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Notational types in scores for guitar and electronics

Abstract

Notation is one of the factors upon which the longevity of mixed music is dependent. In this paper, I first discuss how academic production has conceived representation in works with electronics and dealt with inherent problems. After, I present the nine representational strategies I have identified in repertoire for guitar and electronics. These notational types aid understanding how composers conceive the interaction between the acoustic and electroacoustic parts in mixed music performance. Their simultaneous use, even if redundant, can help understanding instrumental performance issues and contribute to the preservation of the electronic part. I conclude with some considerations about the relevant strategies and their importance for the performance and permanence in the repertoire.

Keywords

guitar, mixed music, notation, tape, live electronics

Cover Page Footnote

Lecture given at The 21st Century Guitar Conference 2021 under the title: Musical Notation in Music for Guitar and Electronics.

Notational types in scores for guitar and electronics¹

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Notation is one of the factors upon which the longevity of mixed music is dependent. In this paper, I first discuss how academic production has conceived representation in works with electronics and dealt with inherent problems. After, I present the nine representational strategies I have identified in repertoire for guitar and electronics. These notational types aid understanding how composers conceive the interaction between the acoustic and electroacoustic parts in mixed music performance. Their simultaneous use, even if redundant, can help understanding instrumental performance issues and contribute to the preservation of the electronic part. I conclude with some considerations about the relevant strategies and their importance for the performance and permanence in the repertoire.

The notation of mixed music is pointed out as a problematic issue by many authors (Couprie, 2003 and 2011; Gallo, 2006; Leite, 2012; Malt, 2015; McNutt, 2003). According to McNutt (2003), a score of mixed music that does not offer the instrumentalist the information required to understand the electronics creates a “barrier” for the musical performance (p. 298). This lack of information might also affect the longevity of the work, as stressed by authors like Canazza and Vidolin (2001) and Chadabe (2001). As well as the notation, this is related with the obsolescence of the technological means used for the electroacoustic part. Information on the electronics is essential when it is difficult to access specific rare devices, and so needing to use other hardware; or when the software has been updated, turning impracticable the use of the original patches. The lack of information on the electroacoustic discourse therefore makes it difficult to recreate a piece according to the composer’s intention and hinders the restoration of the works with obsolete systems.

I have recently investigated repertoire for guitar and electronics and was confronted with these issues of technological obsolescence. Many of the works I analysed can no longer be performed (Guerrero, 2020). Some works need to be restored or updated for new software and many others cannot be recovered due to an insufficient level of information on the elaboration of the electroacoustic part (e.g., when the data doesn’t provide proper instructions to update or create a new patch). Therefore, as I intend to demonstrate, the long-term sustainability of a mixed music work and the possibility of it being performed, is not only associated with technology conservation but also with the quality and redundancy of its forms of representation.

In my research, I could identify unusual systems and different ways to represent the relationship between the sound of the guitar and the electronic part (Guerrero, 2020). In electroacoustic and mixed music research fields the term *representation* is usually used to cover a wide variety of information related to the performance of the mixed music repertoire, which goes beyond traditional notation and may address instructions for system operations and graphical representations of the performer, the arrangement of loudspeakers² and sound events that may not be represented by traditional notation (Guerrero, 2020). This paper is concerned with the representation of the electronics part and/or the performer-electronics interaction. I present the results of analyses of 54 pieces for (classical) guitar and electronics³, in which I

¹ Lecture given at The 21st Century Guitar Conference 2021 under the title: Musical Notation in Music for Guitar and Electronics.

² Which, due to the spatialization conceived for certain works, can be a fundamental instruction.

³ I identified a total of 286 works for solo guitar and electronics composed between 1967 and 2018, but only had access to 54 of them.

identified the types of notation and performance instructions; the strategies used for the synchronization of acoustic and electroacoustic sounds; and the kind of instructions for operating the systems (Guerrero, 2020).

Representation in mixed music

As mentioned above, flutist and researcher Elizabeth McNutt (2003) claims that a mixed music score may not be very effective in providing sufficient information for its analysis, and the preparation of a musical performance. According to this author “the written score ideally bridges the gap between composer and performer. However, in electroacoustic compositions in particular, the score is often a barrier the performer must overcome in order to ‘find’ the piece” (McNutt, 2003, pp. 297-298). On this point, the composer Petra Bachratá (2010) claims that the musical score has the capacity to represent only some aspects of the sound phenomenon and this partiality should seek reinforcement in listening. We could consider that, in part, the same claim is also true for music “purely” instrumental. Although the consolidation of certain practices makes us believe that the instrument's sound is fully covered, musical notation is not able to cover the entire characteristics of sound and its ways of organization. Therefore, it is possible to consider that the lack of a convention for the notation of electroacoustic sounds makes their reproduction more difficult. Moreover, works with live electronics performed in real time can generate further difficulties with their notation about how the performer should interact with the electronics. Believing that artistic expression should not be limited by technical and documentation issues, I intend to demonstrate that there can be several levels of correspondence between sound/gesture and its representation, and that this association can reach a greater or lesser degree depending on the systems used, the type of sound events present in the musical discourse and the notational strategies selected.

By identifying different strategies of notation in mixed music with guitar, I understood how important a good representation is for the understanding of the electroacoustic part and its synchronization with the performer, and how fundamental it is for the permanence of the repertoire. For example, the piece *Ongaku for Guitar and Electronic Sound*,⁴ by the Japanese composer Kenjiro Ezaki (1967), which is probably the first work for guitar and electronics, cannot be played anymore. According to Quinn (2003), the tape, which should be requested from the publisher, is lost. Unfortunately, the information available and the type of notation used to represent the electroacoustic part are not sufficient to reconstruct it. Another important point that guided this work is the understanding, proposed by the composer Mikhail Malt (2015), that the patch is a way of representing the sound events performed in a work. This author sees the patch as an “electronic tablature” (p. 69), which can be essential for the documentation of the system used.

The concern with the notation of electroacoustic sounds is not a recent topic in the academic area, nor is it restricted to the practice of mixed music. Below, I present how Zampronha (2000) addresses the issue of representation and notation in electroacoustic music in a broader way. Zampronha's work was selected because it proposes a clear and systematic typology of electroacoustic music that includes a separate category for mixed music.

Zampronha's typologies

The representation of electronic sounds, either in isolation or inserted into a work, can serve several purposes. As mentioned above, my focus is on the representation's capacity and effectiveness in transmitting to the performer the information for the interaction with the sound events of a mixed work, however, there are intersections between the different types of notations and their purposes.

⁴ *Ongaku* means music in Japanese language.

Edson Zampronha (2000) claims that there are five score types in the context of electroacoustic music: 1) the listening score, the purpose of which is the study of the work; 2) the score of realization, with the function of supporting the creation; 3) the performance score; 4) the registration score, with a documentation goal; and 5) the sonorization score, that instructs the sound diffusion.⁵ It is worth mentioning that these types are not exclusive and are used simultaneously in the investigated repertoire. In my analyses I used the performance scores of the pieces.

Notational types in scores for guitar and electronics

A result of my analysis of 54 works for solo guitar and electronics, was the observation of nine types of notations of the electronics part and/or the performer-electronics interaction: 1) Traditional notation; 2) Trigger points; 3) Metronomic indication; 4) Chronometric indication; 5) Graphic representation of electroacoustic part; 6) Partial notation of sound events (cues); 7) Textual description of the electroacoustic part; 8) Tablature; and 9) Textual indications for the performer. Although many of these types are used in combination with each other, they will be addressed separately for the clarity purpose. With the exception of tablature, which is a type of notation very associated with plucked stringed instruments, the other notational types can be found both in repertoires of other instruments and electroacoustic music. The difference in the application of notational types, as well stated by Zampronha (2000), lies in their different purposes in musical creation and practice. As already mentioned, the emphasis in this work is on the use of these notational types from a performer's perspective.

1) Traditional notation

The type of notation allows the representation of both the electroacoustic events and their synchronization with the instrumentalist's actions. Considering the complexity of certain electroacoustic sounds, traditional notation may not be able to fully represent them (just as it does not always represent instrumental sounds). Nevertheless, some composers use this type of notation to partially represent sound events, using rhythmic references and pitch indications, as depicted in Figure 1. Examples of this type of application include the works with tape *Synchronisms No.10* by Mario Davidovsky (1992), *Va(lé)riation 5b* by António de Sousa Dias (2009) and *Waves of Refraction* by John Christopher Nelson (1992); as well as the works with live electronics *I Stole a Bar from Leo*, by José Luís Ferreira (2010) and *Five Pieces for Guitar and Live Electronics* by Ronald Smith (2007). Since this type of notation was found both in works with tape and with live electronics, we can consider that the effectiveness or not of the representational strategy depends on a series of more complex variables than just the electronic systems used to play the electroacoustic part, recurrently discussed only in the duality between real time and deferred time (tape and live electronics).

Instrumental tape

Traditional notation is also used in the mixed music repertoire to represent sounds pre-recorded by traditional instruments, especially in situations where there is a kind of play along. In my thesis, this practice was called *instrumental tape*. Examples of this kind of application can be found in the pieces: *Per Suonare a Due* by Leo Brouwer (1973) and *Looking for Claudio* by Barbara Kolb (1975). Although these works can be played by ensembles, they were created specifically for guitar and tape.

⁵ Zampronha (2000) exemplifies his typological proposal with the following works: the score of Ligeti's *Artikulation* by Rainer Wehinger (listening score); *Williams Mix* by John Cage (score of realization); *Kontakte* by Stockhausen (performance score); *Rosace 5* by François Bayle (sonorization score). Additionally, we can indicate the live-electronics scheme of *Traces* by Bartetzki (2007) as a registration score.

Waves of Refraction
for guitar and tape

by Jon Christopher Nelson

Allegro ♩ = 120
Misterioso Repeat until tape cue for second measure.

guitar

tape

Tape starts about 5^m after the guitar begins. 15^m

pp mf sfz f sfz pp sfz f

pppp sfz p

f mp f sfz sfz mf sfz ff

mf sfz mp f sfz

slide fingers down string 6

ord. 3

Figure 1 Excerpt from John Christopher Nelson's *Waves of Refraction* for guitar and tape. The lower staff partially represents the electroacoustic part using traditional notation. Reprinted with permission from *Waves of Refraction* (p. 1), by J. C. Nelson, 1992 (Unpublished typescript).

2) Trigger points

The second notational type recognized was the use of symbols to indicate moments when the performer or the sound engineer must activate system functions, as depicted in Figure 2. In this case, sounds can be triggered, or sound processing turned on or off (depending on the type of system used). It was possible to identify the separate use of this type of notation in many works for guitar and electronics, with the omission of any other representation of the sound events. The use of trigger points can be found in works like: *Afterimage 6 for Guitar and Computer Processing* by Ronald Parks (2003); *Mutazione* by Rael Gimenes (2008); *Deconstructing Dowland* by Natasha Barrett (2020); and *Inside a Cloud of Butterflies* by Jon Christopher Nelson (2011).

3) Metronomic indication

The metronomic indication is a type of instruction that does not require much explanation here. However, it is worth mentioning that, especially in the practice of the repertoire with tape, this type of instruction can be fundamental for working with click-track.⁶ This strategy was found in works like: *Diálogo con Manuel Castillo* by Rafael Díaz (2013); *Fideal* by Marcela Pavia (2009); and *Krypto* by Enrique Mendoza (2018).

⁶ Click track is a series of audio cues used for synchronization, which the performers receive through headphones.

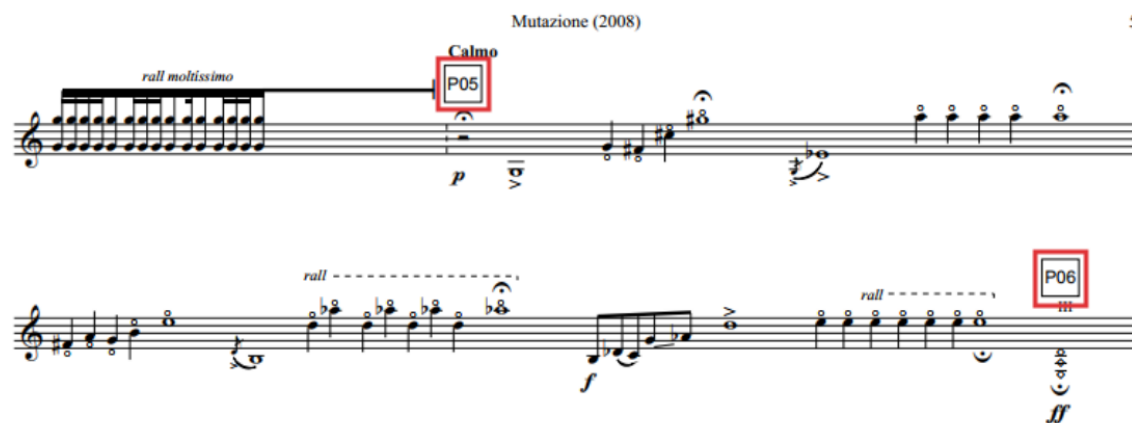


Figure 2 Excerpt from Rael Gimenes' *Mutazione* for guitar and electronics. Trigger points indications are outlined in red. Reprinted and adapted with permission from *Mutazione* (p. 5) by R. B. Gimenes, 2008 (Unpublished typescript).

4) Chronometric indication

The use of chronometric indications has been found both in works with tape and with live electronics. In the repertoire with tape, this type of indication is used as a strategy for the synchronization of the performer with the electroacoustic part, as depicted in Figure 3. That is, it is used to situate moments when a specific instrumental action must correspond to the minute on the recording. In the repertoire with live electronics, the chronometric indication is associated with the instrumental part alone, having the function of indicating the duration of notes in certain sections. Examples in the repertoire include *Music for Guitar and Tape* by Cort Lippe (1991); *Mutazione* by Rael Gimenes (2008); *Sinais no Tempo* by Jaime Reis (2007); and *Wildflower* by Federico Bonacossa (2016).

5) Graphic representation (of the electroacoustic part)

The fifth type of notation identified was the graphic representation of the sounds. In the analysed works, this type of notation was used more frequently in works with tape. An example is the work *Mimetismo* for guitar and tape by Stéphane Roy (1992). Like with traditional notation, this type of instruction is less recurrent in works with live electronics. This is probably due to the level of variability of sounds that can be generated by the system in real time. In consequence, there is a risk that a graphic representation will distance itself a lot from the sounds generated by live electronics. However, real-time processing that has less variability in events generated by the sound input can be represented graphically without hindering the understanding of the synchrony between the acoustic and electroacoustic parts. An example of a very detailed representation of the sound events of the electroacoustic part is the score for *Lambda3.99* by Mikhail Malt (1994). MIDI-generated graphics are used to represent the sound events of the electroacoustic part. The indications of pitches, sound envelopes and polyphonic events help establish a correlation between the graphic representation and the sounds, as depicted in Figure 4. The electronic part of this work was conceived in a pre-recorded way, with small tapes triggered during the performance. This type of representation is highly useful for the analysis of the piece and preparation of the performance because it allows the instrumentalist to have a very clear idea of how the synchronization should occur.

Figure 3 Excerpt from Jaime Reis' *Sinais no Tempo* for guitar and electronics. Chronometric indications are outlined in red. Reprinted and adapted with permission from *Sinais no Tempo* (p. 2) by J. Reis, 2007 (Unpublished typescript).

Figure 4 Excerpt from Mikhail Malt's *Lambda3.99* for guitar and electronics. The red arrows indicate the graphical representation of the electroacoustic part. Reprinted and adapted with permission from *Lambda3.99* (p. 13) by M. Malt, 1994 (Unpublished typescript).

6) Partial notation of sound events (cues)

It was possible to verify the use of cues to partially represent the sounds of the electroacoustic part. This type of indication is used in several ways: traditional notation, verbal description of sound events or by using onomatopoeia. One of the functions of this strategy is to enable the performer to identify specific points of the recording. As an example, this kind of notation was used in the work *Smile* by Rafael Díaz (2004).

7) Textual description (of the electroacoustic part)

Textual description is a strategy widely used to describe technical terms of the electroacoustic part, such as the description of certain filters, procedures and effects used. This type of representation can be found in *Quaderno* by Flo Menezes (2007) and *Traces* by Andre Bartetzki (2007).

As previously demonstrated, the repertoire for mixed music is very susceptible to problems with its permanence. Given the context, this type of notational resource can be very important, not only to instruct the performer, but also to allow documentation and longevity of the repertoire, enabling a restoration of the electroacoustic part, if necessary.

8) Tablature

Tablature, a notational type widely used in the 16th, 17th and 18th centuries, is currently less used in the classical guitar context. However, for some works of mixed music, this representational model may be fundamental for musical performance, as is the case of the work *L'Apparizione di Tre Rughe* by Roberto Doati (2003). In this piece, the interactive system is powered by a video input (instead of an audio input, more common in works performed in real time). The tablature is essential because the work was designed in such a way that the behaviour of the system is responsive to the movement of the guitarist's fingers.

9) Textual indications (for the performer)

The last notational type observed was the textual description of how the performer should behave. That is, instructions for the type of action that the instrumentalist must perform at a certain point in the work. As an example, in the work *Refração*, Ricardo Tacuchian (2010) writes: "improvised rhythms played with the right hand on front and sides of the guitar harmonic body. Reproduce rhythms suggested by the electronics, among others" (p.7). This kind of representation can also be found in the works *RUO* by Diogo Novo Carvalho (2018) and *Traces* by Andre Bartetski (2007). This type of instruction is similar to that found in performance notes.⁷

Final considerations

Once presented with the types of representation found in the mixed music repertoire with solo guitar during my PhD research, I would like to make it clear that there is no single preferred model for notation of electroacoustic sounds, because different interactions between acoustic and electroacoustic sounds will require different representational solutions.

Nonetheless, it was possible to conclude that some forms of representation are used more frequently in works with tape (pre-recorded), whereas others are more frequent in pieces with live electronics (real-time). For example, it was possible to identify that graphic representations of sound profiles are most used in works for tape. Real-time works can use certain sound processing that, in certain cases, do not have an

⁷ In the annexes of my doctoral thesis (Marques, 2020) it is possible to find a catalog with a detailed description of all the notational types found in the works accessed.

obvious causal relationship between the input and the sound event generated by the system. In these cases, a graphic proposal could suggest behaviours of the electroacoustic part that would never be achieved.

In my thesis (Guerrero, 2020), I noticed that the representation of sound events can influence different levels of dependence on the composer. Instructions for operating the system are essential for the performance of this repertoire. In the same sense, when writing a work, the choice of types of notations suitable for analysis and performance in different systems can change the way that the instrumentalist approaches a musical work. Although this statement seems obvious, during my research it became clear that a great deal of important information for the performance of the works and operation of the systems is often omitted. This occurs in some situations due to the close relationship between composers and performers during the elaboration and performance of the works, as in some cases, instructions are not documented because they believe in a common understanding of how things should work.

Considering that the obsolescence of the works is a problem for the repertoire of mixed electroacoustic music, I believe that the convergence of several notational types can favour the documentation of the works and help to prolong the existence of the elements necessary for the performance of this repertoire. There is no single notational type that, if deprecated, will ensure that the obsolescence of the repertoire is avoided. However, the diversity of information on the electroacoustic part, through multiple forms of notation and documentation, can indeed favor the permanence and the restoration and updating capabilities of the works. In addition to guiding the performer to understand the sound discourse and the synchrony between the acoustic and electroacoustic parts, the documentation may help the repertoire to extend its longevity throughout the time.

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