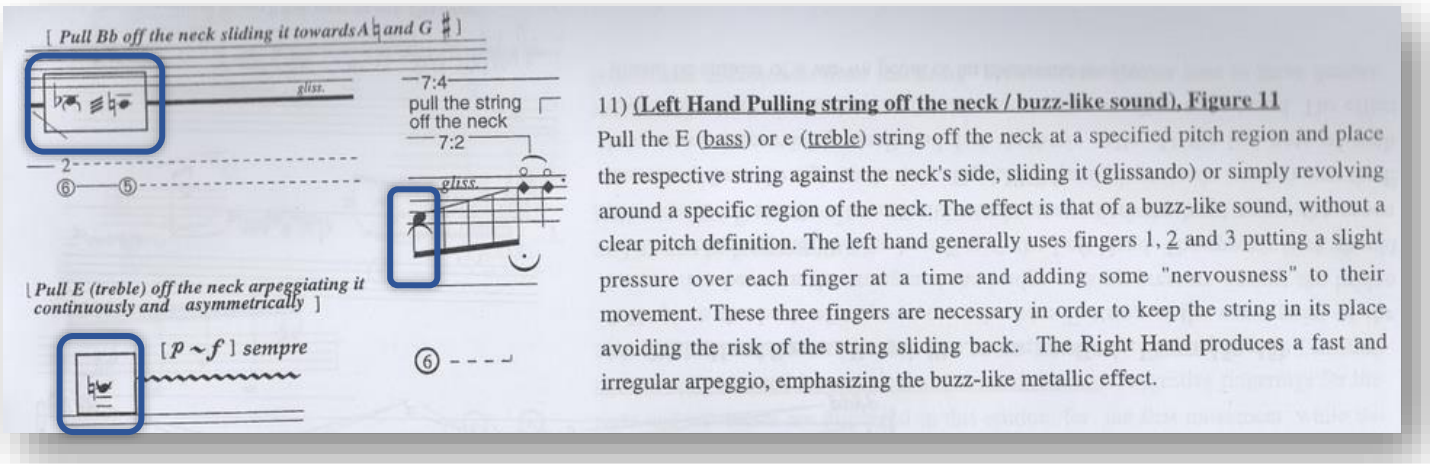


Figure 146: *Percussive Study n. 1*, "Symbols/explanations".

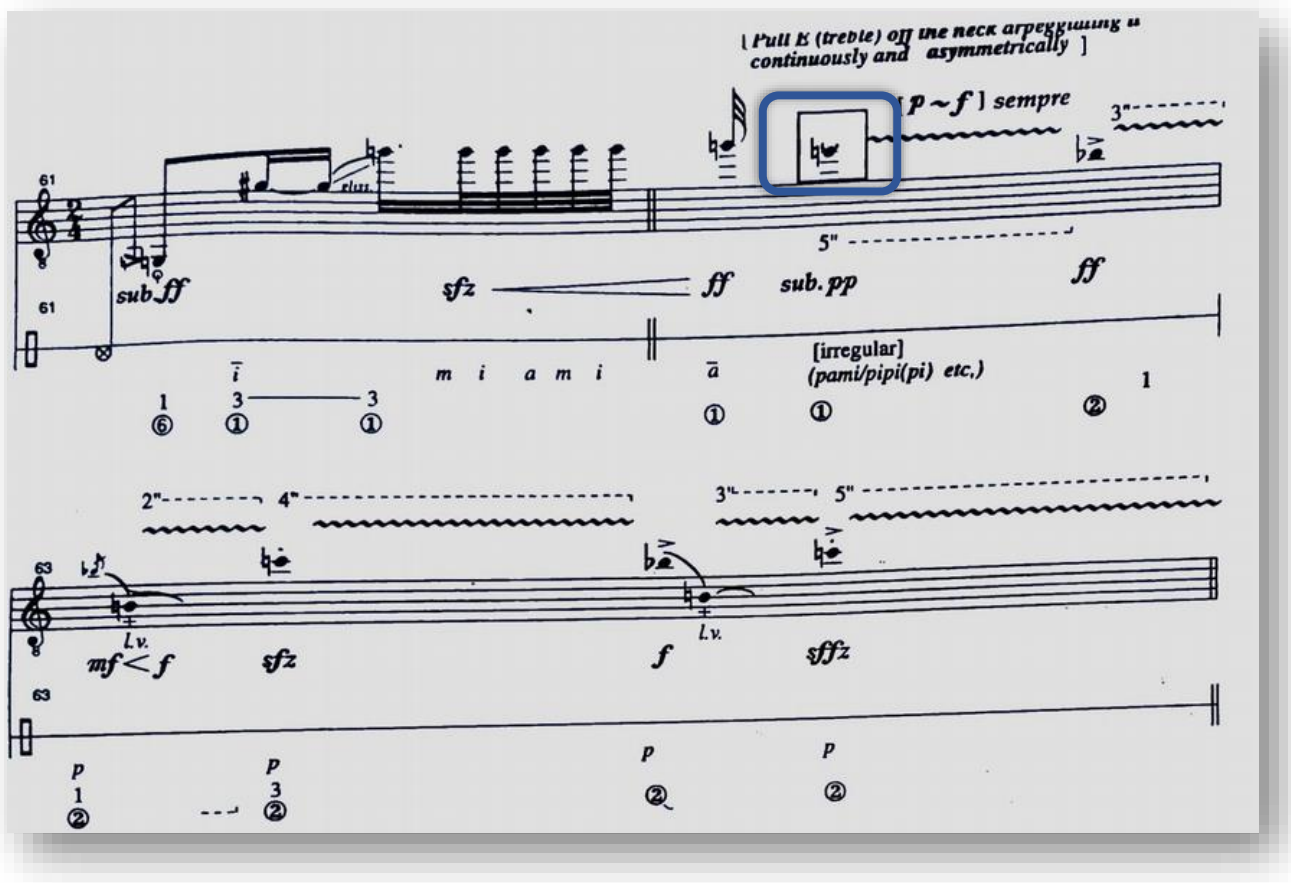


Figure 147: *Percussive Study n. 1*, bars 61-63, showing the string pulled out of the fretboard and integrated with regular plucking.

Variations:

Two strings: It is possible to bring two strings together to the side of the fretboard.

With crossed strings: A variation of the above. In this case, the strings are crossed outside the fretboard, the resulting sound being a mix of the buzz and the crossed strings.

Examples in the literature:

CG: *Percussive Study n.1* and *n. 2*.

PERCUSSIVE TAPPING – [5.3/A.APIN OR GP] [151]

Video 18: *Percussive Tapping*

Tapping is a controversial matter when it comes to percussive playing. Undoubtedly, the guitar is an intrinsically percussive instrument, even when played employing traditional techniques. Tapping only adds percussivity to that natural inclination, but to which extent can it be automatically considered percussion, at least in the sense that we use here? Most occurrences of this technique privilege its melodic and/or harmonic function, as we see, for example, in the practice of the artist Stanley Jordan, as well as in many examples in FG. In these situations, the strong inharmonic attack functions as a kind of timbral variation or are diluted in the harmony. Fewer are the cases in which the rhythmic punctuation, along with the attack itself, are the prominent factors. More often then not, both these functions come interwoven in the musical discourse, the prevailing aspect being a matter of subjective evaluation. Josel and Tsao (2014, p. 154), who discuss the technique in their chapter "Guitar as percussion", put the problem in the following terms:

> (…) Tapping – in all its forms – is perhaps the most common of these percussive string methods. As the preceding examples suggest, some tapping may be vigorous enough to exert a strong percussive effect. There are, however, other techniques whose impact is literally more forceful and explicitly percussive in nature: (…)

Therefore, we only consider a tapping percussive when, despite having a (more or less) clear harmonic spectral content, its results are "percussive in nature", that is, the attack prevails over the resonance, and its rhythmic function prevails over the others. Contexts in which this happens are, for example, the tapped sections of *La Espiral Eterna* (Fig. 148) or *N-Dimensional* (Fig. 149), or, to a lesser degree, the rhythmic basses of some fingerstyle songs, such as *Drifting* and *Hunter's Moon*.

[151] This technique is already thoroughly dissected in many manuals for the electric guitar, as well as many classical guitar methods of the last decades. For that reason; because it is essentially a variation of basic *punteado* techniques (hammer-ons and pull-offs); and because its uses are most of the time not (strictly) percussive, we will refrain from an extended discussion here.

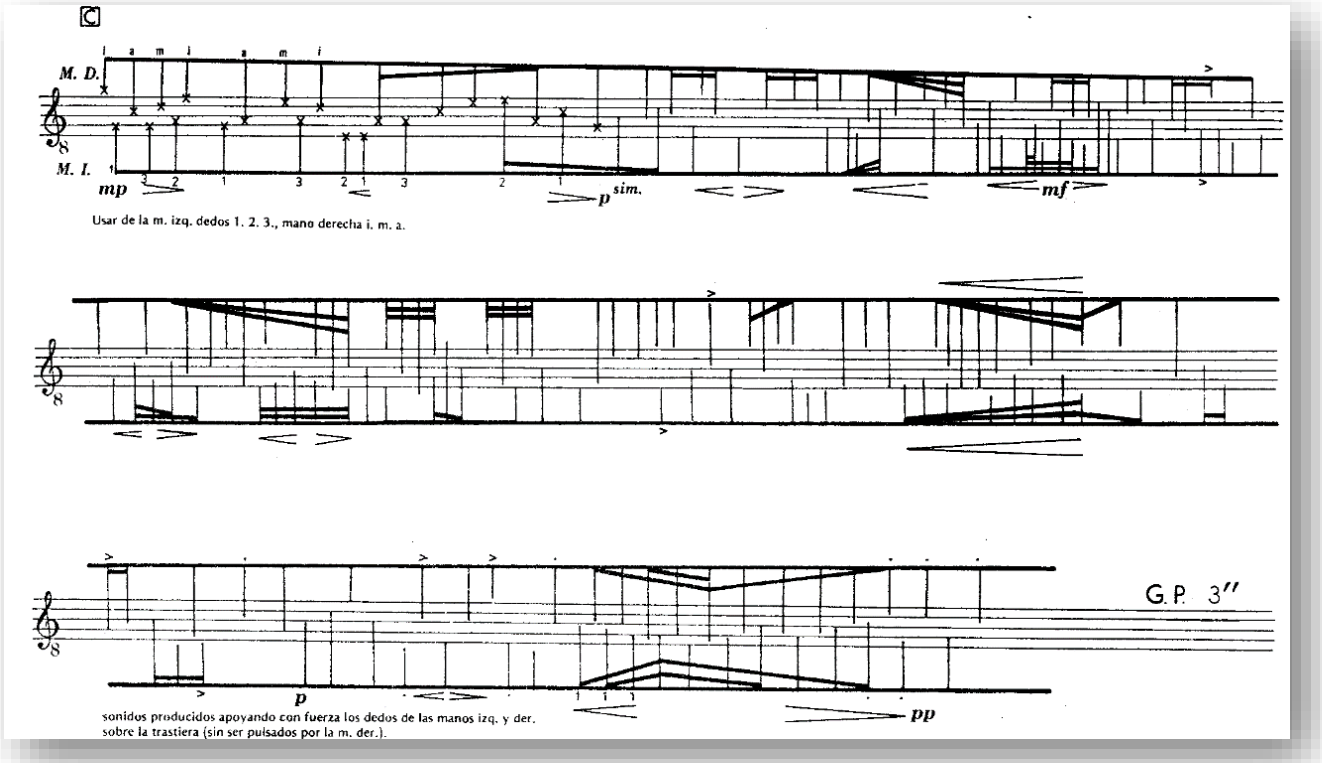


Figure 148: *La Espiral Eterna*, part "C": tapping and its notation.

While in popular music the tapping technique is often understood as an interlacing between right and left hands hammer-ons and pull-offs, the percussive character of the technique is actually brought out by the hammer-ons only. Therefore, decreasing the use of pull-offs greatly enhances the general percussive impression of tapping, as does separating the hammer-ons from each other, much like a non-legato[152].

[152] That can be achieved by having the finger leave the string right before the arrival of the next one, without letting a superimposition happen. It is possible to play relatively *legato* this way, but of course the more staccato the texture is, the more percussive the result will be.

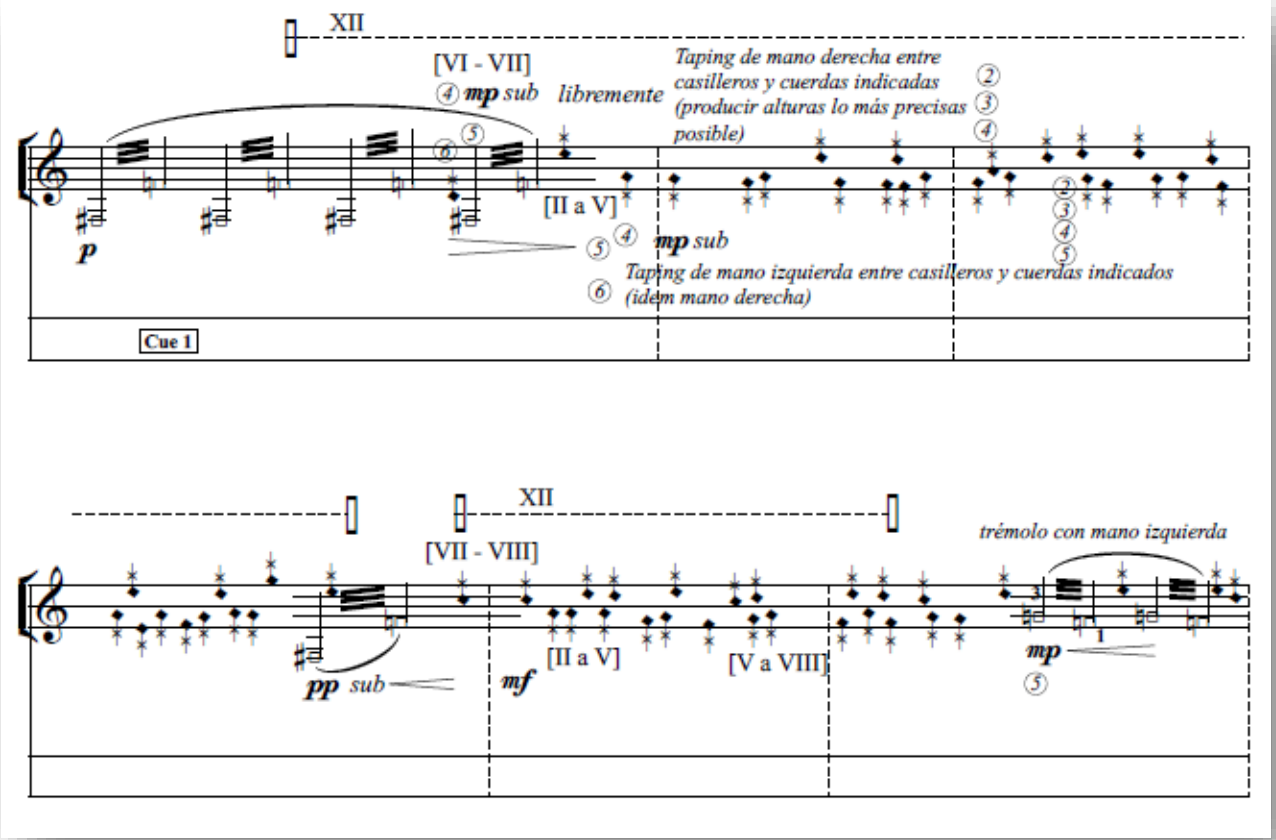


Figure 149: *N-Dimensional*, bars 6-11. The indications in Spanish read as follows: "R.h. tapping between indicated frets and strings (produce the pitches as precisely as possible)" – "L.h. tapping between indicated frets and strings (idem r.h.)" – "L.h tremolo".

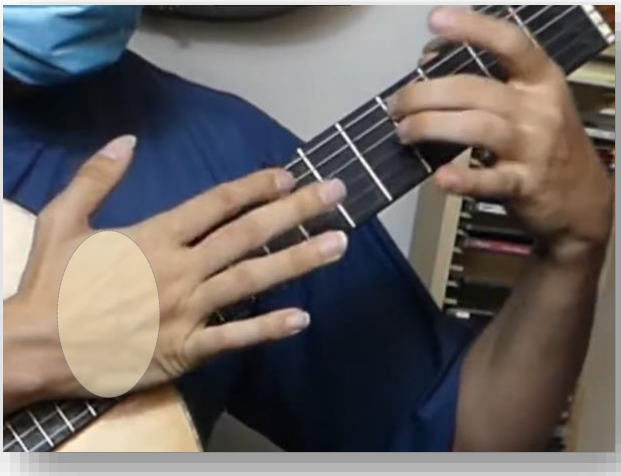


Figure 150: Percussive Tapping, highlighting the 5.3/E(MD)ab muting.

Notation: The use of a "+" is standard for l.h. plucked notes, while an inverted triangle as notehead is somewhat common for r.h. tapping; textual indications such as "r.h.", or "tapping", are also common. Schneider (2015, p. 195) comments on the "reasonable" use of a tablature; it as good a solution as ever, but we do not see its special benefits for tapping writing. Josel and Tsao (2014, p. 171) recommend different characters for each hand, "x" for the l.h. and the inverted triangle for the r.h. (Fig. 151). We argue that a simple textual indication ("tapping"), with a line indicating its duration, or with a dedicated character, in case it is interwoven with other techniques, suffices; the "+" (for the l.h., as usual) is enough to differentiate hands if that is essential for some reason.

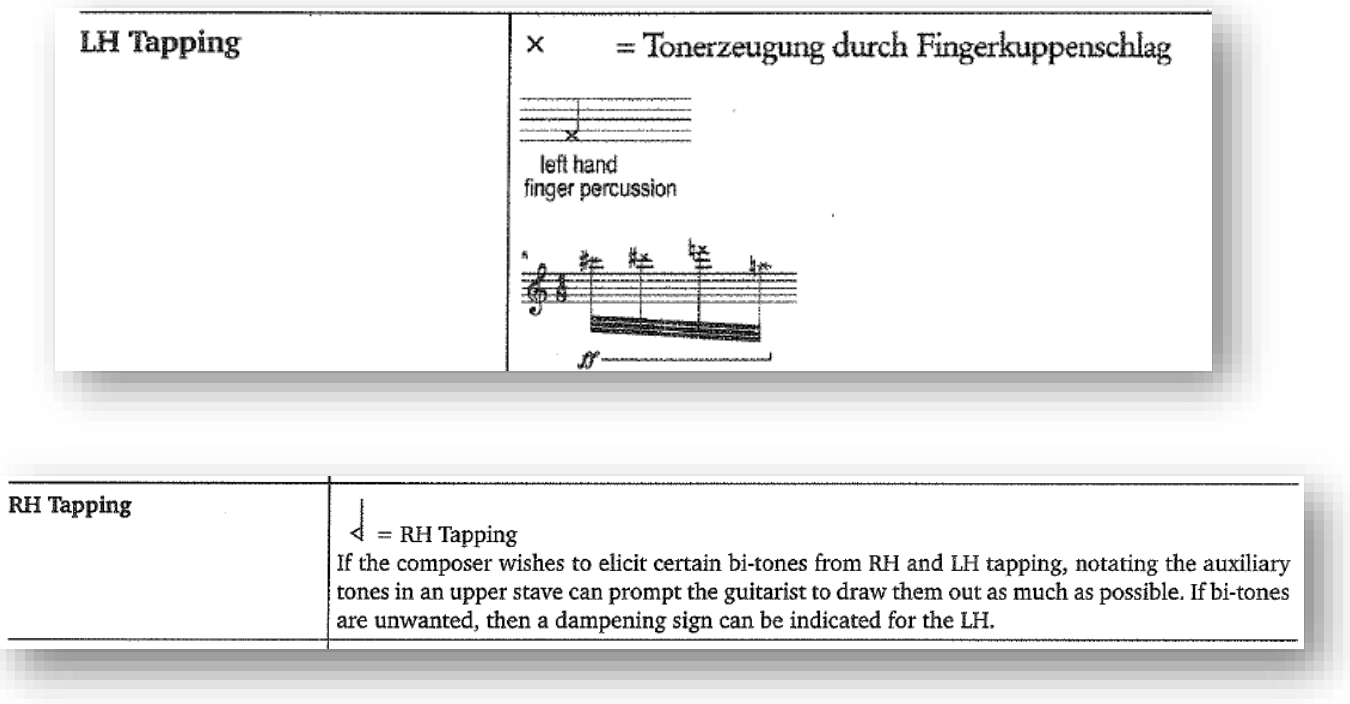


Figure 151: Josel and Tsao (2014, p. 171) indications for tapping notation.

Variations:

Muted: See "Dampened Strings" entry.

Examples in the Literature:

FG: *Drifting, Hunter's Moon, Boogie Shred, The Impossible, Boogie Slam, The Future, Passionflower, Telepathy, Dance of the Last Rhino.*

CG: *La Espiral Eterna, N-Dimensional, Cenas infantis, Las Seis Cuerdas, Sonant, Lux et Tenebris, Firefox Eins, Tensibillia II*

Original Works: Not significant.

DAMPENED STRINGS – [5/AB + 5/CRG OR PIN]

SONS ÉTOUFFÉS, GHOST NOTES

Video 19 – Dampened Strings

Playing on dampened strings can generate a variety of percussive results, all of them characterized by a strong attack with little or no resonance. Most of them also have identifiable pitches, however subtle they might be, but are predominantly inharmonic. Pitch and resonance are strongly correlated in this broad SF, as the latter derives from the persistent vibration of the strings in the normal patterns, which are also responsible for the pitches. Both the muting and the playing methods admit a great plethora of possibilities, whose combinations unveil a rich world of colors and technical solutions, open for exploration. All hand parts and the whole length of the strings between bridge and nut are available, as well as strumming, plucking, and some percussive techniques.

It is possible to control the dampening to achieve more percussivity or harmonicity, moving the sounds within a continuum from almost no pitch or resonance – and therefore maximum percussivity – to more harmonic spectrums and resonance – minimum percussivity. Some parameters that can be manipulated in the dampening are:

a) Pressure: Optimal muting requires an intermediate pressure, between a very light touch that favors harmonics and multiphonics and maximum pressure, which favors normal pitches. It is important to observe that an extremely low pressure can produce buzzes, especially if the contact happens after the attack of the note.
b) Covered area/strings: a broader covered area or multiple contact points/areas on the same string have more dampening effect. One or several strings may be muted at a time.
c) Dampening hand part/material: Hand parts A-F, with each of their respective hardnesses, can be used, and at varied angles. The softer the material, the more efficient the dampening.
d) Placement: The muting effect is progressively alleviated as one approaches the fixation points of the strings or the more prominent nodal points, in which case harmonics begin to surge.

That means, conversely, that harder dampening materials, focalized at smaller contact points, with corresponding pressure, tend to produce more harmonicity (pitches), as illustrated in Figure 152:

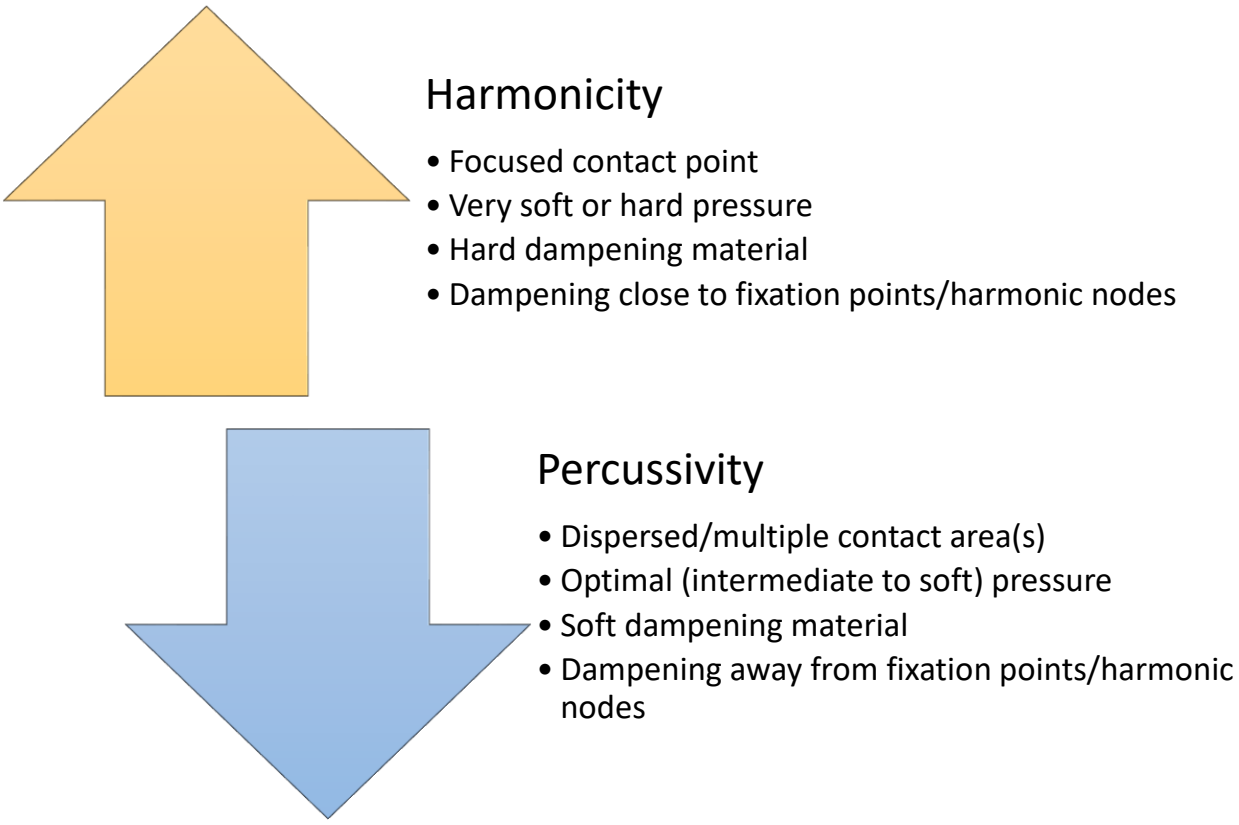


Figure 152: Continuum Harmonicity-Percussivity and related technical parameters.

All hand parts from both hands can be used to mute. A.A is good for individual strings and pairs, leaving others unmuted. A.B can cover everything from 3 to 6 strings, also allowing for control of precisely which strings are to be muted. B.A is ergonomically inappropriate in standard playing position, while B.B and B.C are surprisingly effective to produce more harmonic sounds and even glissandi, especially at the upper register, even more than C.A, and arguably easier to aim at the strings; control of which strings to mute is not so good but it is still possible in some cases. The hard material of C.A and C.B has the potential to produce both good harmonicity and buzzes, C.A being somewhat hard to aim. They offer good control for individualizing the strings. D is very effective for a strong overall dampening, because of its softness and area, demanding little effort; it offers a poorer control of strings or group of strings, however. It works particularly well in lap position. Area E, as well as the side ("blade") of the hand, do not offer the dampening power of D or the precision and harmonicity of A.B. Despite mobilizing the

fingers a little less than **D** – which is good for technical integration and particularly adequate for tapping –, they should be used as a technical relief in specific situations. **Area F** and its vicinities are, of course, the most cumbersome of all, but can be useful as a technical solution in some cases, such as leaving the hands free for percussion in the guitar body, especially in lap position. Table 16 organizes all that information:

Table 16: Hand parts and their dampening characteristics.

Hand Part	Advantages	Disadvantages	Observations
A.A	- Excellent string individualization. - Can achieve good harmonicity - Fingers and hand in an excellent position for plucking and strumming	- Limited multiple-string reach - Dampening power is good but inferior to some other areas	- More difficult with r.h. because of the nails
A.B	- Good string individualization and grouping - Can achieve good harmonicity - Fingers and hand in an excellent position for plucking and strumming	- Dampening power is good but inferior to some other areas	
B.A	-	- Ergonomically impracticable	-
B.B	- String grouping is possible - Excellent harmonicity	- Limited reach* - No string individualization - Fingers tense and in a bad position for plucking	- Using the phalanx between **B.B** and **B.C** produce a more effective dampening at the cost of harmonicity
B.C	- String grouping is possible - Excellent harmonicity	- Limited reach* - No string individualization	- Same as above

	- Fingers in a good position for strumming	- Fingers tense and in a ackward position for plucking	
C.A	- Excellent string individualization. - Can achieve good harmonicity - Fingers and hand in an excellent position for plucking and strumming	- Limited multiple-string reach - Dampening power is inferior to some other areas - Difficult to aim	Buzzes are more effective
C.B	- Good string individualization. - Can achieve good harmonicity - Fingers and hand in an excellent position for plucking and strumming	- Limited multiple-string reach - Dampening power is inferior to some other areas - Difficult to aim	Buzzes are more effective
D	- Excellent dampening	- No string individualization or grouping - Fingers and hand out of position for plucking and strumming	Particularly good in lap position
E	- Good dampening - Fingers and hand unoccupied and ready.	- Difficult for the l.h.	- Particularly practical with r.h.
F (and vicinities)	- Good dampening	- Cumbersome - Takes the hands too far away from normal positioning - Hard to aim	- Good with lap position - Can help in some situations, expanding the reach of the hands

* varies according to the player's hand size.

Having covered dampening in the four dimensions we deemed more relevant (hand part, covered area, pressure, placement), we must now address the playing techniques that

accompany it. They are, as the dampening, multiple, and incite exploration of their vast array of possibilities. A generic description follows, along with highlights of some usual applications.

Rasgueados: Most *rasgueado* techniques are effective, from the various rhythmic patterns and fingerings to individual strummings, covering all the strings or different areas of the string set. Individual strummings on the trebles with C.B and, generally, *i* ("hi-hats" – DAWES, 2017), are fairly common, as is their inverted version, strumming the basses with C.B area of *p*. Even though many *rasgueados* include closing (inward) finger movements that use a mixture of C.A and A.A (nail and flesh), the defining characteristic of this technique is the sound that C.B produces when it hits the strings. It was thoroughly explored in Tellur, a piece that is a truly comprehensive treatise on percussive *rasgueado*. Some of its specific techniques will be shown ahead, under "Variations".

It is important to note that, while it is possible to use *rasgueado* together with r.h. muting, that greatly limits the movements of that hand.

Punteado: Most plucking techniques are also available in muted strings, from single free and rest strokes to tremolos, arpeggios, and chords. The ghost notes (muted) in the middle of melodic passages are very common and constitute an early example of *micro-alternation* in guitar practice, as well as many traditional *pizzicato* techniques, when used in percussive contexts. We highlight Sor's l.h. *pizzicato* (stopping the string exactly on the fret itself) and muting with *c* while playing with the other fingers, as seen for example in Kampela's *Percussive Studie n. 2.*

Plucking is also limited if executed when the r.h. is muting, which is normally done by the side of area D opposed to the thumb, being effective mostly with *p* and *i* in these situations.

Percussive: Some percussive techniques, such as the Bártok *pizzicato*, bass snaps or slaps, tamboras, and percussive tapping are also functional in damped strings.

All these variables for dampened playing can be combined in many ways. For practical purposes, it is always good to have in mind that:

- it is possible, however more difficult, to play and dampen with the r.h.;

- one should be aware of nodal points if harmonics are to be avoided;

- **constant pressure control** is important to keep timbre consistency and to avoid unintended pitches, harmonics, or multiphonics – these last ones can surge in absolutely any part of the string if pressure and damped area are not well controlled.

- **a certain degree of pitch will always be heard**, except in the most radical mutings (those with both hands, possible with area **D** of the l.h.).

Many kinds of dampenings described here are treated as *pizzicatos* in the literature, in the context of a more melodic-harmonic approach. We refer the reader to the extended discussions on the subject found in the literature, for example, in Schneider (2015, p. 185-191), Josel and Tsao (2014, p. 80-82), Almeida (2009, p. 28-30), Inda (1984, p. 22-24), Câmara (1999, p.22-23 and 122-123), and Titre (2013, p. 55-57), in addition to those by the classical authors, such as Sor, Pujol, and Carlevaro.

Notation: The use of "x" on the noteheads or stems is relatively common (Fig. 153 to 157). For undetermined superhigh pitches, standard notation is with up arrows (Fig. 158).

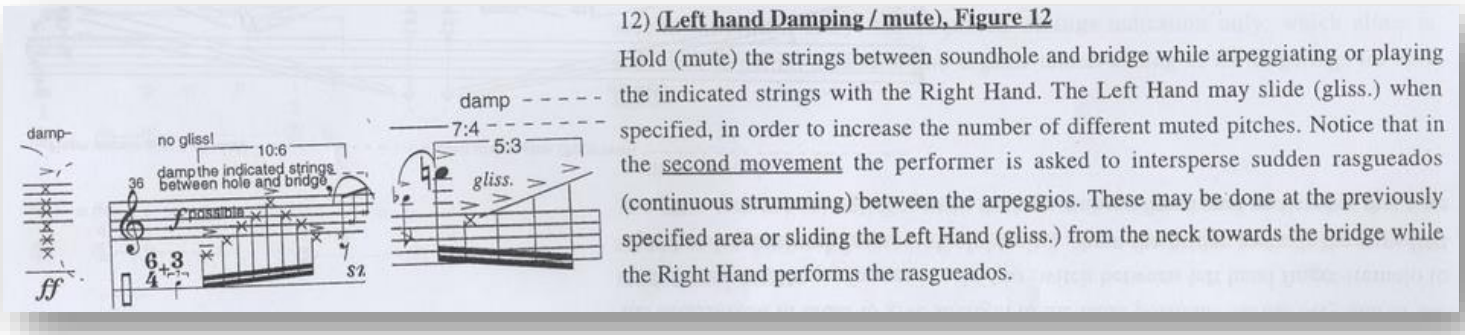


Figure 153: Muted plucked sounds in *Percussive Study n. 2* ("Symbols/explanations").

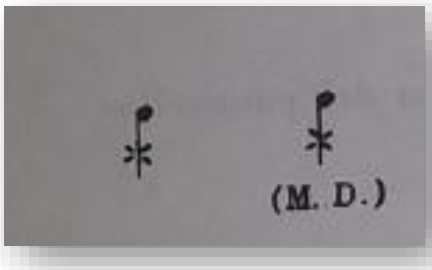


Figure 154: Notation of muted notes in *Las Seis Cuerdas* ("Simbologia Tecnica").

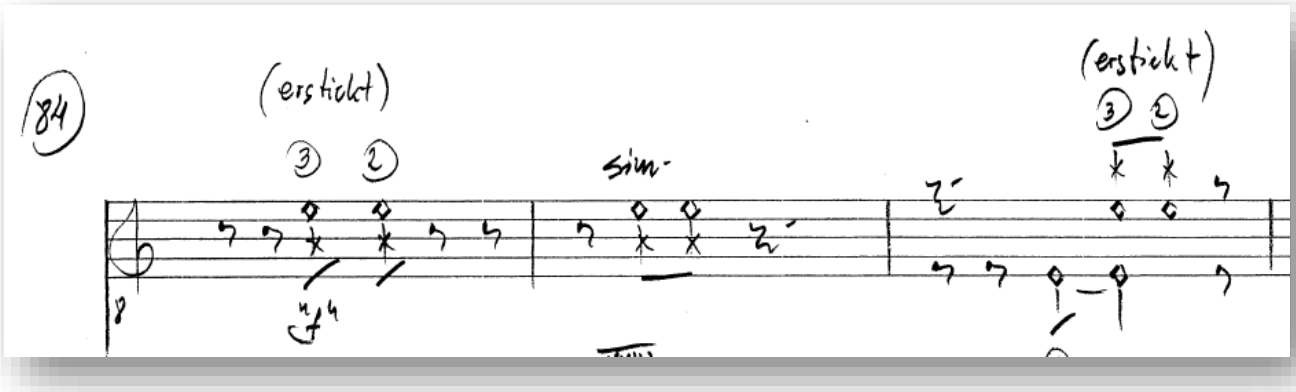


Figure 155: Notation of muted notes ("erstickt", suffocated) in *Un Mismo Mí*, bars 84.

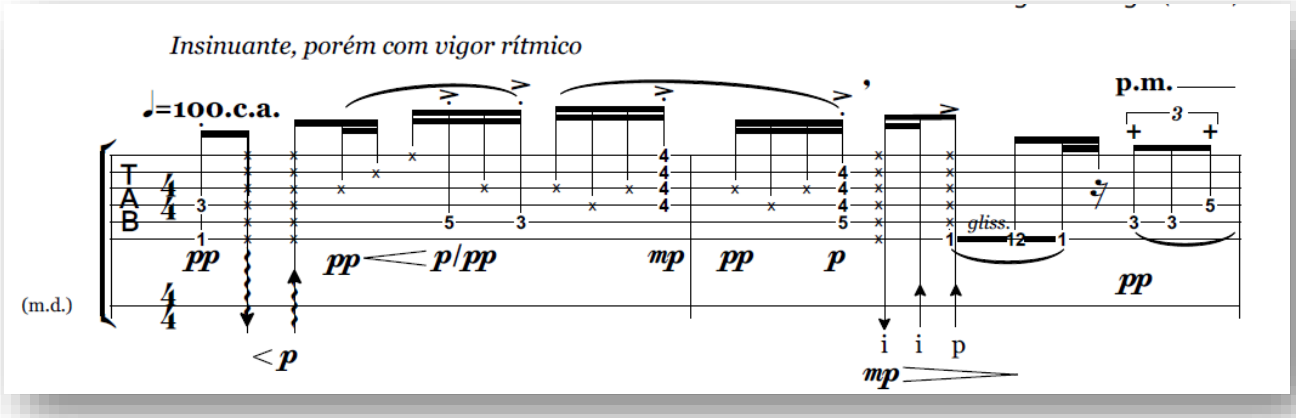


Figure 156: *Veneno*, bars 1-2. Written in tablature, it specifies only on which string the muted notes should be played; these are indicated with an X notehead.

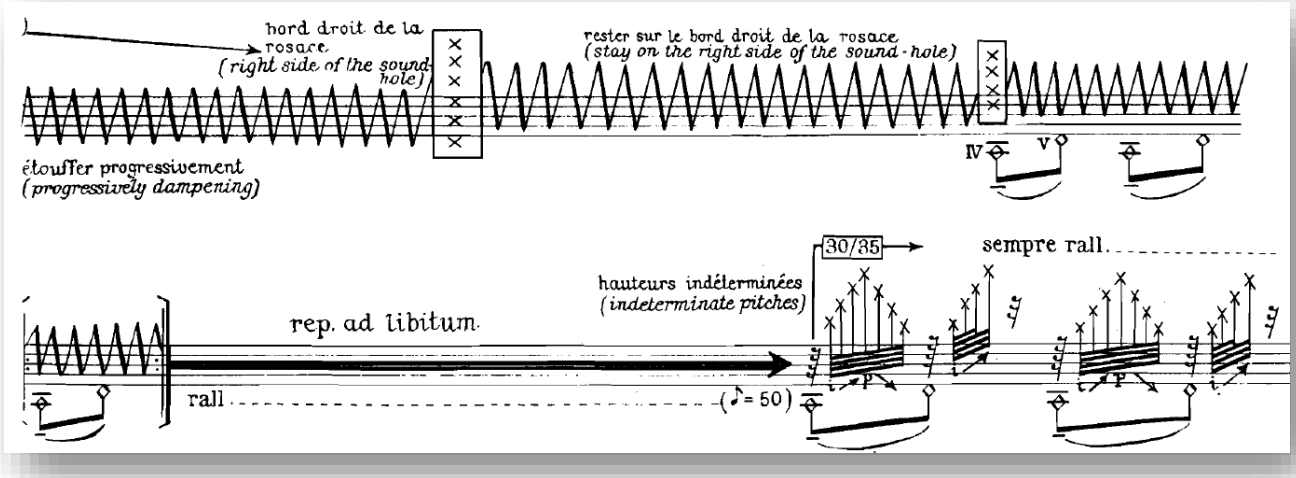


Figure 157: *Tellur*, p. 3, systems 5-6. The vertical zigzag lines represent r.h. *rasgueado*, as well as the X notes, which are to be played with *C.B* with determined rhythms.

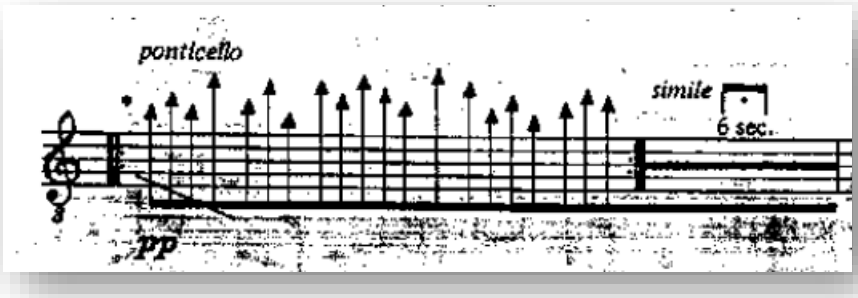


Figure 158: Sonata op. 47, p. 5, excerpt from the last system showing super-high notes notation with up arrows.

Variations:

Muting and playing with the r.h.: As explained, it is possible, at the price of restricted movements, to muffle and pluck or strum the string(s) with the r.h.

One major SF within this group is dampening the string with a finger and plucking with the others. Two examples are Kampela's *Percussive Study n.2*, in which he dampens the first string with *c* while the other fingers play an irregular tremolo, and Murray's *Estudo n. 1, "… sobre arpejos e notas mudas…"* (VASCONCELLOS, 2013), which intersperses notes played with *i* while damped by *p*.

It is also possible to use tappings, such as in *N-Dimensional*, in which the r.h. dampens with E while both hands play random tappings in defined regions of the fretboard.

Rasgueado is also effective in diverse ways, such as the hi-hat (damping with the side of area D of the r.h. and strumming the trebles with *i*) and the *chasquido:*

> *Chasquido*: One particular type of *chasquido*, a SF found in folklore guitar music from South-America (more specifically, Paraguay, Uruguay, Argentina, and the south of Brazil), consists of strumming the strings with the *imac* split, followed by a quick muting with a split *p* in the same movement. The result is an accented percussive attack with no more than a quick remembrance of the chord defined by the l.h., and, occasionally, subtle, aleatory harmonics left sounding after the attack. The muting might include an occasional *snap.*

Muted Tapping: The muting can be performed with either hand or both. Auxiliary tones (from the Bi-Tones) ring audibly (unless also muted) and transient sounds (noise at the attack) grow in importance.

Super-high notes[153]: Notes produced after the end of the fretboard (area 5.2). There, the boundaries between stopping the notes and dampening are blurred. It is still possible to control, however, the level of harmonicity of the sound: focalized contact points – for example, with the nails, or area B.B – with more pressure produce more definite pitches. A fairly common resource exploits this possibility, aiming at the subtle pitches to be found in the trebles, normally left undetermined and still with a pronounced percussive character.

Tellur superhigh *rasgueado* notes: Tellur inaugurates some interesting percussive *rasgueado* techniques. In search of the super-high components of the vibration of the strings, these are muted, so the lower modes are not heard. Two of these PRs, in particular, deserve attention: playing *c,a,m,i* on the muted 6th string (the sounding pitches can, optionally, be determined) and using that same *rasgueado* pattern to play on several strings muted with the l.h. (preferably with area D), moving the r.h. between the soundhole and the bridge to control timbre. In both cases, the higher partials are especially audible because of the schokc of the nails (C.B) against the strings, but the overall effect is still predominantly percussive.

Bártok: Seen under 5.2/A.Apin

Güiro: Similar to what can be done in area 5.4, a guiro-like effect can be obtained when both hands dampen the strings and an arpeggio is played between them.

Examples in the literature:

FG: *The Impossible, Boogie Shred.*

[153] "high" refers more to the technical placement of the fingers than to pitch, although many, or most of those notes, go beyond the basic range of the instrument.

CG: *N-Dimensional*, *La Espiral Eterna, Sonata op. 47, Si le Jour paraît... , Percussion Study n. 2, Cenas Infanatis, Tellur, Veneno, Malambo* (from *Cuatro Piezas Latino-americanas)*, *Estudo n. 1* "… sobre arpejos e notas mudas…".

Original Works: *Laputa Variations, Escutorium*.

SQUEAK – [2 OR 3/A.AAR]

Video 20: *Squeak*

This Family occurs in string instruments in general and the guitar in particular. It appears in different contexts, from Piazzola's tango group to David Beldford's *You Asked for it* and *Nurse's song with Elephants* (SCHNEDER, 2015, p. 41 and 411-412). The oldest occurrence we could establish is located in the *Gaucho*[154] musical tradition (BASINSKI, 1994, p. 17). It consists of rubbing/sliding the fingertips on the surface of areas 2 or 3 with some degree of friction in a continuous (not bouncing) movement to produce a high-pitched "squeak". This squeak "glisses" continually up and down and has a complex spectrum. It can achieve a kind of continuity even despite the common small interruptions to which it is subject, due to its difficult technical execution (it is possible, however, to obtain a sound with more inner consistency, depending on a stable grip on the rubbed surface).

Dynamics can be controlled via pressure or rubbing area – more fingers or the use of areas D and E produce a stronger sound. Pitch can be controlled with speed. Timbre varies according to speed, rubbing material, rubbed area, and the number of contact points. There is a very broad range of possible durations, however often subject to small interruptions. It is a willful SF, difficult to control, that is rarely performed without minor deviations.

It functions equally well with both hands.

[154] The *gaucho* (*gaúcho*, in its Brazilian form) is a cultural tradition particular to a large area in South America around the *la Plata* river, encompassing large portions of Argentina, Paraguay, Uruguay and the south of Brazil. It dates back to colonial times (XVIII-XIX centuries). Their music inspired the music and many PRs in the canonic *Sonata op. 47*.

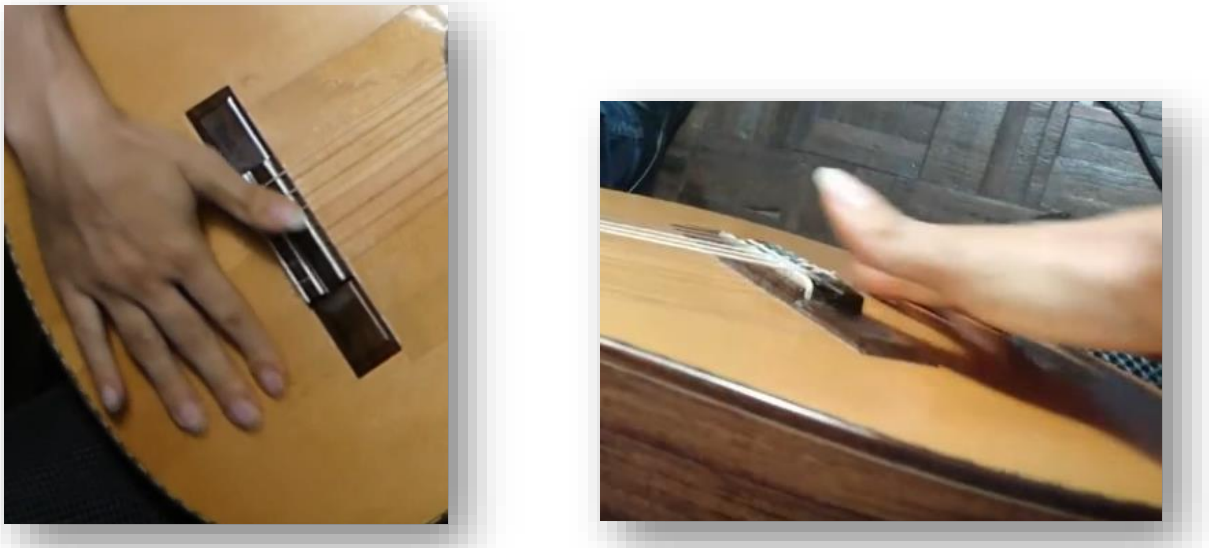


Figure 159: Squeak

Notation: A dedicated character is recommended, and notation should happen on the percussive staff if it exists. As rhythmic writing is generally unpractical, the use of a duration line is recommended – see figures 68, 160, and 161.

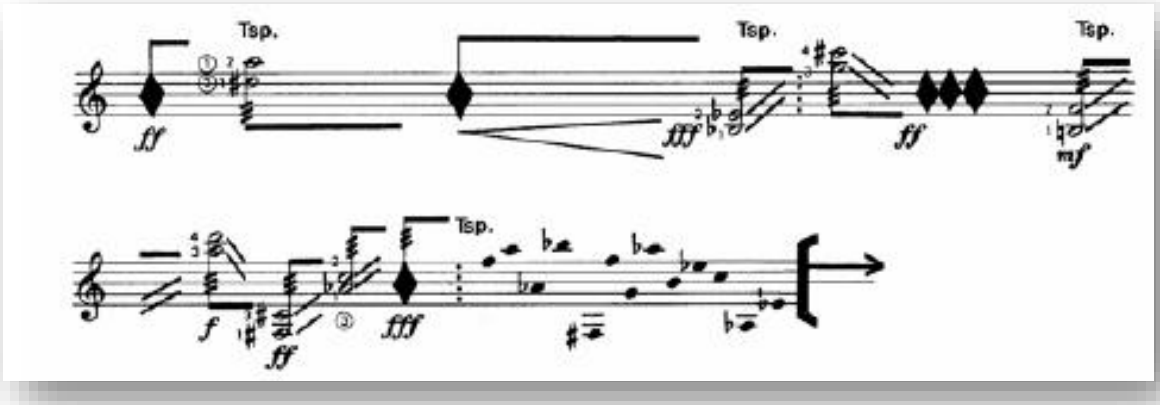


Figure 160: *You asked for it*, showing the diamond-shaped notation for the squeak and the duration line.

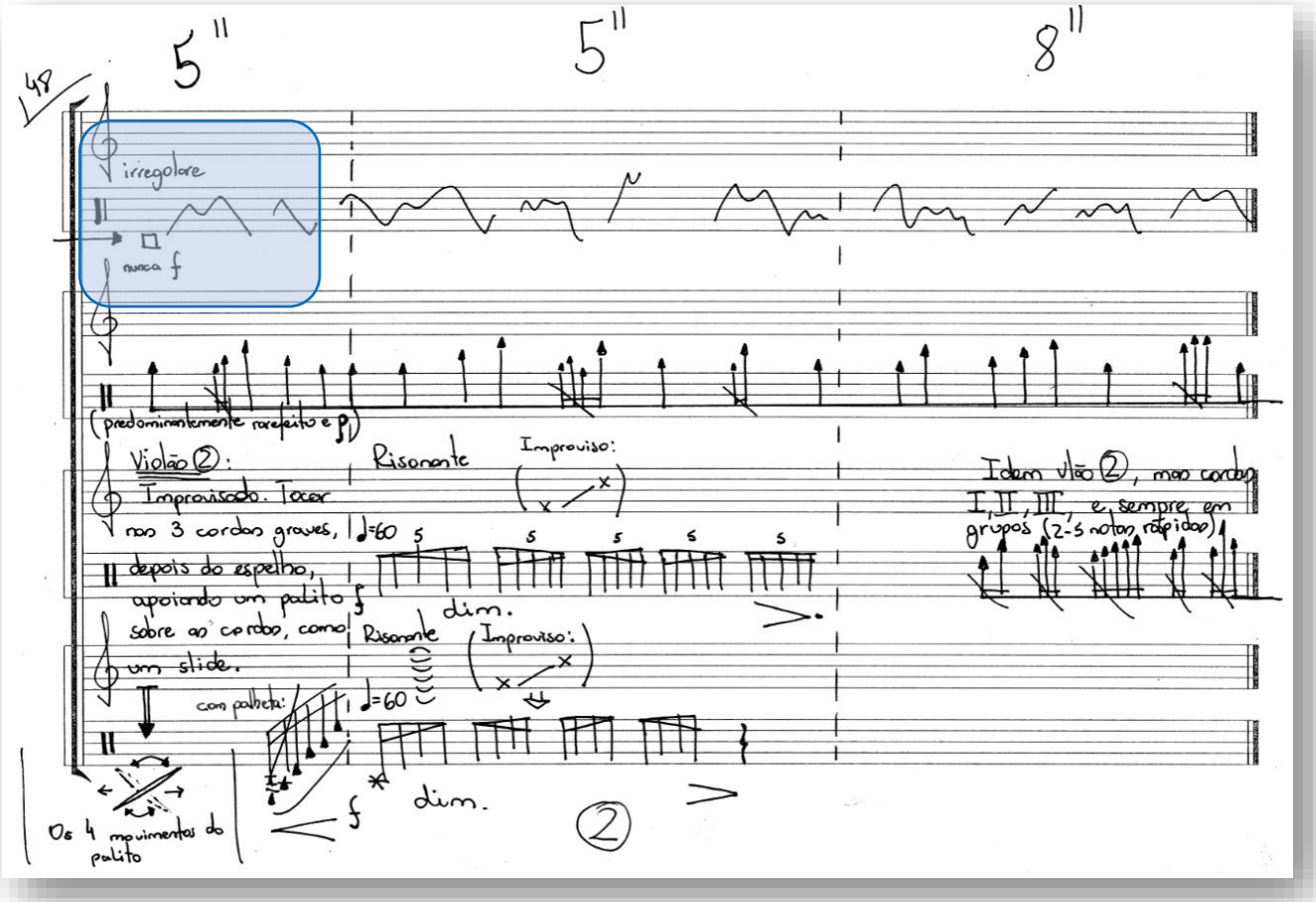


Figure 161: *Cenas Infantis*, second part, bars 48-50. Notation for the continual squeaking at guitar 1 (in blue), using irregular duration lines on the percussive staff.

Variations:

Multiple fingers: It is possible to use from one to five fingers, changing timbre and intensity. They also help significantly in keeping sound continuity.

Other hand parts: Hand parts **B** (the phalanx, not the joint), **D**, and **E** can also be used, with progressively higher intensity and different timbre.

Continuous/discrete: Welding alternating movements with both hands can establish an almost continuous sound; completely avoiding interruptions for a long time is almost impossible, due to the nature of the Family. Discrete movements are easier to control when they are shorter, but not too much: it generally takes the hand a fraction of second to create the necessary friction.

Elephant Trumpeting: This variation by David Bedford requires a wet finger, and consists of a continuous sound somewhat resembling that of a trumpeting elephant.

Zigzag: a non-linear, zigzag movement produces an effect similar to vibrato. Rapidly varying the pressure at the fingertips by flexing the **B.A** joints without losing contact with the surface can also achieve a similar result.

Tremolo: A trembling hand movement with actual interruptions can result in a tremolo. It requires, however, a very sure grip on the surface.

Examples in the literature:

CG: *N-Dimensional*, *Cenas Infanatis, As Entranhas da Terra, You Asked for it, Nurse's song with Elephants.*

Original Works: *Laputa Variations, Escutorium*.

SIDE CLAP – [4.5(A)/D(ME)GP]

LEFT SIDE SNARE (DAWES, 2018, p.5)

Video 21: *Side Clap*

This PR is very practical for the l.h., because it does not demand precision, leaves the fingers ready for integration with other TGs, and produces a loud sound. It consists of hitting the side of the guitar in part **A** (or **B**, when in inverted l.h. position) with the palm, creating a clapped sound. The movement allows for quick departure and return from/to the fretboard, especially in positions **V** to **X** and departing from fingers **1** or **2**; it is more difficult to perform when the l.h. is playing after the 12th fret. Additionally, it is possible to maximize the effect by snapping the sound. That is made by forming an inner air chamber with the palm which resonates the attack, making it more explosive and brighter. To achieve that, one has to hit with the right spot and that is learned through exploration; it does not involve curving or tensing the hand in any way. Doing it raises the precision demands of this PR.

It is widely used in FG to emulate snare drums, be it in the classic pop beat (beats 2 and 4), as seen in *Drifting* and *Boogie Shred*, or in other more complex structures, such as *Hunter's Moon.*

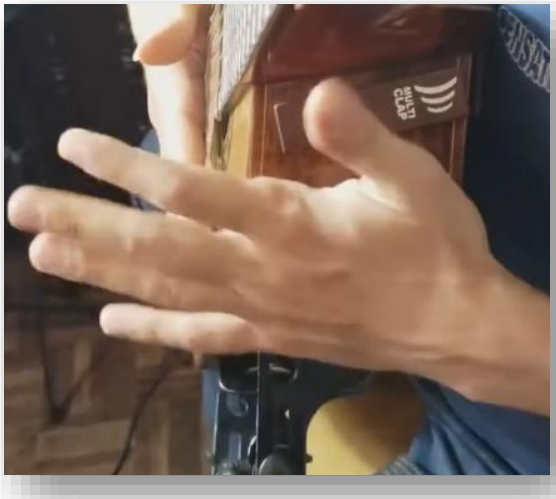


Figure 162: Side clap

Notation: This PR demands no special notational care, being notated as standard percussion on the guitar "box" (percussive staff recommended), with an indication for the palm via text or dedicated character.

Variations:

With or without the "pop" of the inner air chamber of the palm.

Guitar parts A or B.

With the r.h.: In areas 4.2 and 4.3 it is possible to comfortably use the r.h. Its use in area 4.1 can produce an especially explosive effect, at a higher technical cost. All these uses take the r.h. significantly out of standard position.

Examples in the literature:

FG: *Boogie shred, Drifting, Hunter's Moon*.
Original Works: *As Entranhas da Terra, Escutorium, Laputa Variations.*

C - Developed PR/SF

Next follows a list of PRs/SFs created or reworked/developed in the context of artistic research. Many PRs developed in the research were later found out to have appeared first elsewhere in the form of variations and were accordingly described in the previous entries.

Notation: There are, of course, no conventions here. We make general recommendations extrapolated from existing notational principles.

Introductory practice: We offer a suggestion for the initial development of playing skills of some particularly difficult PR.

Pandeiro Roll – [2.1<->2.3(A<->B)/A.Aar]

RULO, TREMOLO

Video 22: *Pandeiro* Roll

This is an adaptation of a technique from the Brazilian *pandeiro*[155] . It consists of dragging one or more fingers (or, possibly, other hand parts) through the surface of areas 2 or 3, in a way that produces a series of fast attacks along the trajectory, as it hits the wood, is locked, bounces, and comes back, successively.

This SF brings out the resonance of its guitar area and therefore gets progressively louder and fuller as it approaches **2.1** or **3.1**. The angle at which the finger attacks the surface is also important: it can go from around 30 to almost 90 degrees, changing color and resonance. Dynamics can be controlled through the speed of the movement and its pressure, but both variables alter timbral characteristics and the speed of the tremolo as well.

To execute it, there is an initial impulse followed by the slightest pressure of the finger on the surface, and control of speed and trajectory. The surface must be clean and smooth; French polished guitars, with shellac, are less practical. Wetting the tip of the finger, a traditional *pandeiro* trick, helps enormously but requires time and displacement of the hand; it can also

[155] Tambourine.

distort the *roll,* making it an elephant squeak (see "Squeak" entry). The r.h. is less fit for the roll, because the nails limit the angle of the fingers, but it can still be done.

Many Brazilian *pandeiristas* can sustain the roll indefinitely; that is a somewhat standard technique. As it was not possible to confirm its feasibility on the guitar, it remains, as of yet, only a possibility.

Notation: The same notation used for areas 2 or 3 in the score should be used here, with a standard figure indicating duration, and traditional tremolo slashes on the stems. The trajectory of the movement, if important, can be suggested with accompanying lines, with textual indications (such as "2.1", "3.2") marking reference points. Other parameters (speed, angle) can, if necessary, be given textually. Dynamics can use standard notation.

In *Amadeirado* (2018), Bruno Avendanha notates the roll on the percussive staff, with proper duration, differentiating the roll with a *tr* (trill) indication, as seen in Fig. 163:

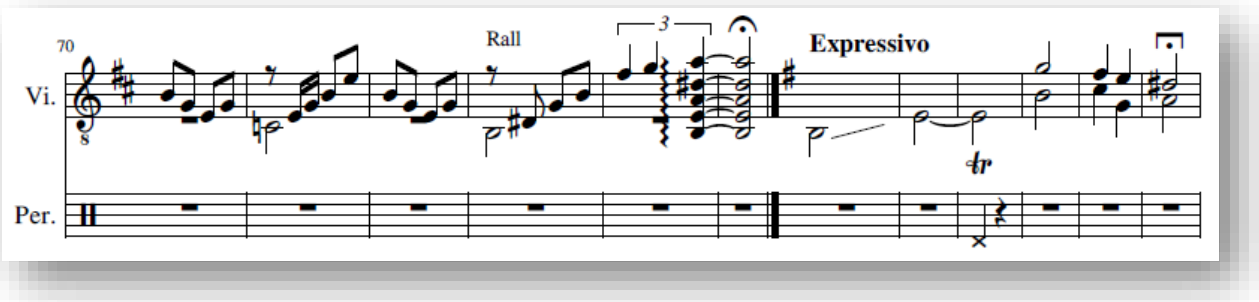


Figure 163: Amadeirado, bars 70-80, showing a pandeiro roll in the soundboard notated on a dedicated percussive staff with a trill indication.

Figure 164: Pandeiro roll.

EMERGENCY NECK TAP – [6(B)/C.B(PAMIC-ME)GP]

Video 23: Emergency Neck Tap

Video 23B: *Emergency Neck Tap in context*

This resource was developed in *Laputa Variations* as a solution for a practical unpitched percussive sound in the context of a texture mixing harmonics and notes at area **5.4** (see Figure 118 under "Exploration of sub-area **5.4**"). It consists of hitting part **B** of area **6** – the side of the neck facing the ground – with the back of the nail(s) of any available finger(s). Most of the time, the wood hit is actually that of the fretboard, not the neck. The sound is a discreet but clear mid-range tap.

It is very practical to tap when the r.h. is busy because it enables the l.h. to hold stopped notes up to three fingers – that is highly dependant on the exact context. When fingers **1**/**2** are holding, the use of *p* is the best option; when stopping notes with finger **4**, it is better to tap with *i* or *m*; finger **3** depends on the situation. Combinations are possible and variable, obeying the following principle: either **1** or **4** must be free. In the first case, **1** is used to tap; when **4** is free, it is possible – although sometimes unpractical – to tap with *p*. Therefore, the following combinations are excluded: **1-4**, **1-2-4**, **1-3-4**.

The dynamic range is *ppp* – *mp*. There is not much timbre or pitch control. The duration is very short.

This SF does **not** work optimally while stopping the basses.

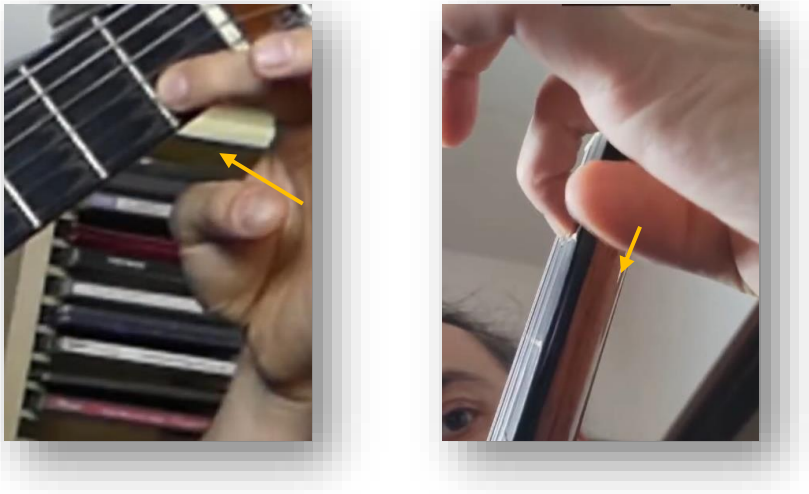


Figure 165: Emergency Neck Tap.

Notation: This SF uses whatever standard notation is established for the neck. After the description on the instruction sheet, it suffices to indicate the finger, and the guitarist will contextually understand the instructions, as seen in Fig. 118.

Introductory practice:

Stopping a note in the first string at the middle of the neck with finger **1**, experiment with all the possibilities of tapping the side of the guitar neck facing down. Then play them, repeating 4 times each, even the fingers that do not produce a good sound – that strengthens the hand and enhances sensibility and control. Then repeat the process with fingers **2**, **3,** and **4**.

The tap must be as audible as possible, and the movements well separated from each other, to give the hand resting time. Pay attention to relaxation at all times. Variations:

a) The same, but in positions all along the guitar neck.

b) Using other strings, going as far up as possible. As a rule, the basses should be only sporadically exercised, since their usage is restricted.

c) Different finger combinations.

BONE TO BONE FINGER TAP – [6.3(A-NUT)/A.B(A DISTAL KNUCKLE -ME)GP]

Video 24: *Bone to Bone Fingertap*

This PR was created for variations in the performance of *Hunter's Moon.* For the construction of a more subtle texture, we discovered that tapping the guitar neck at the nut's height, or the nut itself – which is usually made of bone, hence the name of the PR -, with the bony area of the distal knuckle of the ring finger produces a penetrating, well defined, and mid to high pitched sound. It is short-lived but resonant.

The dynamic range is *pp-mf*. Because it is so specific, no variations other than the strength of the hit are possible[156].

The PR is applied preferentially in inverted l.h. position.

Notation: Normal notation for the neck, and occasionally this hand part, applies. A small textual note can be made to ensure the exact outcome, indicating all elements of playing.

Introductory practice:

Explore the sounds given by the arm-nut junction at the side of the neck until you find the right spot of your finger and the guitar, the ones which grant a more resonant and well-defined sound, almost like a "pop". Then, slowly repeat that attack, always focusing the sensation and relating it to your visual input, until you stop missing the spots. Then, alternate that with some easy PRs of your preference. When that is mastered, create small sequences of 3-5 percussive

[156] An exception would be changing the finger, which is disadvantageous for the loss of the optimal leverage the ring finger offers while rotating the hand.

hits, with only one Bone to Bone tap, so that you develop the ability to find the sound in different contexts. Then apply the PR in a musical context where you think it could be useful.

Figure 166: Finger *a* of the l.h., aiming at its phalanx bone, aims at the bone of the Nut.

EXTENDED *VELLUTATOS*

FINGERTIP OR FLESH TREMOLO (SCHNEIDER, 2015, p. 178)

Video 25: Extended Vellutatos

The *vellutato* is not an inherently percussive technique, but it can become one under certain conditions. The two possibilities presented here were casually discovered in compositional exploration for *Laputa Variations* but were already possible to be extrapolated from the content of "Dampened strings" and "Exploration of area **5.4**". We decided to make them explicit, since they are quite effective but not obvious.

A *Vellutato* is essentially a kind of *rasgueado* with the flesh of the fingers, very subtle, and that requires energetic movements to be made audible. The r.h. must be laid parallel to the strings, which are then rapidly brushed with a finger. This brushing alternates up and down movements of the forearm that originate in the elbow. In our experience, fingers *a* or especially *m* offer the

best balance to the hand. An optimal effect is achieved close to the middle of the strings (between fixation points), where their laxer state produces a louder sound.

It was originally conceived to be used with the fingertips, but that can be extended to body parts **B.B**, **B.C**, and **C.B**, in which cases not only one finger, but the whole *imac* split is mobilized.

Variations:

Muted - [**A.A**, **B.B**, **B.C**, and **C.B**]

Any of the above-described *vellutatos* are usable with the strings dampened, instead of a sounding chord. That produces a continuous tremolo with mostly unharmonic components.

All effects seen under "Dampened Strings" apply. That means, especially, that, unless both hands are used to mute (l.h. plus area **E** of r.h.), some degree of pitch will be heard, and these can be manipulated through repositioning the l.h.

Pressure and placement with both hands, along with the speed of the *vellutato,* can change dynamics (*ppp-mp)* and timbre. We recommend thorough experimentation to get to know the different outcomes.

Notation: Standard *vellutato* notation, which in general resembles that of a tremolo, is recommended, along with standard "X" noteheads for dampened strings and textual notes or symbols indicating the hand part to be used. Additional information, such as pressure, speed, and placement, can be given according to context.

Vellutato **in area *5.4*** **(see video 09)**

This technique produces a subtle harmonic microtonal chord (see "Exploration of area **5.4**"). Because of the distribution of the strings, it is difficult to include the external ones; the 4 middle strings will, in any case, sound louder. That can be corrected to some extent by placing the axis of the movement parallel and close to the nut, using the nut itself to stabilize the hand. That, however, situates the player in a difficult trade-off between a) optimal stabilization + string coverage and b) reaching the looser areas of the strings + louder responsiveness. This technique is normally more effective and safe with hand area **A.A**, and is somewhat awkward with both hands – in our experience, despite the difficult reach, it is less so with the r.h.. Dynamics range from *ppp* to a soft *mp*. Timbre can be varied by moving the technique axis along the strings. Instead of the

middle finger, the **side of the right thumb** can be used, achieving a more harmonic effect thanks to a small contact with the nail (to retain the *vellutato* character, one must preserve the prevalence of flesh).

Notation: Standard vellutato plus area **5.4** notation. Details such as timbre, placement, and other technicalities are best left to the discretion of the player.

EXTENDED TAMBORAS

A natural extrapolation of some propositions in this work is extending the *tamboras* to lengths of string other than that between nut and bridge. In a normal guitar, area **5.1** offers the *tambora* nothing different from area **1** and is therefore excluded; area **5.4** (see video 09), however, is quite effective, along with the string segment between bridge and tailpiece, for those guitars equipped with it. All that was discussed in the respective entries still apply, with the following additional considerations:

In both cases, the strings are stiff and demand energetic movements to resound; the rebound of the striking finger becomes even more crucial. The attack adds a mid (headstock) or low (tailpiece) component to the exploding sound of the strings. In area **5.4** it is hard to get all the strings to sound, but changing which string areas to cover gives the performer some sound control. Tremolos sound more like a drum roll with distant chimes.

Notation: The tapped area should be properly specified; for area **5.4**, see "notation" under "Exploration of area **5.4**". For the tailpiece string segments, we recommend similar procedures. The *tambora* action should be indicated textually or with *auxiliary characters*.

DESCRIPTION OF SPECIAL PERCUSSIVE TECHNIQUES

SPLIT HAND

Video 26: *Split hand*

This consists of dividing the hand into sections. HIRSCHELMAN (2011, p. 83) defines this "common" technique as a split of one hand "in two separate divisions, each with its own attack and timbre qualities". He goes on to quote traditional splits from hand percussion players (*p\imac* for conga, *i\mac* for tabla) but limits the splitting to two parts. In our experience, the hand can be divided into three parts (as in the *p\imac\E* from the Brazilian *pandeiro* technique) or up to 4 parts, following the natural muscular groupings of hand and fingers (*p \i \mac (ac) \E*).

It is important to also emphasize the technical-motor individuality of these parts, which allow for a wide range of applications: it greatly increases the speed of the hand, allows for many simultaneous APR, enables several TG integrations, diversifies the available timbral palette for a given guitar area in a given musical situation, and makes it possible to reach different guitar areas without changing hand position.

Integration and simultaneity: Hand part **E** is especially effective in splits whose goal is TG integration, as discussed earlier, as well as in striking different guitar areas.

The simultaneity of actions within the domain of one hand being particularly difficult, it can be very helpful to organize the hand in well-defined splits. Common uses include flamenco *golpes* on the soundboard combined with *rasgueado* chords (the thumb strikes the wood or the strings, while the fingers do the opposite); *snaps* combined with melodic notes or plucked/strummed chords; **2.1/Egp** combined with notes (especially basses) or plucked/strummed chords.

MULTIPLE FINGER TAPS (MULTITAPS)

Benefiting from the number and arrangement of fingers, it is possible to play very fast acciacaturas (two, three, four, or five taps) with little technical effort. These techniques work better in the *(p=>) c =>a =>m =>i (=>p)* direction. The most effective and common occurrences

are *mip* and *ami*. Despite being more commonly used in areas **2**, **4**, and **5**, this technique can be applied in all of them. See video 01, last example.

TREMOLOS

There are several possible effective (fast, strong, even) tremolo techniques. All of them can be successfully applied in all 7 guitar areas.

The *finger tremolo* (see **video 02**) is a development of the mentioned multiple-tap technique: the formula is repeated for as long as desired in a continuous chain. Alternating 2 (*m,i/2,1* or *a,i/3,1*) or 3 (*p,m,i/p,2,1* or *a,m,i/3,2,1*) fingers are the most effective combinations. Finger grouping is also possible and effective: *table* players can achieve very fast speeds with the classic *i\mac* hand split. There is a relatively broad dynamic control limited to the strength of individual fingers, especially when evenness is expected (approx. *f,* varying with the guitar area); the strongest range requires considerable effort to sustain and the softest is hard to control. This tremolo can be sustained for long periods, but longer-than-10-sec tremolos require special training and can leave the fingers extenuated, especially at *f* dynamics; an immediate change to plucking could be problematic. At moderate dynamics and with proper training, it is possible to prolong it for an indefinite time. This tremolo offers the best result/effort relation in moderately soft dynamics and not-so-fast speeds.

The *forearm* or *hand tremolo* (see **video 01**) uses the powerful rotation of the forearm to make the best out of the "opposing thumb" disposition of the fingers, alternating fast strikes with *p* and any combination of the other fingers; it is, therefore, a *split hand* technique. It can generate a stronger tremolo than the fingers alone, and the control is much easier in soft dynamics; however, sustaining it for long periods (over 10 sec.) in strong dynamics is still very taxing. It is the fastest of the three types of tremolo. The rotation movement has an axis located approximately between *i* and *m,* which means that these fingers are best left "floating" to balance the hand, while *a* and *c* get more leverage. Common combinations include *p* against *ma* (good dynamic balance, slightly awkward position), *ac* (less dynamically even but with optimal hand stability), *mac* (more power at the cost of dynamic balance). It can be performed by the r.h. over the strings, leaving it in a close position to and from plucking.

The *two hands tremolo* (see **video 01**) is achieved by the alternation of actions between hands. Its main advantage is the greater independence (compared to fingers on split divisions in one

hand) and greater area coverage, enabling for broader timbre compositions; its disadvantage is occupying both hands. It is fit to be used with any one-hand technique, from **E** or **B** strikes to fingers or split divisions. It offers the biggest strength and stamina of all tremolos, limited by the structural resistance of the guitar/guitar part. It is possible to combine it with simultaneous or alternating *finger* and/or *pulse tremolos*; two very effective combinations are ***mi21*** and ***ami321***, which can reach very high speeds and good intensity while being sustained for long periods; alternatively, ***m2i1*** or ***a3m2i1*** grant more recovery time for the individual hands, allowing for a stronger sustained tremolo, albeit slightly slower.

The *pandeiro roll*, which is a kind of tremolo, was explained in the entry "Developed PRs/SFs".

DEADSTROKE

Video 27: *Deadstroke*

Very similar to its use on percussion instruments, it consists of letting the part of the body used to strike rest upon, or press upon, the guitar area activated. This dampens the vibration of the area, diminishing the duration of the sound and slightly changing its timbre. Differently from its percussion origins, however, it tends not to be so effective in the guitar, with the obvious exception of the strings.

Figure 167: Deadstroke used in a thumb tap on area *2.1*.

DOUBLE THUMB STRIKE

Video 28: *Double thumb strike*

A technique that is also used in the other TGs, the double strike with the thumb is powered by the strong forearm rotation movement, rendering it strong and agile. The thumb takes

advantage of both the forward and backward movement of the rotation, performing a stroke on each. Note that the backstroke necessarily takes place with part C.B. It is used, for example, in *Hunter's Moon*, where two hits on the soundhole area are associated with *Rasgueos*. The technique can conceivably be employed on other guitar areas as well.

TABLA I-SUPERSTRIKE

Video 29: *Tabla* i-*superstrike*

An accent executed through a combination of forearm rotation + finger movements with a fine control to employ the most effective percussive spot on area A.B of the *i* finger (generally somewhere around the distal knuckle), producing an explosive sound.

Figure 168: Tabla i-superstrike.

PETELECO

Another accent, in which the tapping finger (*imac*) is held with the thumb and then released, hitting the guitar with the back of the nails (C.B area). That movement uses the extensors of the fingers.

A variation (taken from Zarb[157] technique) is holding the ring finger with the thumb, releasing it so that it hits the wood with its A.B part in a closing, inward movement. That uses the same muscle groups as plucking.

[157] A hand percussion instrument, used by Georges Aperguis in his *Corps á Corps*, from where this technique is taken.

B.C(P)

It is possible to use area **B.C** of both thumbs to execute strikes with the **B** area when the other fingers are not available. While the position of the finger is not comfortable, it is effective and even enables forearm rotation tremolos with the characteristic sonority of hand-part **B**.

WELDING

Video 30: *welding*

This technique is borrowed from orchestration techniques of extending and transitioning sounds. It enables continuous sounds by merging the movement of one hand with that of the other without interruption. That happens most of the time in the opposite direction. On areas **2** or **3** it is possible to assign to each hand a specific area (**A** or **B**), so that they have more freedom of movement.

To do it, it is necessary to begin the movement of the coming hand a little before the end of the previous one, to ensure a smooth transition. It can applied to most **ar** actions (such as Soundboard Rub or String Rub) and tends to make both hands unavailable for almost anything else. A symbol similar to that of Figure 169 can be used in the score to indicate welding.

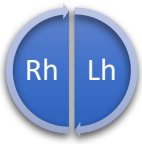


Figure 169: Diagram of hand flux in welding and notational recommendation.

Figure 170: Welding

SIMULTANEITIES AND SEQUENCES

COMPOSITE PRS - CPRS

Composite Resources are those that require two different actions from the player, generally one with each hand, to produce a single sound result. Commonly, one of the hands modulates timbre or frequency, while the other provides the energy for the sound, very similarly to what happens in traditional *punteado/rasgueado* playing. They differ from two simultaneous PRs by the fact that these produce two separately identifiable sounds, while in the CPR each hand/action has a different function but within the same PR.

The CPRs are written preferably with two complete code lines joined by a "+", but without spaces to signal their interdependence.

Examples of CPR are dampened notes, Kampela's off-string buzz, crossed strings, bi-tones.

PR MIXTURE - MPR

Any combination of different PRs that generates a perceptual aggregate (that is, is perceived as one sound) can be considered a PR Mixture. The attribution of this label will often be context-dependant. It requires at least two different hand parts, even when used in the same movement (action) and on the same guitar area. APRs (below) are an example of MPR, but mixtures can happen with PRs from different hands or even different guitars. The focus here is the sound, how it is perceived, technique being irrelevant. The level of aggregation (that is, how discernible the individual components will be) is variable, and, therefore, there is also a level of subjectivity in the attribution of this label.

Sariola´s Snare Drum (2.3(A)/A.B(p-MD)gp + 5.3(VI-V)/A.B(imac-MD)gp): Dawes (2017) and Sariola (2018, p. 28) describe this PRM as a specific kind of "snare drum" (*Sariola´s snare drum)*, consisting of slapping the strings at fretboard hight (which alone is also named "click" by Dawes) and, at the same time, adding a fretboard hit on area **2.3** with the thumb to bestow more resonance and depth, resulting in a fuller sound. This PR is also an example of APR and CPR.

ASSOCIATED PRS - APRS

APRs are a case of PR Mixture. Differently from the CPRs, where two different actions merge to form a unified sound result, and from casually simultaneous PRs, whose actions/sounds can be separated with relative ease, the APRs are those whose both sound result and especially technique are intrinsically linked, forming a mix where the technical components, however identifiable, cannot be completely isolated. They are executed by one hand, split or not, necessarily in the same movement, but generate two (or more) sound results mixed in a perceptual aggregate.

While the focus here is the technique, the sound results will inevitably converge to some extent.

They should be written preferably in one single code line, in which all guitar parts and techniques mobilized appear in their respective fields (before and after the "/") joined with their equals by a "+" without spaces.

2/Egp + Finger Action (E x fingers): The "kick drums" lends itself docile to combinations with other *sections* of the same hand, because it leaves the fingers free. Dawes (2017) presents the 'kick drums with open hi-hat' – **2.1(A)+5.2(I-III)/E+C.B(m-MD)gp+rg + 5.3/A.B(1234-ME)ab –**, a bass muffled hit on the soundboard along with a quick strumming on the damped *primas*. Other possible combinations include the 'bass with woodblock" – **2.1(B) +4.2(B)/E+C.A(imac-MD)gp –** and the "bass with chasquido" (which Dawes would probably consider a snare drum variation) – **2.1(A)+5.2(VI-IV)/E+B.A(MD)gp**.

2/A.Bgp (p x imac): This particular split uses the natural "opposing thumb" disposition of the hand, being therefore relatively comfortable. Simultaneous strikes on different guitar areas (generally the soundboard, sides, and strings) are possible. Examples include the above mentioned Sariola´s snare drum – **2.3(A)+5.3(12-19-VI-IV)/A.B(p+imac-MD)gp** –, a combination of a dry bass soundboard hit with a classic *chasquido* on the bass strings. A variation of the "bass woodblock" in the previous item is possible with **2.1(B)+4.2(B)/A.B+C.A(p+imac-MD)gp**; another very effective and distinct possibility is the "*snapknock*" – **2.1(B)+5.2(VI-IV)/A.B+B.C(p+imac-MD)gp**.

5.3<->5.2(VI+V)/A.A+C.Bar: This is the above described "Longitudinal Fretboard-rub" (guiro) together with the longitudinal string rub with the nails, executed on metallic strings (preferable

between V and VI); for a complete description, see the corresponding entry under "Description of relevant Sound Families and Percussive Resources".

It is possible that a percussive phenomenon will be, at the same time, a CPR and an APR (and, therefore, also a PR Mixture). The kick drums with open hi-hat above is an example: while the l.h. dampens the strings, the r.h. executes an APR combining a tap with body part E with a strum with the fingers (2.1(A)+5.2(I-III)/E+C.B(m-MD)gp+rg + 5.3/A.B(1234-ME)ab).

PRs WITH OTHER TECHNICAL GROUPS IN LINKED, SIMULTANEOUS, AND DIFFERENT ACTIONS

Any divisions of the hand can be used to generate different combined actions, in this case between different TGs. These *splits* must, however, occur within good reach of area 5 for both hands.

2/Egp + Finger Action: This combination is very common in FG literature. It consists of playing notes (normally on the bass strings, with the thumb) or chords (plucking or strumming) while simultaneously hitting the soundboard with the heel of the hand. It is very practical because the different body parts used are very independent and, while their movements are not coincident, they can be harmonized without too much training. The difference to the APR above described is only the fact the finger action here results in plucking or strumming, not in a PR. The following combinations follow the same logic:

2/A.B(p-MD)gp + *rasgueado*

2/A.B(p-MD)gp + *punteado*

5.2(VI,V,IV)/A.B(p-MD)gp(snap) + *rasgueado*

5.2(VI,V,IV)/A.B(p-MD)gp(snap) + *punteado*

6/A.B(p-ME)gp + *punteado*: A difficult combination that enables the use of the l.h. while stopping notes on the fretboard, this technique produces quiet but audible taps. Also works with *rasgueados* but less effectively.

SEQUENCES

Sequences are combinations of successive PRs that are easily linked together because of their idiomatic characteristics and that of their catenation. They demand lesser technical effort and allow for greater speeds. The sequential concatenation of PRs is a whole theme by itself, which we could not cover in this work except generally (under "Idiomatic percussive playing"). However, because of their importance in the literature, we will discuss some specific sequences that are either very common or particularly effective.

"Kampela's Finishing Combo"

Video 31: *Kampela's Finishing Combo*

This very common occurrence in the first two *Percussive Studies* is a fast sequence for the right hand. It consists of availing the power of forearm rotation to release multiple timbres in a very fast succession; it alternates attacks with *p* and *am* and concludes with a repetition of *p* in a *pizz*. Bartók. Its more common formula reads like *snap* / 2 kick drums +/ *pizz*. Bartók. (5.2(VI+V)/A.B(p-MD)gp – 2.1(B)/A.B(am-MD)gp - 2.1(A)/A.B(p-MD)gp - 5.2(VI)/A.A(p-MD)pin(Bartók)).

It can be used in many variations, such as: with the left hand; with other timbres; in bigger rotation sequences, repeating the rotation module; interspersing it with other PRs, notes, or chords with the free hand; or combining all of the above. For example, this 11-event sequence with plucking integration, which can be executed in quarter notes at 160 bpm or more: 2.1(B)/A.B(p-MD)gp – 4.2(B)/A.B(i,m,a,c-MD)gp - 2.1(B)/A.B(p-MD)gp – 4.2(B)/C.A(imac-MD)gp - 4.5(B)/D(ME)gp - 2.3(B)/A.B(a,i-MD)gp(trem) - 5.2(VI+V)/A.B(p-MD)gp – 2.1(B)/A.B(am-MD)gp – 5.3(11-VI)/A.A(m-ME)pin - 2.1(A)/A.B(p-MD)gp - 5.3(0-VI)/A.A(m-ME)pin(pull off) - 5.2(VI)/A.A(p-MD)pin(Bartók).

"Kampela's Castanets Combo"

Video 32: *Kampela's Castanets Combo*

This is simply a very effective hand split (*p* \ *imac*) employing a combination of multiple finger taps with rotation of the arm. Kampela (1990) uses it in his first *Study* (c. 46-49), using the split

to reach two very differently sounding guitar areas: 2.1, bass with *p*, and 4.2, treble, with *i,m,a,c*. The trebles are reinforced by the use of the nails (C.A), resulting in a castanet-like sound. He uses many variations, sometimes interspersing l.h. actions, the biggest sequence being 2.1(B)/A.Bgp – 4.2(B)/C.A(a,m,i-MD)gp – 2.1(B)/A.Bgp. One can see right away that the formula (*p,a,m,i*) is that of a normal guitar tremolo, and is therefore fit to be sustained indefinitely. It is of course usable with the l.h. and other guitar areas.

"Mckee Combo"

Video 33: *Mckee Combo*

The area combination (2.1(B) vs 4.2(B)) in Kampela's castanets combo has become common practice in modern fingerstyle thanks mostly to Andy Mckee's *Drifting* and *Hunter's Moon*. But Mckee uses those areas in combination with l.h action in guitar areas 2.3(A) and 4.1(A), creating a more varied constellation of percussive sounds.

The r.h. idiomatic hand movements are still the multiple-finger tap and hand rotation, but Mckee introduces the hand-split *imac* vs D, making use of the forward/backward movement of the wrist. This movement naturally exposes (prepares) areas D and E after the strike with the fingers, but in a perpendicular plane to the first strike; therefore, it lends itself well for combinations with soundboard and side sequences, for they are also presented in 90 degrees. These very effective movement combinations can be used in many different sequences and in different guitar areas; the biggest is Hunter's Moon's 6-hit sequence 4.2(B)/A.B(a-MD)gp – 2.3(A)/A.B(ma-ME)gp – 4.2(B)/A.B(m,i-MD)gp – (rotation) – 2.1(B)/A.B(p-MD)gp – (wrist backwards) 4.1(A)/D(ME)gp.

Pandeiro Sequences

Video 34: *Pandeiro* Sequences

This sequence and its variations were developed in the course of the research as an adaptation of a traditional Brazilian *pandeiro* technique, which is based on alternating movements from a trice split hand: *p* – *imac* – E – *imac.* These splits follow major anatomic divisions of the hand and have therefore a "natural" feel to them. Nevertheless, control can be difficult due to the asymmetry of mass, muscle power, and movement in each of them. *P* is generally deployed

with rotation (main) and finger (secondary) movements. *Imac* are deployed mainly with finger movement, which is weaker. E, with its bigger mass, comes in with an impulse from the wrist or even the forearm, which are larger muscle groups. A tendential accent occurs in *pandeiro* playing in the *p* strike, as a consequence of the strong rotation and the muffled nature of area E. On the guitar, the topography of the instrument requires adaptations in hand position and movements which can alter that balance.

The sequence can be employed in several areas and area combinations. A very effective one is 5.2(VI-IV)/A.B(p-MD)gp – 2.1(B)/A.B(imac-MD)gp – 2.1(A)/E(MD)gp – 2.1(B)/A.B(imac-MD)gp. This colorful combination can achieve speeds comparable to that of the *pandeiro* (Sixteenth notes at 140 bpm and faster).

Many variations apply, such as taking advantage of the multitaps possible in the *imac* split, as we can see in the following example from *Laputa Variations* (Fig. 171). In the first rectangle, area 2.1(B) close to the border of the guitar is hit with *p*, followed by an *a,m,i* multi-tap. A l.h. strike with hand-part D on 4.5(B) is interspersed between that and the next action in the sequence, an E strike close to the area previously hit by the thumb. A new incrustation of a l.h. hit at 2.3 separates that from the end of the sequence, two hits with *p* and *ma* at area 2.1. The resulting movement of the r.h. (excluding l.h.) is 2.1(B)/A.B(p-MD)gp – 4.2(B)/C.A(a,m,i-MD)gp – 2.1(B)/E(MD)gp – 2.1(A)/A.B(p-MD)gp – 2.1(B)/A.B(ma-MD)gp. The second rectangle shows a very similar pattern, but with no l.h. interventions, the omission of the second *p* hit and the elongation of the last *ma* movement to create a "squeak" [158] : 2.1(B)/A.B(p-MD)gp – 4.2(B)/C.A(a,m,i-MD)gp – 2.1(B)/E(MD)gp – 2.1(B)/A.B(ma-MD)gp+ar.

The successful adaptation of the *pandeiro* and tabla ("tabla I superstrike") techniques points at investigating the technique of other percussion instruments.

[158] This last PR is, therefore, an APR.

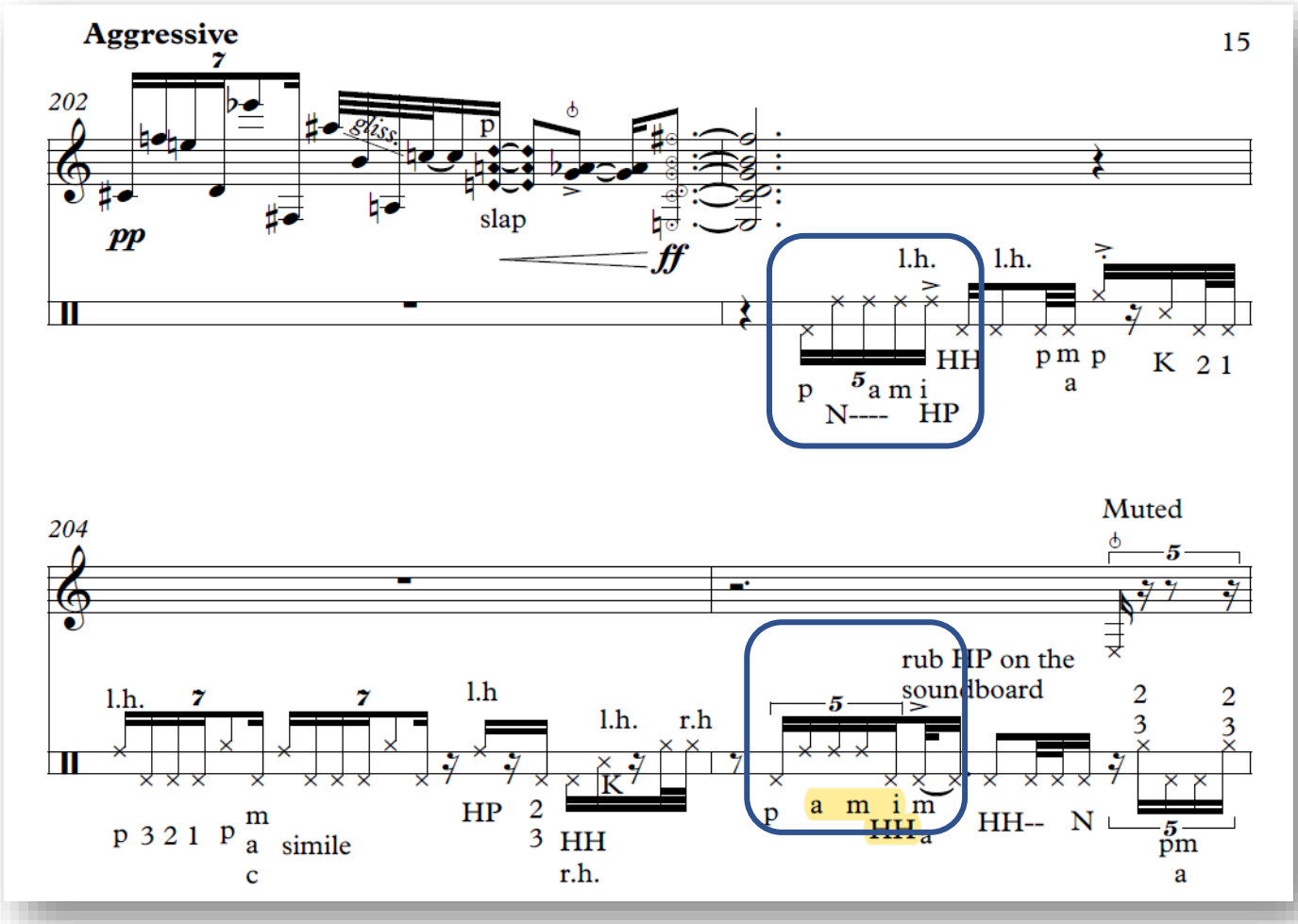


Figure 171: Variations from pandeiro sequences in Laputa Variations, bars 202-205.

THIRD PART

NOTATIONAL SYSTEMS

The description of the individual PRs we presented included notation recommendations that are not yet enough to notate works with extensive and complex use of percussion. For that, it is necessary to build whole new *notational systems*. We will complement the information already given with some general remarks in that direction. They are based on the study of our samples, other works consulted for the research, the surveyed technical literature (especially JOSEL AND TSAO, 2014; SCHNEIDER, 2015; and FRENGEL, 2017), and our artistic research.

We begin by introducing 4 concepts (*notational system, notational space, characters,* and *dimensions*) that discern between different aspects of notation, enabling a discussion about them and their manipulation. We then group the many functions of the notational spaces and characters into categories and bring these together to form two main approaches to PR-notation: the *technical* one and the *sound* one. Afterward, we present good practices for creating functional systems, and we finish by briefly discussing the convenience and possibilities of conventions in percussive guitar notation.

We emphasize that a comprehensive discussion on notation is outside the scope of this project. These remarks refer exclusively to PR notation and should be understood only as an initial step to spark future debates.

Notational system

What is, then, a *notational system*? It is a set of conventions and rules that organize and give meaning to *characters* allocated in a *notational space*.

Notational Space

Any notation occurs within a defined space on which different symbols represent the musical events. This space could be a staff, a grid, a free blank space, a tablature, etc. The *notational space* is organized by certain rules that give meaning to the symbols. These rules might be arbitrary but they can also be systematic, such as in the case of traditional notation, in which

the pentagram defines discrete frequency values determined by the lines and spaces, evolving in a logical progression (as opposed, for example, to assigning random sounds to arbitrary regions of the notational space with no perceivable relation between them).

The notational space can be *simple* or *composed* of many layers, which are essentially partitions, such as using one staff for "notes" and a second one for "percussion" (Fig. 171). All the layers which are essential for understanding the meaning of the characters are called *main layers,* such as the two we just mentioned. If, however, they only complement the notation, make it clearer, or present otherwise non-essential information without which the music could still be played, they are called *auxiliary.* Examples of auxiliary layers are staves used to inform real pitch (eg., on the notation of harmonics, *backtones*, or works with *scordaturas*) and the secondary line for percussion in *Sonata* (Fig. 73), used only to clarify the text (the "x" notehead would be sufficient). It is important to distinguish between spaces *composed* of several main layers (first, second, and so on) and those, *simple* or not, with actual auxiliary layers. Special attention should be given to not calling percussive layers "auxiliary", as this last term carries an inherent hierarchy that might not correspond to the musical context.

Characters

The notation is carried out through the use of *characters*. *Families of characters* group symbols with graphical affinities that refer to the same parameter. Examples are the note values in traditional notation, which share graphical features, evolve according to a mathematical rule, and refer to the duration of the sounds, or the various noteheads in *Escutorium,* all referring to the body parts (Fig. 173 ahead). The characters that follow the rules of the notational space are the *main characters*, such as the numbers indicating the frets on the tablatures. The others, whose function is to give complementary information outside the systematics of space and main characters, are called *auxiliary*, such as intensity, timbre, or fingerings on traditional scores. These can be of any nature, including textual.

System dimensions

The notational system can have one or several *dimensions*. Each one organizes a parameter of the represented musical event. For example, a syllabic notation, such as the one used for Indian percussion instruments, is a bi-dimensional system that defines timbre and suggests rhythm.

Many traditional staves are bi-dimensional: the placement of the figures on the staff indicating pitch (dimension 1) and the note values indicating duration (dimension 2); if the direction of the stems (up/down) indicates the hand to be deployed, then we have a third dimension. The bi-dimensional tablature uses the lines to represent the strings (1) and numbers to represent frets (2); if they have figures above indicating rhythm, that is a third dimension reached through auxiliary characters (since, in that context, rhythm is outside the systematics of the notational space). Graphic scores using proportional notation prescind from the note values and could use the shape of the characters to represent another (generally a third) dimension.

Each dimension can be as simple as distinguishing between two states (such as which hand to use, left or right) or as complex as representing the whole spectrum of a parameter. They can be represented on the main layers or by a family of main characters.

If a certain dimension defines discrete values/states for the characters, they are *striated* – such as pitches in a traditional pentagram. If it lets the characters float in a continuum, they are called *plain*, such as happens with proportional duration (Fig. 172).

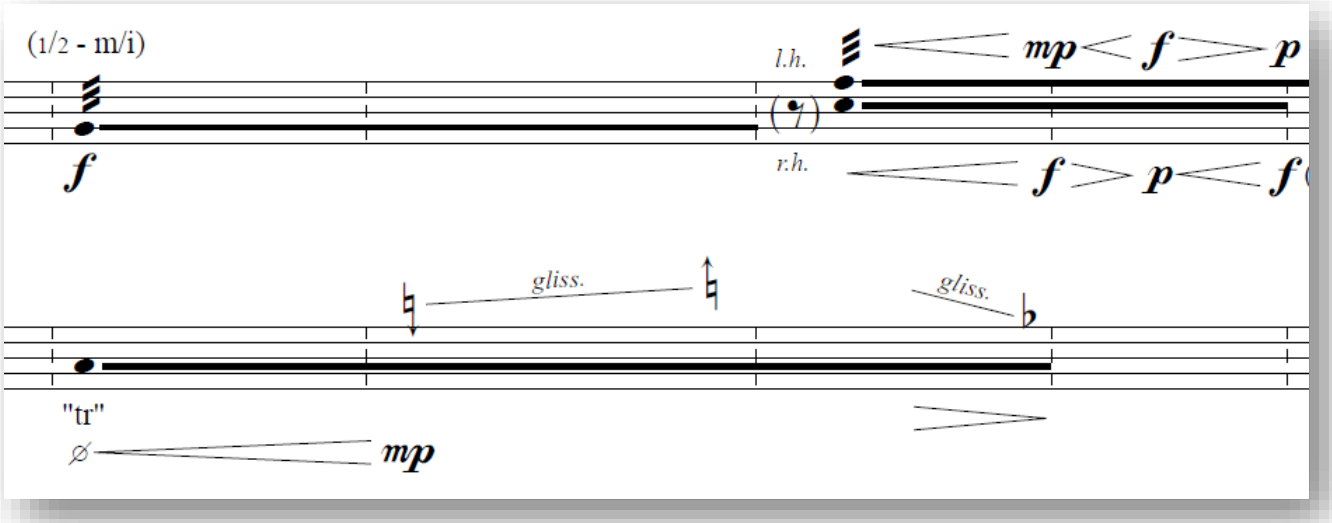


Figure 172: *As Entranhas da Terra*, page 2, showing the plain flux of time in the horizontal direction.

The notational system can be *systematic* (follows definite rules), *coherent* (the rules do not contradict or overlap themselves) and *exact* (not redundant, univocal in its references). In the literature, however, most systems have pragmatic concerns and do not strive to achieve such standards; they are functional, albeit perhaps not optimal.

In the works we analyzed, the characters and notational spaces were given many different uses. We categorized those to distinguish several systematic applications (that is, *dimensions*). We then grouped all applications within one of two main approaches: the *technical* one, which focuses on how to physically produce the sound, and the *sound* one, which focuses on the physical or perceptual parameters of sound or music.

THE TECHNICAL APPROACH

A system as old as the tablature already gives placement indications instead of notating the actual sounds. Josel and Tsao (2014, p. 32) distinguish a related type of notation that uses an "action stave for RH position", defining "*how* and *where* something is to be executed rather than the acoustic result". Vishnick (2014, p. 130), in turn, acknowledges musical situations in which "the physical actions of the performer is (sic) an intentional compositional parameter." All those contexts envision an approach to notation that concerns the process of production of the sounds instead of the sounds themselves. We will elaborate on these ideas using the PACT model to define several dimensions (applications) in which characters and space can be used to determine the technique involved in the musical events. They are grouped into four categories:

The body part

Because the hands can be taken away from their traditional roles, the indication of which hand to use can be essential information on the score. In that case, separating the hands through the direction of the stems (up or down) or in two different staves (such as in *Escutorium,* Figs. 83 and 93, or *Salut für Caldwell*) is necessary. Georges Aperghis, in his *Corps à Corps* for solo percussion, employs empty or filled circles to differentiate hands, a very practical resource.

Similarly, fingering can achieve the same importance, such as on scores with microtonal tunings (for example, in *Escambo* (FREIRE, 2020)) or subtle timbral effects that require specific string or guitar area combinations. In those cases, it should be thoroughly notated. Fortunately, there are well-established conventions for that using auxiliary characters, except for the use of the left thumb. In that case, we would suggest the use of a capital "P" or a "5".

Other hand parts can be equally important. In that case, textual auxiliary characters similar to the fingerings can be used. They could represent the body parts using the initials of their names in capital letters (such as "K" for knuckles) and minuscules to their inner subdivisions (for instance, Kd for the distal knuckle) or use the letters we provided in the FH Code.

Alternatively, all body information can be systematized as a different score dimension, such as conceived by Diniz in *Escutorium*, in which five different noteheads form a family of characters that distinguish between different hand parts, as shown in Fig. 173:

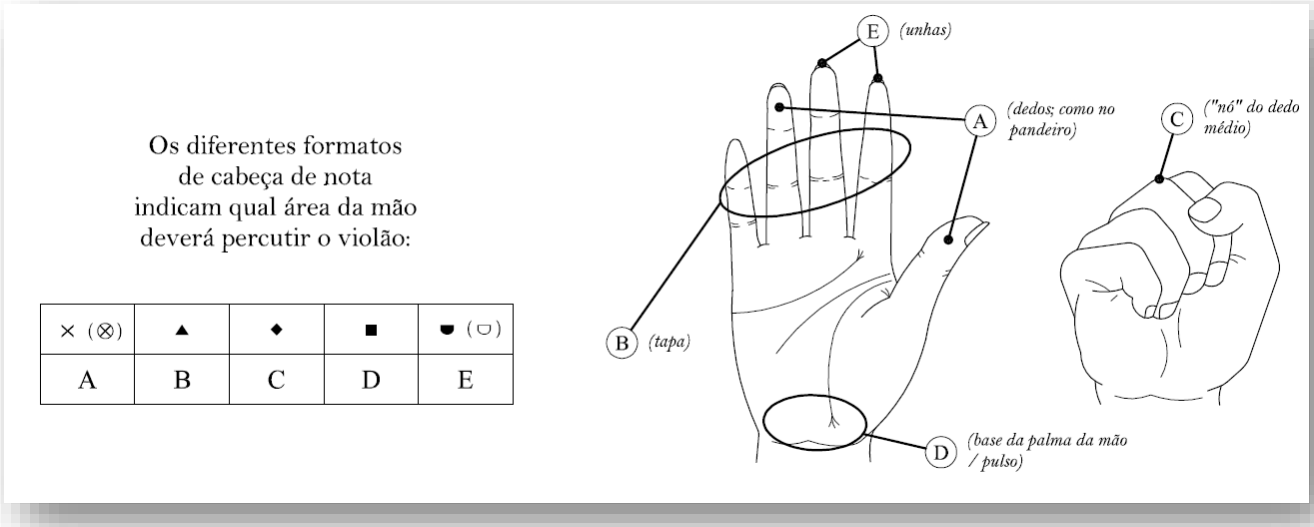


Figure 173: *Escutorium*, "Performance Instructions". The texts read as follows: "The different noteheads indicate which hand area should tap the guitar", A = Fingers, as in a *pandeiro*, B = slap, C = knuckle of the middle finger, D = heel of the hand, and E = nails)

The guitar area

Separating the "Guitar Box" (SCELSI, 2010) from the strings was the most common differentiation we found. That can be made with the notational space (as seen in *Ko-Tha*, Fig. 14) or with the characters (for example, the traditional "x" notehead when used for taps on the soundboard).

A more specific notation could be devised if the work makes extensive use of many guitar areas, as we see in *As Entranhas da Terra, Seringal,* (see figure 77 under "2/A.Bgp") and *Escutorium*. In these, each line/space of a pentagram is associated with a particular guitar area, and an effort was made to approximate the "brightness" of the sound to the positions on the staff

(brighter sounds notated higher). However imperfect, that approximative placement helps the performer to better "hear", internally, what is written.

Sergio Freire devises yet another possibility when he divides the fretboard into two with the use of a capo and assigns a staff for the *backtones* and another one for the normal tones (see Fig. 128 under Playing between a stopped note and the nut).

The notations of guitar parts can define specific spots or areas to be activated (striated), or they can analogically represent the space of the guitar, enabling a continuum of possibilities (plain).

The (inter)action

It can be important to distinguish between the most used actions on a piece (for instance, those described in the FH model), or to indicate features of the movements, such as their direction (eg., in strummings), speed, trajectories, etc. In *Veneno*, for example, a second line is used for the actions of the right hand (and occasionally also the left):

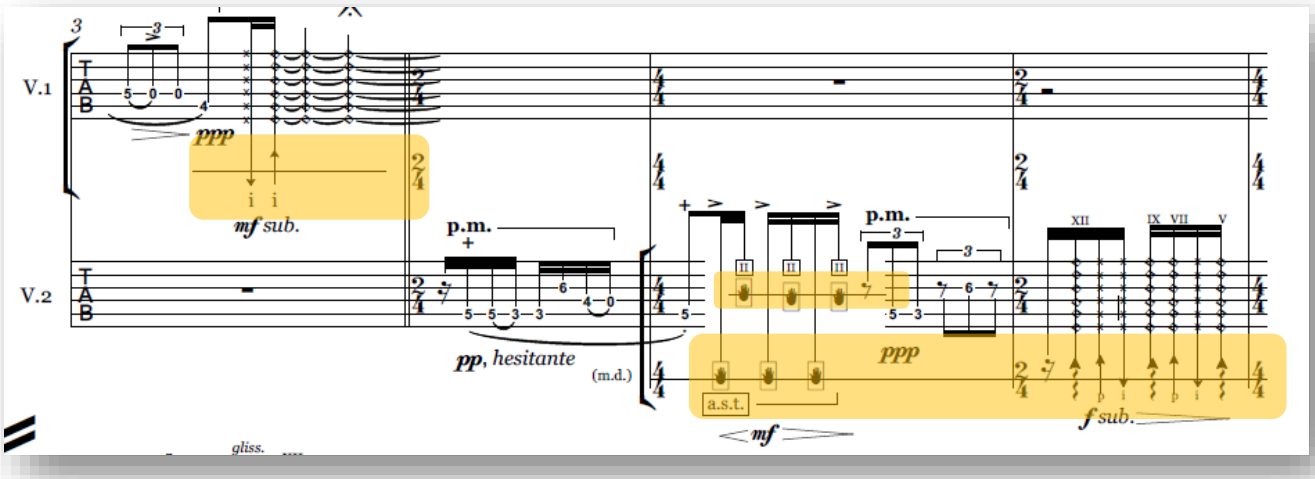


Figure 174: *Veneno*, bars 3-6, showing the r.h. actions of guitar 2 represented on the second, single-lined staff. There is an occasional usage of the single line for the left hand as well.

Technical Groups

It is conceivable to use notational spaces or character families to distinguish between *punteado, rasgueado,* and *percussion.*

THE SOUND APPROACH

On the other hand, the notation can refer to the characteristics of sound and music, that is, the intended results, instead of the means to achieve them. That happens, for example, in most traditional staff notation.

Pitched/unpitched

A very common solution is designing composite notational spaces to distinguish between pitched and unpitched sounds, such as in *Percussive Studies I* and *II* (Fig. 175) or the common use of the "x"-noteheads.

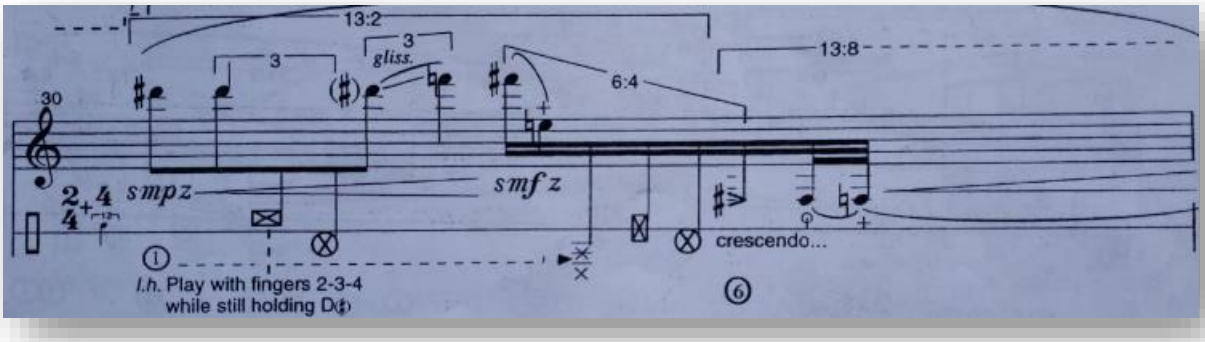


Figure 175: Percussive Study n. II, bar 30. Staves differentiate sound, while characters are technique-oriented.

Timbre

Differentiating timbre is another possibility, such as seen in *Arien IV, Solo Music for Guitar* by Sidney Corbert (in which the lower staff indicates harmonics and the upper, normal notes) and *Zwei Skizzen* by Klaus Hübner (in which the three staves indicate, respectively, *sul ponticello*, ordinary, and, *sul tasto*), as reported by Josel and Tsao (2014, p. 29-30):

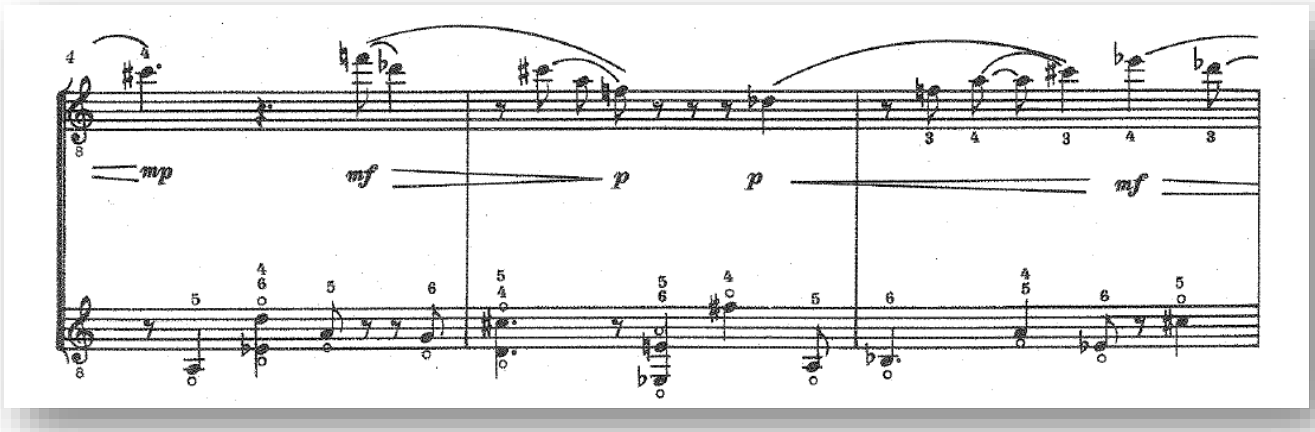


Figure 176: Aerien IV, bars 4-6, showing the staff for ordinary notes and the staff for harmonics. Source: Josel and Tsao, p. 30.

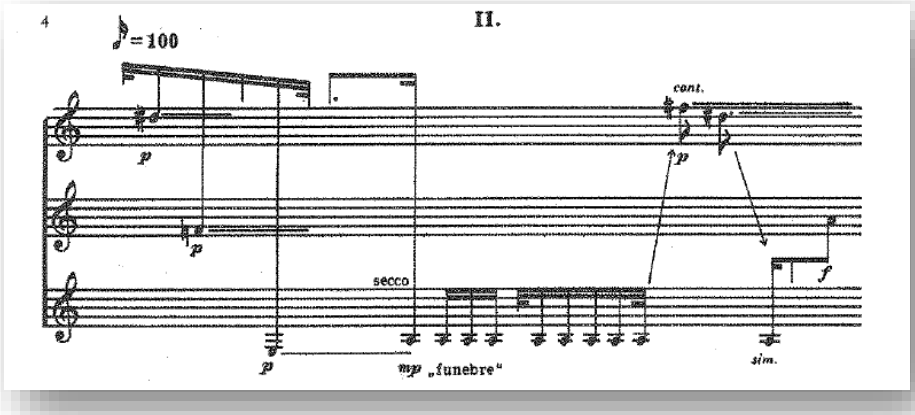


Figure 177: Zwei Skizzen, page 4, system 1, showing staves dedicated to timbre. Source: Josel and Tsao, 2014, p. 30.

Intensity/dynamics

A scale of intensities using notehead sizes, color, color intensity, or different staves for dynamic plateaus could be practical in situations in which intensity is a main compositional parameter.

Space

Spatial information, such as the placement of the sound source or the directionality of the sounds can be promptly represented in scores analogically (that, however, is rarely an issue for solo guitar), such as in *Cenas Infantis*:

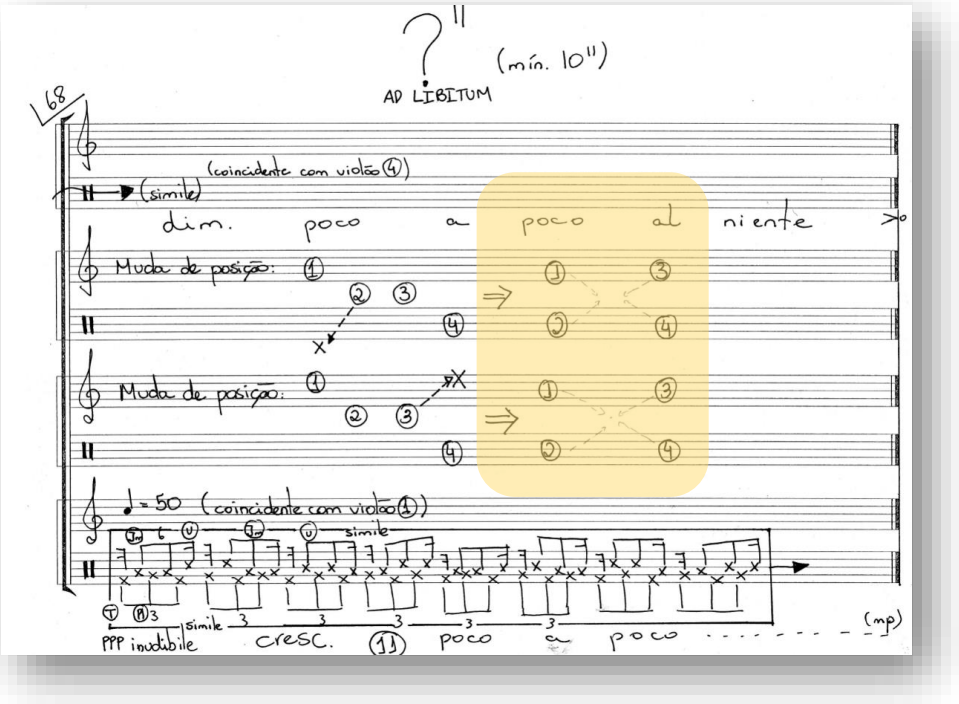


Figure 178: Cenas Infnatis, bars 68. After indications of repositioning, the resulting guitar quartet formation is given, with diaphanous arrows indicating the direction each guitarist will be facing, which is also the direction of the sounds (= placement + direction).

Duration

Duration can be represented through graphic notation, chronometric indications, or traditional note-values.

Textural Layers

The separation of textural layers through the use of different notational space layers is also effective, such as in Figs. 176 and 177 above, or in this fragment from Peter Maxwell Davies *Lullaby (for Ilyan Rainbow)* (Fig. 179). It differs from the previous solutions because it can be determined by the conjunction of several individual parameters.

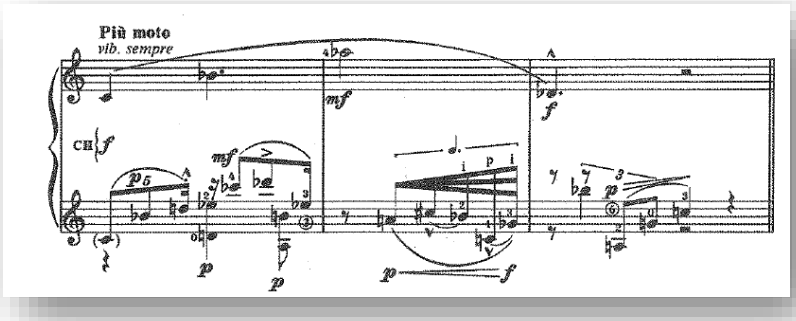


Figure 179: Lullaby for Illian Rainbow, II: Double, bars 1-3. Source: Josel and Tsao (2014, p. 31)

GOOD PRACTICES FOR BUILDING FUNCTIONAL NOTATIONAL SYSTEMS

It is the work that determines the most appropriate form of notation to be used, together with practical considerations, such as existing conventions, availability of characters for edition, etc. However, we would like to share some basic principles that might be helpful in a broader range of situations. They derive from our experience and should be understood as suggestions.

BEING SYSTEMATIC

A system creates predictability, and that is a great advantage for notation. A systematic notation, one that organizes its parameters logically, can be understood and memorized more quickly. It enhances recognition and reaction times, easing the process of reading. It can also be more economic in symbols. **Systematic writing is simpler and clearer**.

CLARITY

A clear notation guarantees better communication and eases the preparation of the performance. To be clear, it is important to be as simple as possible – see next entry –, but also to be univocal (unambiguous), direct and understandable.

To achieve that, keeping the textual instructions as short as possible (but not shorter than necessary) generally helps. The performance instructions should be, however, thorough and contain all the non-conventional symbols used in the piece, with sufficient explanation. While in short scores *in loco* instructions might not be a problem, in larger works it might be better to keep all information in the same place (exception made for one-time occurrences).

It is good to balance the complexity of the notation between notational space and characters to make the score cleaner. *Las Seis Cuerdas* exemplifies two practices to be avoided. In the first movement, it overloads the notational space with six lines that function like a "super-tablature", but the effect is only the pollution of the score (notating the string to be used with circled numbers would make reading it much easier). Moreover, it uses such a big number of characters (over 50!) that their memorization and prompt recognition become arduous. **As a general rule, we recommend the use of a second staff to alleviate the density of information on the score**, but that should be evaluated case by case. If that is not enough, using a character family is the next step, and then rely on some auxiliary characters. That should suffice for most

cases. For more exigent compositions, one can complexify the system by adding new features according to his or her needs (layer, character family, auxiliary character).

Ambiguity, such as happens when a character can mean two or more different things, or when one result can be achieved with two different characters, should be avoided.

When creating characters and families of characters it is always advantageous to use *pictograms*[159] and their variations to form the families, as that allows for quicker recognition and understanding of the symbols.

ECONOMY

Vishnick (2014, p. 121-155) warns against the problem of over-complexifying, showing examples of works (for instance, Lachenmann's *Salut Für Caldwell*) that could be rewritten in simpler, more direct graphical language. A most important aspect of building functional notational systems is to make them as simple as possible – the complexity of the notational system should match that of the work it notates, simplifying it whenever possible.

When the work does not mobilize too many PRs or does not dwell in timbre minutiae, it is usually worth using a simpler notational system, perhaps even non-systematic, and leaving the rest to the good care of an informed interpreter. For example, many pieces that mobilize PRs only on one particular section (e.g., Belinatti´s *Jongo* or Telles´ *Vanera para bailar solito*), or in which they appear always sufficiently separated from other TGs, would require no extra staff and perhaps no extra characters: a simple percussive clef delimitating the percussive passages would suffice. To guarantee that the interpreter understands its role, a small text explaining what is expected of him/her and the general sonority of the percussion is a good idea.

[159] Figurative drawings that, through their form, refer directly to that which they aim at representing.

ON THE NEED AND POSSIBILITY OF CONVENTIONS

Much of what we dealt with here could be subject to conventions, especially the most common percussive phenomena (say, those described in the Main Group). That could ease the process of both writing and reading.

As we discussed, however, there are two problems to face in that endeavor: firstly, conventions could be useful in many, but not all cases, as the specificities of the composition dictate the optimal notation system. The scores are part of the works themselves, not accessories, participating in their aesthetical concept, influencing *how* they will manifest in sound. Secondly, the guitar community is composed of guitarists, composers, associations, producers, critics, editors, publishers, software companies, and other specialized personnel all around the world, making a broad commitment to any convention no easy task to accomplish.

About those problems, we would argue, firstly, that conventions do not always interfere negatively in the notation of compositions; we do have conventional notational systems, after all. Conventions should be understood as optional tools, if, and when, they are useful, and should not be regarded as prescriptions or obligations that replace the creativity of the artists. Secondly, we believe that, over time, some conventions could be gradually adopted by the community, should the growing tendency toward guitar percussion maintains its impetus.

Considering the size of the challenge, the limited reach of this work, and the plurality of aesthetic uses for the PRs, we deliberately avoided too direct recommendations most of the time and will not propose any specific notational system. Opposed to its intentions, such an effort would only result in *yet another* notation proposal instead of truly establishing a common language.

EXPANDING THE REPERTOIRE AND INCORPORATING PERCUSSIVE PLAYING INTO CLASSICAL GUITAR PRACTICE

At the beginning of this work, we approached some of the many obstacles percussive playing faces to reach more adepts within the classical guitar world. From them, we would like to highlight still a few which, we hypothesize, are the most important: first, the relative novelty of the techniques when compared to the traditional guitar technique; second, the absence of pedagogic material and established formative trajectories – which, as we discussed in the introduction, is related to the lack of focus or even to the acknowledgment of these techniques as a way of playing; third, and perhaps most important, the repertoire.

While there already exist many works that use percussive resources – in this work alone, we have dealt with around 80, and that does not include the exploding FG production of the last 10 years nor the innumerous less-known works from composers all around the globe in the last decades – they are not yet sufficiently disseminated nor do they make their way regularly into institutions, competitions, and recordings[160]. And, if their absolute number is perhaps large for one individual guitarist to manipulate, that still constitutes but a small fraction of the whole repertoire of the instrument. Additionally, they are still concentrated in CG, lacking in many other types of classical guitar repertoire. Many of those (for example, dance forms) could incorporate PRs easily. Lastly, but no less important, the average difficulty of works that make substantial use of PRs is also relatively high; the repertoire resents the absence of a robust *corpus* of short to medium duration, and of simpler technical demands.

Based on our artistic experience, we will discuss here five ways to overcome those difficulties, in addition to the systematization, analysis, and comprehensive description we already offered. Each of them is a highway that could foster several other works such as this one, and we shall

[160] To the date, we have heard of only two institutions, one in Dresden and one on the East Coast of the USA, that offer education concerning FG, and none specifically directed at "percussive guitar".

hint at that as possibilities for future research. However, we believe that what we discussed in chapters three and four already offer the necessary tools to execute the task. They are:

1. Add percussion to the existing repertoire: Several works enable a more "active" approach from the instrumentalist; they range from any kind of music whose form is not completely pre-determined (experimental, aleatory) to traditions more open to structural contributions of the performer (such as arrangements of popular music). Or, from another perspective, several artistic perspectives for the performance itself induce a greater level of interference from the player into the works, even if they were not initially so conceived. In both cases, everything ranging from small percussive embellishments to whole new sections is possible. Our incrustation on the *Sonata op. 47* 2nd Movement is an example of such interferences. *Cielo Abierto* and *Jongo* both present percussive sections that serve as models for what could be done with a great number of similar works, performance liberties fully justified by the cultural environment in which they lie.

2. Composition/collaboration: Creating new works that explore percussive resources, playing, and publishing them is the most obvious front in expanding the repertoire and developing percussive playing. It does not have to be particularly complex or belong to any specific style; in fact, where there is the most space left for composition is in the introductory and beginner levels. That could be carried out by the guitarists themselves or in collaboration with professional composers, as we did with the many new works that integrate this research.

3. Transcription/Adaptation: Bringing the literature from other instruments or instrumental groups to the the guitar is another solution. Popular music and works for hand percussion are particularly docile to this endeavor, as we demonstrated with *Rock Study n.7*. Specifically, about transcriptions from popular music, we recommend the work of Carpenedo (2020), who deals precisely with arrangements for percussive guitar.

4. Improvisation: Exploratory or not, systematic or not, improvisation is an excellent way of reaching the percussive potential of the guitar, as we showed with initiatives such as *Brücken, Solo*, or *Quantos violonistas são necessários para desconstruir um piano?*. It can be used for several purposes, such as a compositional or interpretative tool for creating new materials, small interferences inside existing music, or autonomous pieces of music.

5. Tocautoria: while not essentially different from all the previous, it is a particular blend of all of them. It could be described as doing all of those activities with the focus on one's particular artistic identity, in a way that lets the performance and the idiomatics of the guitar deeply influence all kinds of creation – composition, improvisation, interpretation – and, at the same time, has the creation as the basis for one's performance. All the creative work we developed in this research could be classified as *tocautoria,* as can the activity of most FG artists presently active.

***

CLOSING REMARKS

RECAPITULATION

Aiming at gathering, organizing, and formalizing knowledge about percussive playing in the guitar, we surveyed the literature – methods and works, both written and recorded –, analyzed and interacted artistically with it, forming a panorama of its state of the art. To improve our artistic capabilities and create music in its various forms, we performed, improvised, composed, and adapted works for percussive guitar, and also worked in collaboration with several artists. These two research fronts were intrinsically methodologically linked.

We analyzed a sample of five canonic guitar works with percussion to arrive at a diagnosis and develop a research method. Those results, along with the study of guitar methods, other pieces, and artistic practice, led to the formulation of a network of concepts that enable an in-depth and specific understanding of percussive playing. They also made it possible to create a code that identifies the different percussive occurrences in varying levels of detail and tools to facilitate the analytical process. All of that constitutes a model through which to understand, observe, analyze, describe, and manipulate the percussive guitar phenomena.

This PACT model enabled the extended analysis of a larger *corpus*. With a focus on CG and FG literature, 20 works were analyzed, the collected data statistically processed, and several conclusions were drawn from it. Through successive grouping procedures, both statistical and technical, we concluded that approx. **65%** of all percussive occurrences in the sample can be described by only **eight technical entities**, the *main group*, out of 228 PRs occurrences observed. We also observed other interesting facts, such as the usage of the body parts and guitar areas, and were able to devise artistic paths that are particularly open for exploration.

Separately, we presented and discussed the several products of artistic research, in the categories Performance, Adaptation, Composition, Collaboration, and Improvisation.

Finally, we brought together the results of the analyses and the artistic research to present a comprehensive description of percussive playing, comprising several aspects of it: a technical-

musical description of several Families of PR, based on the statistical analysis and expanded with several other percussive possibilities with artistic interest; guitar positioning and care, body care, idiomatic issues, several PRs and SFs, notation, and repertoire.

We will now present some issues and limitations of the research, as well as give some perspectives and possible applications.

PROBLEMS AND LIMITATIONS

DATA COLLECTION

The analysis of repertoire requires qualified personnel and considerable training. The analyst must have fluency in the FH Code and be familiar with guitar technique and some compositional concepts. That is a hindrance for future analysis that must be dealt with.

During the analytic process, we have faced some ambiguous situations that demanded methodological answers. Some of them prompted reformulations in the FH Code, most of them already incorporated and some others described ahead. Others, such as incomplete descriptions of PRs in the works, required statistical manipulations to make the data usable. In that specific case, we re-distributed the incomplete PRs throughout the compatible SFs in the same proportion in which those SFs were found in the sample.

We believe that, despite having gathered good data, its quality can be further improved by the following:

a) Creation of a referential bank of figures for the different guitar parts, using different guitars and from different angles.
b) Prioritizing sources with good quality, especially good quality videos, including that as criteria for the selection of the repertoire to be analyzed.
c) Expanding the database will further diminish the bias of personal experience.

Analysis of other collected data

We were not able to process and analyze all the collected data. Several categories of variables (see chapter one) were not discussed in this report and constitute perspectives for future works. Especially, we have data to be analyzed on body parts and guitar areas, uniqueness or commonality of PRs per work, scordatura, work duration, PR density, musical use, and notation.

Performance of composed works

Some of the works composed for this research were finished out of schedule and, for that reason, could not be premiered.

Applications and perspectives

Improvements to the FH Code

At its final stages, the research pointed at some new areas of improvement for the Code. They are:

Updates on area 4: as discussed in chapter 4, it is more practical to join sub-areas 4.2 and 4.3 in the "lower bout area", limiting the number of sub-areas to four, and counting them simply from right to left (as seen from the player's perspective).

Body part B should concern all joints in their dorsal side, starting from the elbow, which would be the new B.A, and going through the wrist (B.B), metacarpal joints (B.C), proximal joints (B.D), and arriving at the distal joints (B.E). That spares a category in body parts (no "F" required) and offers a logical anatomical and timbral progression (from dark to bright).

PRs that only make sense in groups of iterating events (such as percussive tremolos) would benefit from a symbol to indicate repetitions with permutation (that is, in no particular order).

EXPANDING THE DATABASE

Now that the PACT model is ready and functional, all of its tools (especially the Analysis Sheet) are operational, and we are sufficiently trained in its application, it is possible to cover significantly larger samples of works. That will further expand our understanding of percussive playing in its PR possibilities, notational systems, and musical uses. Provided the conditions are given, we expect that samples of 50 or even 100 works could be covered. We also envision applications for deep learning in the automation of the process of data retrieval.

The distribution pattern of the SF suggests that the expansion of the sample would increase the number of low-recurrence PRs, but we expect that Groups I and II would remain largely unchanged and the overall distribution patterns would hold.

As we first did with the exploratory analysis, we believe that case studies (a restricted selection of works from a certain time-frame or artist) could, along with expanding the database, lend the analytical criteria further refinement and bestow the model with new conceptual clarity.

FURTHER EXPLORATION OF THE PERCUSSIVE CAPABILITIES OF THE GUITAR

Guitar Areas with residual use (1, 3, 6, 7): There is a lot of potential here, especially for areas 1 and 6. Area 1 presents the interesting possibility of the *guiro,* has a very good response, and the darkest sound in the guitar. It is also relatively easy to reach from standard playing positions. Area 3 offers limited access in standard playing position and can be occasionally used for timbral variety and scenic effect. Area 6 is the key to ensure a more active participation of l.h. in percussive playing. We presented some interesting possibilities for its use in chapter four[161]. Research into guitar construction, to make this area more resonant, could greatly impact percussive playing in the future. Finally, area 7 can be useful as technical relief and offer a curious variation of the *kick drums* when used with body parts E or A.A; it further broadens, albeit discreetly, the timbral range of the instrument.

[161] Thiago's Neck Slap; Bone to Bone Neck Tap, Emergency Arm Tap and "p" in the back of the neck.

Area 4.1 can be more explored as well, offering more playable area, resonance, and power than other sub-areas of the sides.

Body Parts with residual use: Together with some seminal literature (*Ko-Tha, Sonata op. 47*) we have demonstrated (*Cenas Infantis, Ella, Escutorium, As Entrnhas da Terra*) that body part B can be successfully employed to expand the timbral range of the instrument, and could find much more uses than its 6% Use score suggest. Area D could similarly find more usages, especially in dampening, scratching, and using its inner concavity for amplification. Area E also has usage in dampening and scratching, and could also be more often employed in combinations as a distinct hand split.

Left-hand: We believe there is a lot of space for more consistent use of the left hand for percussive resources. Especially promising are the uses of area 4.5, snaps and fingerboard taps (5.3/A.Bgp), area 5.4, string scratches, fingerboard *güiros,* and area 6.

Actions: Scratching and dampening, while arguably less effective and technically more expensive than simple taps, can nevertheless enhance the timbral potential of percussive playing. Guitar construction and audio developments could have a great impact here.

New and uncommon PRs: Composite and simultaneous PRs could allow for tonal diversification and manipulation of other musical parameters (such as duration, intensity, etc.). The many uncommon PRs and SFs we have found in our sample, many of which are described in chapter four, can also imbue new compositions with originality and freshness. Finally, creating new PRs based on the indications given in this entry, through deductions from the FH Code, or via exploration remains a core possibility for percussion in the guitar.

ACADEMIC RESEARCH

For performance studies, this work contributes to new methodological designs for artistic research.

The model can also find applications in Analysis, Music Theory, Musicology, and Composition.

ARTISTIC RESEARCH

We expect that the artistic output of this research could be integrated into an album of percussive works for guitar focusing on Brazilian contemporary music. The artistic results, including the technical and aesthetical self-improvements the research lent the researchers, will impact our future artistic projects, and possibly of other artists as well, as they demonstrate part of the potential for the application of percussive resources in the classical guitar.

DIRECTIONS FOR GUITAR CONSTRUCTION

The information given in this work can inform guitar construction to help in building adaptations that favor percussive playing. We are presently working in that direction with a luthier partner and went as far as building a prototype, which is actually being revised after the first battery of tests. As future perspectives, we believe in incorporating some minor changes in standard guitar projects that empower certain guitar areas and open new paths for percussive exploration.

NOTATION

The many examples, recommendations, and discussion on notation can inform the building of notational systems (as seen in Carpenedo, 2020, p. 75-81), and could even go as far as helping in the establishment of some conventions, if the conditions are given. They also function as a catalog of existing notation for each described PR or SF.

CLUSTER AND OTHER STATISTICAL ANALYSIS

We have made some preliminary attempts at using cluster analysis techniques to enable a comprehensive analysis of the collected data. The results are particularly promising to style prediction/identification, but further exploration can reveal other applications.

STYLE CHARACTERIZATION

The kind of analysis we carried out demonstrated considerable potential in understanding the characteristics of the studied genres. That could be greatly enhanced with cluster analysis, as mentioned.

DEVELOPMENT OF PEDAGOGIC MATERIAL BASED ON HARD EVIDENCE

The conclusions drawn from statistical analysis, along with the extended description of percussive playing, can be adapted (simplified) in the form of instructional material focusing on the more representative percussive occurrences.

ACADEMIC EDUCATION

Especially relevant is the research interest in **influencing the guitar curricula** in the institutions I work (UEMG and UFMG), by incorporating the results into the practice of teaching at basic, undergraduate, and graduate levels. This can lead to the creation of new courses and the inclusion of new content into existing ones. The expected effect is an increase in the versatility of the students of the institutions. We emphasize that the use of the guitar as a percussive instrument is particularly interesting for students aiming to work in public basic education, where the rhythmic work based on percussion instruments is a classic methodology.

TIMBRAL MAP OF PRS

We discussed that making sense of all the timbral variety of the SF/PR is a complex task. Not only do we lack the vocabulary to describe timbre, but also the many aspects of this feature of the sounds vary in ways that are not necessarily correlated. Schneider (2015, p. 154-155) puts this problem in the following terms:

> Unfortunately, the ear does not perceive timbre exclusively in this manner [as spectrum], as we have since learned that the quantification of timbre is far more complex than the simple definition of overtone dynamics. But these attempts earlier in the century pose a very interesting question: *can* there be a scale of timbre? (…) the musical parameter of timbre is itself defined by a series of parameters that, counting the variations of vibrato and the elements of the time envelope, number at least ten. Any parameter varies only one value, so there can be a scale for that aspect of the sound. But if more than one value is altered at the same time, the overall timbral perception cannot be defined by a single term; therefore, there *cannot* be a scale of timbre, since timbre is a multidimensional phenomenon.

Illustrating that thought, how do we perceive timbre when the At/Rs ratios remain stable while the spectrum gets brighter or darker, or more or less inharmonic? What does it mean when two or more sounds have different spectral distributions of energy but similar spectral centroids? Those are questions that are still being answered, if they even have a definite answer.

That considered, a useful way of organizing the timbre of the PRs is assessing their "bright" or "dark" qualities. A promising direction to address that with is the use of softwares for analysis of timbre, such as the *timbreID external collection for PureData* (BRENT, 2010). It enables an analysis through *bfcc*, a descriptor that divides the sound spectrum in small psychoacoustically weighted bands[162], correlating them to human hearing. It then analyses how much energy a given sound has in each band. It is a dynamic descriptor that analyses small sound samples (eg, 90 milliseconds) and issues a corresponding list of numeric values, repeating that for the next frame until the whole sound sample is covered. That enables the description of the timbral evolution of the sounds. All the values of a given sound can be then compared with those of

[162] Narrower at the basses, wider at the higher frequencies.

another, to measure their "timbral distance" with accuracy. That can be made also between values of all the sounds within larger samples, comparing this "distance"[163] among all of them. Algorithm *t-sne* can be then used to generate a kind of "2D map" that expresses the complex relation among their timbres.

We[164] conducted a preliminary run of the method with a sample of approx. 1200 percussive guitar sounds (circa 5 samples of approx. 240 different PRs extrapolated from the FH Code), and then narrowed that to a representative selection of 68 sounds including all *main group* SFs. The results were organized in a map with SF identification, which is shown in Fig. 176 below:

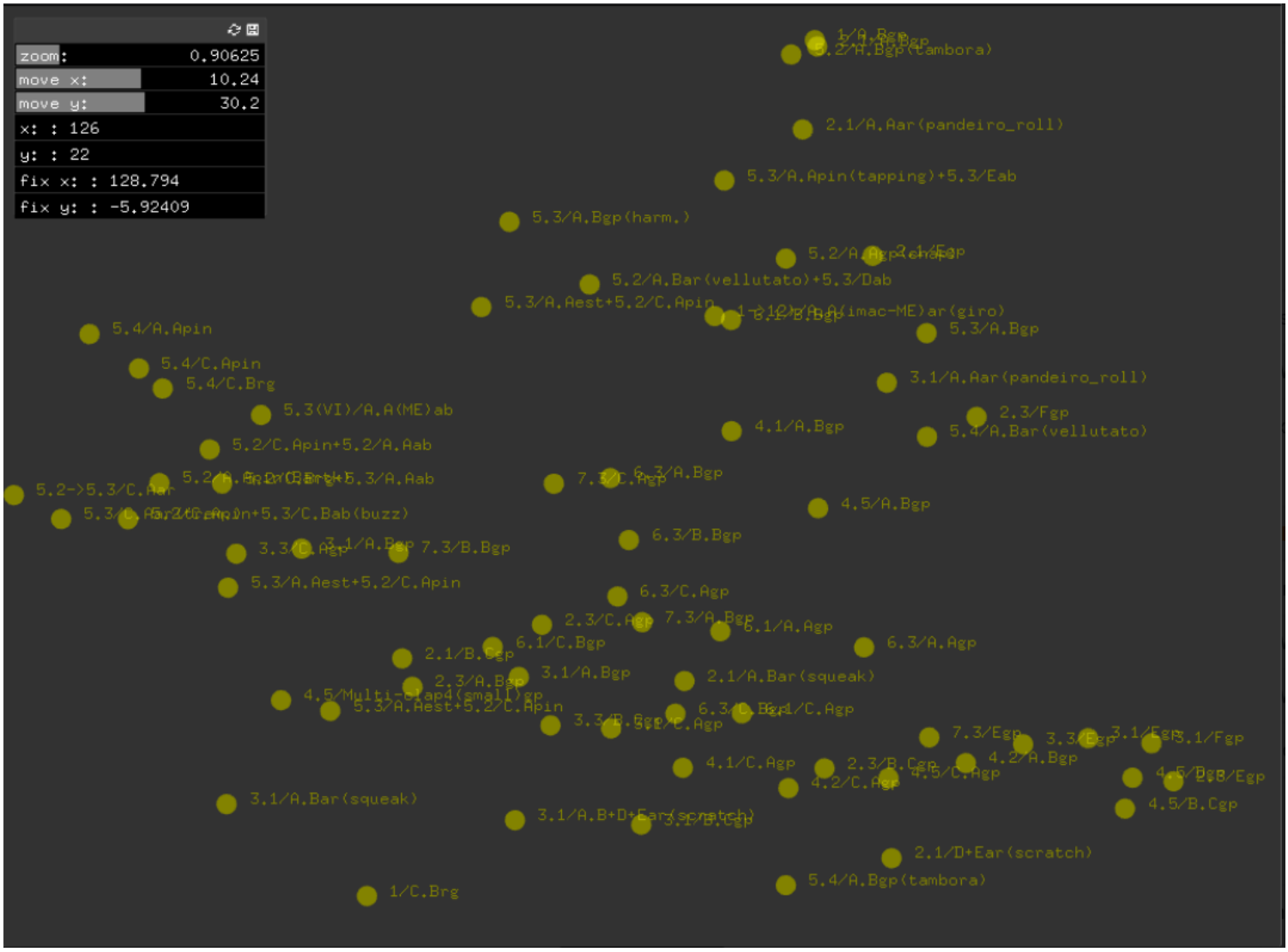


Figure 180: Timbral map of 68 SFs deduced from the FH Code.

[163] Which is, in fact, an Euclidean projection.

[164] In this analysis we are working with prof. Rogério Barbosa, from the Department of Composition at UFMG.

Some aspects of the timbre analysis and the final visualization must now undergo improvements to guarantee meaningful results and a map with practical visualization. Those refinements are presently under elaboration.

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GLOSSARY

Action: The resulting interaction of an action from the instrumentalist over the instrument. Does not necessarily include movement. It is coded in minuscule letters.

PACT Model: A set of concepts, codes, and tools to understand, analyze, and manipulate percussive playing. It is based on the definition of "percussive", the consideration of the role of the instrument, and the separation of elementary events of percussive playing into four vectors, of which the last – the sound result – is not coded.

Analysis Form: A form in which several variables of analysis are gathered. They are coded, for quicker use.

Associated Percussive Resources – APR: Formed when two actions merged in the same movement are executed by the same hand, forming a perceptual aggregate whose constituents – two or more sound results - are still recognizable.

Body Part: One of the six parts of the hand-arm complex or their sub-parts, as defined in Chapter One. It is coded in capital letters.

Composite Percussive Resources – CPR: Formed by the simultaneous execution of two independent actions, one for each hand, generating only one sound result.

FH Code: A code that assigns letters and numbers to the different elements that constitute the PR (area, body part, action), called *primary descriptors*, establishes several *secondary descriptors* to complement them, and defines several operators to combine the descriptors into a **code line** that defines a PR or family. By adding or removing descriptors, it is possible to navigate through different analytic levels, an operation that should be made always with attention to be consistent.

General Family – GF: A group of PR brought together by the exclusion of all secondary descriptors and sub-parts of the main descriptors.

Guitar Area: One of seven parts of the instrument or their sub-parts, as defined in Chapter One. It is coded in numbers.

Integration: The process of merging or alternating two or more TG. Can also be used to address the combination of PR of different natures.

Level Change: The operation of augmenting or cutting secondary (or, rarely, main) descriptors of an FH code line, focusing or distancing the analytical and descriptive level.

Main Group: The 8 groups of SF with the most descriptive power of percussive playing.

Percussive Resource – PR: The result of the application of a *technique* over a *guitar area*, using the guitar as a non-previously-hierarchized whole to produce sounds with a pronounced attack and/or inharmonic spectra.

Percussive Resource Families: Any grouping of PR formed through the consistent exclusion of one or more descriptors.

Percussive Resources Mixtures – MPR: A combination of PR that generates a perceptual aggregate.

Percussive Technical Group: A way of playing that considers the guitar as a non-hierarchized body whose parts are all, *a priori*, capable of sound production. Its objectives are mainly rhythmic and timbral, and it uses attacked and/or inharmonic sounds to achieve them. Its fundamental constituting units are the PR.

Punteado (plucking): A way of playing that considers the strings individually, using the nails at their junction with the flesh to produce clear-toned notes.

Rasgueado (strumming): A way of playing that considers the strings as groups, using also the back of the nails, and incorporating more inharmonic sounds.

Restricted Family – RF: A fully described PR that uses in its formulation the operator _OR_ to accommodate similar PR in the same code line.

Sequences: Idiomatic successions of PR whose technical costs are low and that can, therefore, be executed at high speeds.

Sound Family – SF: A group of PR brought together by the exclusion of all secondary descriptors.

Standard Playing Position: The most common posture for playing modern classical guitar, with the instrument sustained in the left leg and using a footstool or ergonomic support. The hands have definite roles and certain optimal placements that were developed for *punteado* and *rasgueado.*

Technical groups – TG: A certain way of playing whose various techniques share common technical and musical features.

Technique: The sum of a body part and an action. The performer´s contribution to a PR.

Tocautoria: An activity that brings creation and practice together and is developed by a *composite actant* formed by the union of the instrument and the instrumentalist.

APPENDIX

A - LIST OF MENTIONED WORKS

	Work	Year	Composer	Reference
1.	11 Studies		Benjamin Verdery	LUNN, 2010
2.	A Japanese Saga: Laputa Variations	2020	Stanley Levi	FERNANDES, 2020a
3.	A Sad Humoresque		Phyllis Tate	LUNN, 2010
4.	A Whisper in the Desert		Brad Richter	LUNN, 2010
5.	Ahnk	2011	Roberto Victorio	VICTORIO, 2011
6.	Airtap	2006	Erik Mongrain	MONGRAIN, 2006
7.	Algo	1977	Franco Donatoni	DONATONI, 1977
8.	Amadeirado	2018	Bruno Avendanha	AVENDANHA, 2018
9.	Arien IV, Solo Music for Guitar	1986	Sidney Corbert	JOSEL AND TSAO, 2014
10.	As Entranhas da Terra	2017	Stanley Levi	FERNANDES, 2018a
11.	*Aulodia per Lothar*	1965	Bruno Maderna	MADERNA, 2011
12.	Boogie Shred	2010	Mike Dawes	DAWES, 2010
13.	*Broken Rhapsody*	2013	Declan Zapala	ZAPALA, 2013
14.	Canticum	1968	Leo Brouwer	BROWUER, 1973
15.	Cenas Infantis	2011	Stanley Levi	FERNANDES, 2011a
16.	Cielo Abierto	1994	Quique Sinesi	SINESI, 2009
17.	Comunhão	2017	Stanley Levi	FERNANDES, 2017c
18.	Cuatro piezas latinoamericanas: IV (malambo)		Guido Santórsola	SANTÓRSOLA, 2017
19.	Dance of the Last Rhino	2014	Jon Gomm	GOMM, 2014
20.	Drifting	2006	Andy Mckee	MCKEE, 2006
21.	Eclusas	2018	Silvio Ferraz	FERRAZ, 2018
22.	Ella	2012	Ramiro Pons	PONS, 2012
23.	Escambo	2020	Sérgio Freire	FREIRE, 2020
24.	Escutorium, ou a hermenêutica das relações livres num mundo pós-líquido	2017	Thiago Diniz	DINIZ, 2018a
25.	*Estampida*	1968	G. Kröll	SCHNEIDER, 2015
26.	Estudo n. 1 "...sobre arpejos e notas mudas..."	2013	Daniel Murray	MURRAY, 2013
27.	*Feeling Good Inc*	2017	Luca Stricagnoli	GORILLAZ, 2017
28.	Firefox Eins	1993	Helmut Oehring	JOSEL AND TSAO, 2014
29.	Four Poems of García Lorca	1977	Reginald Smith-Brindle	SMITH-BRINDLE, 1977
30.	Hunter's Moon	2010	Andy Mckee	MCKEE, 2010
31.	Incroito Scarllato	2011	Mauricio Pisati	PISATI, 2017
32.	In-side-out-side-in...	2001	Simon Steen-Andersen	JOSEL AND TSAO, 2014
33.	Jongo	1993	Paulo Bellinati	BELlINATI, 1993
34.	Kitara	1971	Jans-Joachim Hespos	JOSEL AND TSAO, 2014
35.	Ko-Tha	1967	Giacinto Scelsi	SCELSI, 2010
36.	Kurze Schatten II	1985	Brian Ferneyhough	FERNEYHOUGH, 1989
37.	La Espiral Eterna	1973	Leo Brouwer	BROWUER, 1973b
38.	La Ressurrección de Indoamérica	2012	Eduardo Cáceres	CÁCERES, 2012a
39.	La Toqueteada	2014	Thiago Colombo	FREITAS, 2014

40. Las Seis Cuerdas	1963	Alvaro Company	COMPANY, 1965
41. Los Caprichos	2004	Catherine Milliken	JOSEL AND TSAO, 2014
42. Lullaby (for Illyan Rainbow)	1972	Peter Maxwell Davies	JOSEL AND TSAO, 2014
43. Lux et tenebris	2003/2009	Sánchez-Verdú	JOSEL AND TSAO, 2014
44. Malambo Mulambo	2017	Stanley Levi	FERNANDES, 2017d
45. Motets		Arthur Kampela	KAMPELA, 2017
46. Movementi für Gitarre	1969	Siegfried Behrend	SCHNEIDER, 2015
47. N-Dimensional	2006	Gabriel Data	DATA, 2006
48. Not Reconciled	2011	Ming Tsao	JOSEL AND TSAO, 2014
49. November Memories		Reginald Smith-Brindle	LUNN, 2010
50. O Fusca Azul e a Festa Tilelê	2015	Stanley Levi	FERNANDES, 2018c
51. Paisaje cubano con campanas	1986	Leo Browuer	FRENGEL, 2017
52. Passionflower	2011	Jon Gomm	GOMM, 2011
53. *Percussion Study II*	1993	Arthur Kampela	KAMPELA, 1993
54. Percussive Study n. 1	1990	Arthur Kampela	KAMPELA, 1990
55. Quattro Pezzi	1974	Aurelio Peruzzi	SCHNEIDER, 2015
56. RAP	1994	Claudio Ambrosini	JOSEL AND TSAO, 2014
57. *Reminiscent Rain*	2019	Jon Hart	HART, 2019
58. Royal Winter Music I - Gloucester	1976	Hans Werner Henze	HENZE, 1976
59. Salut für Caldwell	1985	Helmut Lachenmann	LACHENMANN, 1985
60. Seringal	2020	Ramiro Pons	PONS, 2020
61. Shadows		William Albright	LUNN, 2010
62. Si le Jour paraît...	1963-1964	Maurice Ohana	OHANA, 1972
63. Silhuetas de uma Dança Imaginária	2011	Rafael Nassif	NASSIF, 2011
64. Sonata para guitarra Op.47	1976	Alberto Ginastera	GINASTERA, 1978
65. Telepathy	2014	Jon Gomm	GOMM, 2013
66. Tellur	1978	Tristan Murail	MURAIL, 1978
67. Tensibillia II	2010/2018	Rogério Vasconcelos	VASCONCELOS, 2018
68. The Future	2014	Luca Stricagnoli	STRICAGNOLI, 2014
69. The Impossible	2012	Mike Dawes	DAWES, 2012
70. The Mirror	2014	Oscar Méndez	MÉNDEZ, 2016
71. These Moments	2011	Antoine Dufour	DUFOUR, 2011
72. Toccata Árida: I- Vozes II – Solidão III – Ruídos IV – Brilhos e Tilintares	2008	Stanley Levi	FERNANDES, 2008a
73. Tombola	1963	Arne Mellnäs	SCHNEIDER, 2015
74. Torre de Espelhos	2015	Thiago Diniz	DINIZ, 2018b
75. Trilha sem Rumo	2009	Stanley Levi	FERNANDES, 2009
76. Um mismo Mí	2012	Germán Brull	BRULL, 2012
77. *Vanera para bailar solito*		Mariano Telles	TELLES, 2017
78. Veneno	2013	Sérgio Rodrigo	RODRIGO, 2013
79. Versus	1974	Xavier Benguerel	SCHNEIDER, 2015
80. Vril	2020	Roberto Victorio	VICTORIO, 2020
81. Zwei Skissen	1981	Klaus Hübner	JOSEL AND TSAO, 2014

B – ANALYSYS FORM (AF)

Obra (incluir fonte(s)): ☐ Partitura ☐ Gravação

Duração da obra:

1. Recursos

Quais Recursos? (Conferir, descrever com nome ou expressão, descrever com código completo) - Quais Famílias (sem descritores secundários, só Mãos, e também sem mãos)? - Como toca? (Relacionar cada código a uma descrição em até 5 palavras de como é executado, se necessário) - Como soa? (Relacionar cada cógido a uma descrição tímbrica (até 5 palavras), dinâmica e de duração) Quão usado é? (1 – uma vez ou esporadicamente 2 – pouco 3 – medianamente 4 – Muito, ao longo de toda a música 5 - Predominante)

2. Postura (Geral; detalhes; especificidade de algum recurso. Usar código)

3. Violão e Scordatura (descrição do instrumento. Usar código. Falar de outras características importantes, como **afinação**, revestimento, etc.)

4. Amplificação

5. Uso (descrição geral abordando os aspectos técnico-instrumental e técnico-musical/discursiva da utilização dos recursos. Caso algum recurso apresente especificidades, descrever)

   a. Função (descrição técnico-musical. O que os recursos dizem, na obra?)

Discursiva (contrastante, expositiva, transformacional, cadencial, exclamativa, outras. Descrever as funções predominantes)

Textural (**1º Plano** (figura): melodia(s), interjeições, outros materiais de destaque. **2º Plano**: acompanhamentos/grooves, contracantos, condução melódica de baixos, outros materiais com algum relevo. **3º Plano**: Acompanhamentos/grooves, preenchimentos harmônicos, ostinatos, outros materiais secundários).
Obs.: Nem sempre a textura possui o 2º Plano.

b. Integração (descrição técnico-instrumental/musical)

Forma[165] (5. Transformação / 4. superposição ← 3. integração linear/superposição virtual (microalternância) → 2. alternância → 1. separação/isolamento)

"Quantitativo" (em relação a outras técnicas. 1- Quase nada 2- Pouco 3 – Meio a meio 4- Predominância 5 -Só percussão)

6. Notação (descrição do sistema de notação e levantamento dos caracteres utilizados)
   a. Número de Pautas:
   b. Função das pautas:

[165] A diferença entre 2 e 3 está sobretudo na velocidade, mas também no tipo de textura e impressão criados. *Isolamento* pode se referir, além da sistemática separação das ocorrências de RP do restante do discurso (por ex. por pausas), aos fato dos RP estarem "confinados" a seções (de diferentes graus hierárquicos superiores ao *período*) específicas da obra, mesmo que nelas não ocorram de forma exclusiva: basta que sejam predominantes e que haja um contraste nítido com as demais seções (estejam ausentes nelas). Este tipo de isolamento sempre virá acompanhado da função "contrastante", e pode chegar a configurar algo como uma espécie de *alternância* hipermétrica.
Também é possível uma integração por "transformação", em que uma técnica percussiva que usa ponteado ou rasgueado lentamente se transforma em não-percussiva, ou o caminho contrário.

c. Caracteres utilizados e sua função:

d. Descrição sucinta do sistema notacional (apenas se necessário para complementar as informações anteriores):

Códigos

1. Recursos: ver tabela própria
2. Postura: 1. Banquinho 2. Apoio ergonômico (qual) 3. Sobre a Perna (D, E) 4. Violão Deitado 5. De pé (correia) 6. Outros apoios (chão, tripé, etc.) 7. Outros (descrever). Incluir ângulo do violão e oturas informações importantes.
3. Violão: 1. Nylon (a) clássico (a1 tradicional, a2 treliça, a3 double top; a4 flamenco) 2. Aço (a) folk, b) tradicional, c) Outros (steel, etc.) 3. Outros (sem corpo, semiacústicos, cordas especiais, etc.). Scordatura: Usar sequência das cordas em maiúsculas. "b" (minúsculo) = bemol. # = sustenido. Se microtonal, escrever afinação aproximada "+ MICROTONAL". Se houver uso do capo, escrever "+ CAPO-X(nnn)", onde x é o número da casa onde o capo é colocado (em caso de múltiplos capos, escrever o número da casa seguido das cordas pressionadas entre parênteses ("n")). Se há várias diferentes, escrever separando por "+" (no caso de várias microtonais ou com capo diferentes, separar cada par "afinação + MICRONTONAL + CAPO-X" por parêntesis).
   Incluir: corte no corpo, outras características (incluindo acessórios).
4. Amplificação: A (não), B (microfone), C (linha), D (outros). Especificar.
5. Desenvolveremos o código após alguma experiência direta na avaliação
6. B. 1. Indicar manulação 2. Pauta específica para técnicas percussivas (separa *Grupos Técnicos*) 3. Pauta específica para recursos sem altura definida (separa alturas definidas e indefinidas) 4. Diferenciam regiões do instrumento (por ex., golpes na caixa). 5. Pautas separam partes do corpo do instrumentista[166] 6. Diferenciação de materiais musicais não relacionados à diferenciação entre grupos técnicos 7. Mulifunção/Indefinido[167] 9. Outro (detalhar)

C. 1. Diferenciam manulação 2. Diferenciam *Grupos Técnicos* 3. Diferenciam sons de alturas definidas e indefinidas 4. Diferenciam *regiões* 5. Diferenciam *técnicas* 6. Diferenciação de materiais musicais não relacionados à diferenciação entre grupos técnicos 7. Mulifunção/Indefinido[168] 9. Outro (detalhar)

[166] Ainda não foi observada ocorrência deste tipo na literatura (02.08.2019)

[167] Utilizar este marcador quando pautas ou caracteres tiverem diferentes funções, o que tende tornar seu uso *convencional* (exigindo memorização de cada caractere) ao invés de *sistemático* (organizado a partir de uma lógica global). Se existirem categorias claramente diferenciadas (de fácil identificação visual) de pautas/caracteres, pode ser melhor marcar cada função separadamente.

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C – STRUCTURE OF THE INTERVIEWS

PART 1 – ARTISTIC PROCESSES

1. Como você organiza seu estudo, e que tipo de coisas estuda?

   How do you organize (daily, yearly) your study/training, and which kinds of things do you practice/study?

2. Como compõe?

   Could you describe your compositional process in three sentences?

3. Que relações há entre esses processos?

   What relations exist between the two processes above (preparing the performance and composing)?

4. *You´re a constant researcher and inventor. What kinds of difficulties do you face in that process?*

PART 2 – GUITAR PERCUSSION

5. Equilíbrio recursos percussivos vs outros grupos técnicos

   How do you manage to balance the percussion and the other guitar sounds?

6. Que cuidados técnicos e que refinamento tem ao tocar percussão no violão?

   What technical care and refinement do you aim at when percussing the guitar?

7. Explora diferenças tímbricas no tampo e laterais? E nas partes do corpo?

   How do you explore the differences in tone of the various parts of: the soundboard, the sides, your body?

8. Alternância de Grupos Técnicos

   How do you connect (technically) the various percussive elements with "normal" playing? For example, when the percussion takes the hand away from the strings and vice-versa.

lógica global). Se existirem categorias claramente diferenciadas (de fácil identificação visual) de pautas/caracteres, pode ser melhor marcar cada função separadamente.

PART 3 – THE GUITAR

9. Fale sobre a estrutura física do violão em relação com os recursos percussivos.

   What kind of percussion it is possible to achieve with a guitar? What can you NOT achieve?

10. Modifica, modificou ou pensa em modificar/construir um violão com características especiais para percussão? Quais seriam elas?

    How was the process of developing your new special guitar(s)? What kind of features did you look for? Are you satisfied?

11. O que falta nos violões "normais" para uma boa performance percussiva?

    What´s missing in the normal guitars for good percussive playing?

12. Que cordas você utiliza?

    What strings do you use?

13. Nylon vs Aço

    Do you play nylon? What are the differences?

PART 4 - AUDIO (CAPTURE, AMPLIFICATION, RECORDING, AND EDITION)

14. How do you capture and amplify tour guitar for live shows?

    Equipment, positioning of mics or piezos, soundboard, software, etc.

15. Is It different from your recording procedures? How?

16. Do you use different capture systems for each Song? How they differ from each other? What level of electronic control do you like to have over the sound you´re producing?

PART 5 – DIFFUSION

1. Que papel a internet (Youtube, sites, blogs, streaming) teve e tem na sua carreira?

   What´s the role of the internet (Youtube, sites, blogs, streaming (Spotify)) in your career?

2. Que papel a mídia tradicional (discos, TV, rádio, partituras) teve e tem na sua carreira?

   What´s the role of traditional media (CD´s/DVDs, radio, TV, scores) in your career?

3. Há outras formas de difusão importantes de seu trabalho?

Are there any other relevant media for your work?

4. Você possui profissionais/empresas que cuidam da sua divulgação, marketing, publicidade?

   Do you work with professionals/companies that take care of your promotion/marketing?

5. Você está satisfeito com o alcance que sua produção tem alcançado?

   Are you satisfied with the reach your output has achieved?

D – LIST OF COMBINATIONS OF GUITAR AREAS AND BODY PARTS

This list helps visualizing the possible extrapolations from the FH Code, showing the conceivable combinations of body and guitar parts, excluding only what is, by no circumstance, executable. Most of these possibilities, which number close to 2200, can be manifested through different *actions*, generating thousands of different SFs that could house many more thousands – perhaps tens of thousands – of specific PRs. To that, we must still add the many possible CPRs.

All of this multiplicity constitutes only what is presently deductible from the FH Code, which means there is still long roads open for exploration, both inside and outside those boundaries as well.

1									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
2.1									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
2.2									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
2.3									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
3.1									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
3.2									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
3.3									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
4.1									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
4.2									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
4.3									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
4.4									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
4.5									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
5.1									
					C.A	C.B			
5.2									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
5.3									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	ab
5.4									

	A.B				C.A	C.B			
6.1									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
6.2									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
6.3									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F
7.1									
A.A	A.B	B.A	B.B	B.C	C.A	C.B		E	F
7.2									
A.A	A.B		B.B	B.C	C.A	C.B			
7.3									
A.A	A.B	B.A	B.B	B.C	C.A	C.B	D	E	F