# NOTATING THE NON-NOTATEABLE: DIGITAL NOTATION OF TXALAPARTA PRACTICE

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## ABSTRACT

This paper explores notation practices related to the ancient Basque musical tradition of the txalaparta. It presents the txalaparta practice, introduces the improvisational rules of txalaparta playing, and describes our attempts in creating notation systems for the instrument. Due to the nature of txalaparta playing, Common Western Notation is not a suitable notation, and we will present the notation system we have developed as part of the *Digital Txalaparta* project. This system captures the key parts of playing and could potentially serve for both playback and a rich documentation of what players actually perform.

## 1. INTRODUCTION

The txalaparta is an ancient musical percussion tradition deriving from rural areas of the Basque Country. The instrument belongs to the category of struck idiophones and consists of a variable number of thick wooden planks placed horizontally on two trestles with soft material in between. The planks are struck vertically with heavy wooden batons. The wooden planks typically emit inharmonic sounds, not of any particular pitch, but certain strands in recent developments of txalaparta practice have begun to tune the planks. In txalaparta playing, two or more performers improvise, alternating their beats, through a call-and-response pattern that usually becomes increasingly complex as the performance progresses [1, 2]. The txalaparta is never played by a solo performer: the virtuosity of playing the instrument equally involves the technical skills of the performers as well as the communication established between them, see Figure 1.

The txalaparta is a centuries old tradition, although it lost popularity in the early 20th century, almost disappearing during Franco's dictatorship. However, during the 1960s there was a renewed interest in the tradition, which related to a renewed interest in folk music, diverse projects of preserving Basque culture, and a strong influence of European and American experimental music and avant-garde in the arts, which lead to a fruitful meeting of the ancient tradition and radical modernist art. This further relates to developments in American minimalism, some of whose key protagonists were influenced by the txalaparta [3, 4, 5]. Topics of improvisation, process-based music and algorithmic rules in composition had become frequent, and ideas of using open scores without a fixed results became increasingly popular from the mid-20th century, where an obvious case study would be Terry Riley's *In C,* from 1964. Many of the key elements of txalaparta practice suited this approach to composition, and the reinvigorated interest in the txalaparta in the 1960s can also be traced to Basque musicians and artists engaging with ideological developments in experimental and avant-garde music and art.



**Figure 1**. A typical txalaparta performance setting. The performers are Felipe and Imanol Ugarte. Picture: Xabier Eskisabel.

Although the topic of some discussion, there is a widespread opinion that the term "txalaparta" refers to the rules, performance style, and the rhythm generated, as well as the physical instrument itself [1, 2]. The argument is that the txalaparta can be played on any material substance, but it has to be an improvisation with two or more performers, following the specific rules of the practice. This division between the rules and the instrument was very helpful when we designed a digital version of the txalaparta, which generates musical events using generative algorithms, since the rules could be represented in a digital system, something the material instrument cannot. The digital txalaparta project is therefore the result of a translation, rather than a qualitative transduction into the digital domain.

## 2. NOTATING THE TXALAPARTA

Like many musical cultures that are primarily improvisational (e.g., jazz, Indian music, gamelan, or flamenco), the practice of notating the txalaparta serves a very different purpose to that of, for example, Western classical music. The notation is descriptive: it represents patterns and relationships, and the primary purpose is that of explanation, preservation, and communication between performers. This can be seen in contrast to prescriptive notation, where the purpose of the score is to prescribe the musician's actions, as a set of instructions to be followed typically in a strongly linear manner. These categories do not map perfectly to txalaparta notations, as the txalaparta has until recently been an un-pitched instrument (the wooden planks are not of defined musical notes), where the notation describes actions-in-time, not pitch-in-time, like we find in most descriptive notations. In traditional txalaparta the rhythm is non-metric and fluid, and it does not follow bar lines or standard time signatures. It can be defined as additive rhythm as opposed to divisive rhythm. In terms of its fluid nature, performers often play around the beat, exploring elements of rhythmic tension through early, delayed, or silent strokes. This is not mere swing timing, as the divergence from what might be considered a regular meter is quite distinctive. Furthermore, instead of emphasising pitch during playing, the focus is on timbre, where the location of the plank, the force of the mallet, the way the mallet is held, all affect the timbre.

### 2.1 Scoring the Tradition

There are no notational conventions for the txalaparta. Diverse schools of txalaparta playing have dialects with special symbols and systems to express different characteristics such as which plank to hit. Dynamics are often denoted by the length of the vertical line, and the two players tend to be represented by the respective sides of the line. This type of notation focuses primarily on rhythm and the player relationships, but not on the instrument itself: for example, they do not specify which plank to play or the intended pitch or timbre.

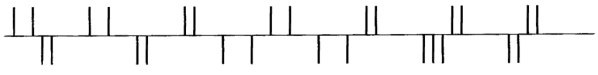

**Figure 2.** A simple example of Beltran's system of txalaparta notation.

An exemplary system for scoring on the txalaparta is the tablature notation developed by Juan Mari Beltran in the late 1980s (Figure 2). The use of this system resulted in compositions being written for the instrument, for example by Eneko Abad and Sergio Lamuedra, and the system is widely used in teaching at many schools of txalaparta. Here, time is represented with a horizontal line. The two players' events are drawn on each side of the line, since the players are typically facing each other. The strokes are represented by vertical lines, whilst time is represented by white space. This means that '||' represents two close strokes, where '| |' is the same, but more separated in time. Silent hits are often represented by the ':' symbol.

Later efforts in quantising the txalaparta resulted in a different approach to notation where the tempo becomes grid-based, although this grid can be stretched and compressed. Examples of this can be seen in Figure 3.

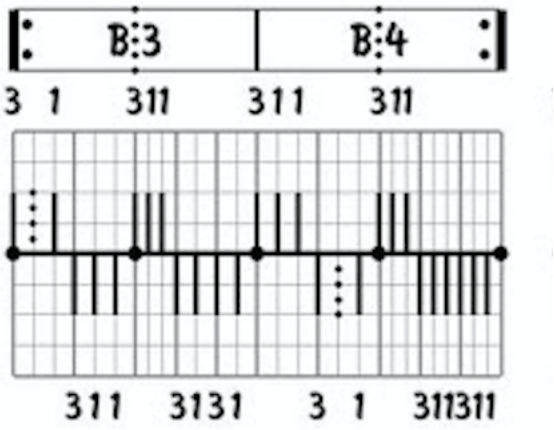


**Figure 3**. A stretchable grid-notation by Eneko Abad. Here the numbers represent the planks, and the dot symbol are silent hits.

### 2.2 Rationalisation of Instruments and Scores

During the 1990s, txalaparta practice diversified and reached new audiences. Practitioners started experimenting with pitched wood and certain rhythms become popular. With the pitched txalaparta came the requirement for pitch representation in notation. Some practitioners began drawing scores on paper, using a time-based grid where thick lines on the grid signify strokes, and the pitch is typically represented by a number, or the name of the note the plank is tuned to. This development can be seen as a form of rationalisation of this musical practice, a parallel we find in dance music through the use of quantisation in music software. Here the un-pitched and metrically free txalaparta becomes pitched, and divisive metrical structures are divided into clear units of time. This shift in the nature of the txalaparta from purely percussive towards melody and straight timing is a process Euba has called *xylophonisation* [6]. This process of standardisation

aligns with Derek Bailey's description of how traditional musics often lose much of the original characteristics, such as tonal and rhythmical richness, when reduced into the scales and meters of Western classical music [7].

### 2.3 A Survey and interviews with Performers

We conducted a survey with txalaparta performers, the first of a kind, and also conducted interviews with performers who tested our software. The aim was to collect qualitative data from the personal experience of txalaparta players and how they relate to issues of notation and formal representation of this practice rooted in oral culture. The survey was distributed on online social media groups for txalaparta players, consisting of 280 members. We had 31 responses to the questions, which considered txalaparta practice in general.

The findings will be published at a later time, but on the topic of txalaparta notation, it was clear that the lack of a standardised format allowed interpreters to freely adapt conventions of notation to their needs. It is therefore difficult to find any two practitioners using score systems that are exactly the same. This is also due to the fact that people's needs with regards to notation are very different: some might simply need to make a small drawing that roughly represents the rhythm, whilst others are interested in writing a more complex composition. Many respondents said they used notation for teaching and a discursive analysis of the musical events. In terms of cognitive load, the spatial nature of the score can illustrate patterns that are harder to demonstrate in time.

However, for most of the practitioners who use notation, there is a dedicated space for improvisation. Players do consider the txalaparta as an improvisational tradition, and the use of notation is generally different from that of Western classical music.

A key purpose of the interviews we conducted was to probe reactions to the digital txalaparta – whether the idea of this practice on the digital computer makes sense to practitioners. We were surprised by the general positivity, and we relate that to the fact that the txalaparta is not just an instrument but the rules of its playing. Participants in the survey reported that they found the questions of the nature of the txalaparta introduced by this research interesting, as the practice had not been studied from this perspective before. Many were also intrigued by the novelty of not having to improvise with another human, but with a computer. Some mention that the playing with a computer made them more self-aware but also made them play different to accommodate their play to the computer. One of the players said he started feeling like a machine himself, as he realised he and the computational algorithm were, in essence, performing the same process.

## 3. THE DIGITAL TXALAPARTA

We present a software system called *Digital Txalaparta,* designed for both performance and analysis of txalaparta. It is a well known fact to software developers that to be able to formalise a practice, a system, or a tool (for example a hospital system, a traffic controller, or an image editor), the developer has to build a representation of the field and be able to categorise it through an ontological process [8]. By so doing, they formalise, make abstractions, and thus have to decide which things to leave out and which to include.

For us, the process of designing software encapsulating the rules and playing of the txalaparta is a method of attempting to understand the practice. In order to program the rules, they have to be made explicit and formalised. This is less problematic in the case of the txalaparta as it is typically defined as a system of rules as well as a physical instrument. Some software applications based on the txalaparta have been developed, but most of them have been playful apps, games or educational tools[1].

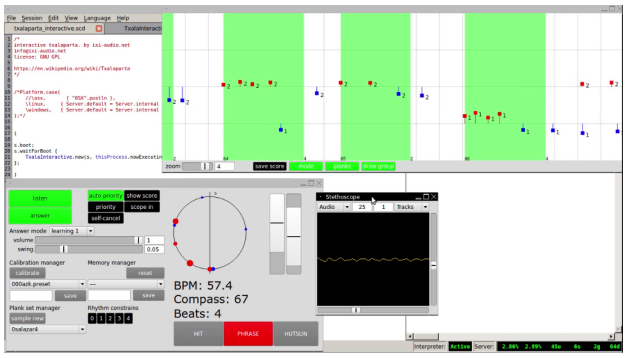


**Figure 4**. A screenshot of the Digital Txalaparta.

The system's primary function is to serve as an accompaniment for a performer playing a physical instrument. There are two apps: *autotxalaparta* and *interactive txalaparta*. The first one plays rhythmic parts, either using generative algorithms or using playback of known forms. It generates either one or both parts of the txalaparta rhythm and its development allowed us to understand better the options the interpreters face when

[1] The Technotxalaparta was able to listen and respond to the human interpreter adjusting its tempo in real-time through keyboard keystrokes; the computer output was MIDI. Ixi audio released an application called Txalaparta where by dragging four batons around the app's 2D space the user was able to control an ongoing txalaparta rhythm. Finally, the Ttakun was a sequencer that aimed at creating compositions and exercises for the txalaparta. There are also a few apps for mobile media (txalapartapp.com), but none of them suit professional practitioners in understanding and analysing their performance, practice, or produce new output.

they play. The software provides control over the parameters used by the generative algorithms. The interactive txalaparta uses machine listening to analyse and respond to the human performance. To generate the response it uses a sample based system with up to 30 samples per plank, classified by amplitude and location in the plank, which provide a lively timbral output close to that of a real txalaparta. Users can calibrate the system to accommodate to the player's style and they can sample the sound of their own txalaparta in order to get a more realistic timbral response.

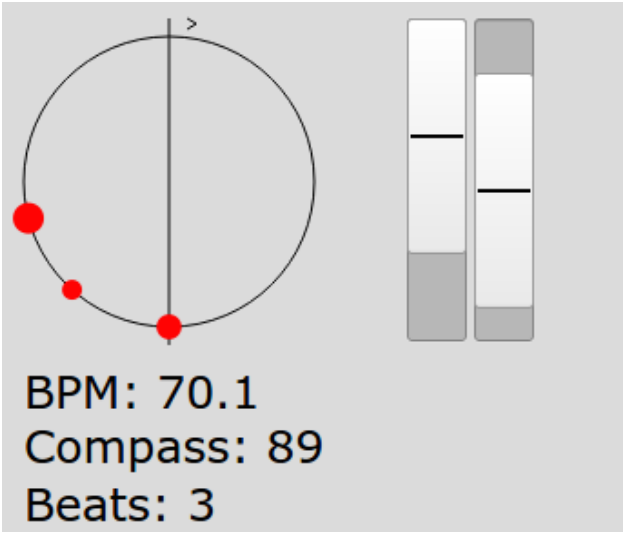


**Figure 5**. The bar is represented as a circle, with the red dots being the detected strokes. The dots' width maps to amplitude. Time is clockwise. The two vertical bars represent the computer's batons, simulating the movement when raising the stick and stroking.

A key problem for users to understand algorithmic processes is the lack of visual representation [9]. Our user tests corroborated these findings in that visual feedback (even just in peripheral vision) proved to be crucial. Interpreters playing a physical txalaparta in tandem with the autotxalaparta or the interactive txalaparta initially found it problematic that they were not able to see the moving body of their partner. These movements are crucial for txalaparta players to anticipate their partner's actions. To overcome this problem we implemented a graphical representation of the algorithmic process. Two vertical sliders are used to as 'virtual' batons in the computer's performance. This is illustrated in figure 5.

Furthermore, a circular representation of the rhythm is used to show the 'thoughts' of the system, a notation inspired by a diagram Sánchez uses to represent the txalaparta rhythm [10]. This visualises the relationship between the different strokes of the same phrase, as well as the relationship between each phrase and the main tempo. In this system, time is represented as a circular flow with no beginning and no end, visualising the bar in real time. The circle represents the length of the bar split in two by a vertical line that signals where the phrases should of each interpreter should be aligned in the case of the tempo being accurate. In this case the first hit of each phrase is located at the vertical line whereas in the case of any deviation this is shown by their position in relation to the vertical line.

## 4. THE TXALAPARTA SCORE SYSTEM

As part of our work on the digital txalaparta we implemented a corresponding notation system (see figure 6) that visually represents both the actions by the player and the machine in real time. Since txalaparta playing is typically a turn-taking performance, we also represent the phrases of each. The txalascore is a representation of the play as it happens in real-time and events are written into the score directly as they happen. It represents visually the amplitude, the timing and the plank beat by each hit in each phrase. The score is reminiscent to a piano-roll where the events the system detects and the system's answers flow across: new events appear on the right and move towards the left. Users can zoom into a longer or shorter time spans, ranging between one and twenty seconds. Each plank is represented in a different horizontal line but a color mark differentiates the hits by each player, which can be displayed both on top of the line, or each of them on different sides of the line. This latest method is closer to the one used by the Ttakun sequencer. Furthermore, in order to visualise which strokes belong to the same temporal phrase, these can be grouped with a green transparent field (Fig. 4). While the txalascore was primarily created to help txalaparta players understanding the rhythms generated by the computer by visualising them, it also serves a useful role when analysing recorded performances.

We plan to implement a data format for recording the data extracted from txalaparta performances by this system into a file format that could be further object of analisys by other means. This would be a format of descriptive notation. Moreover, in future versions, through embedding the txalaparta with contact microphones, and accelerometers on the players' batons, we will be able to describe precisely which performer is striking which plank where, with which baton, at what velocity, at the exact moment. This data could be stored in a time-based file format that can be exported to MIDI or MusicXML.

Txalaparta performances are mostly improvised, so the idea of writing prescriptive scores for linear performances

does not appeal to many practitioners. People might question the purpose of creating a sophisticated notation system for this reason. However, the fact is that a descriptive notation can be useful in understanding performances, for musicological analysis and for players to study and analyse their playing, even with statistical methods.

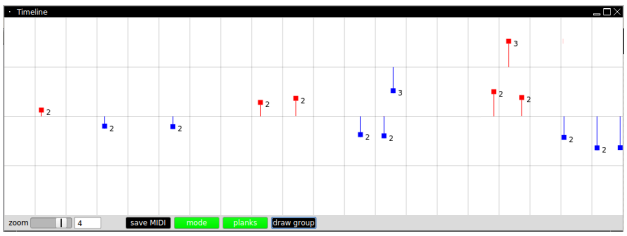


**Figure 6**. A screenshot of the txalascore. The horizontal lines represent the planks of the txalaparta, whilst the red and blue boxes are musical events of each player. Dynamics are the length of the line. Timbre (location) can be represented with color.

A study by Euba that analysed different methods of transcribing txalaparta performances (unpublished research) concludes that it is practically impossible to transcribe perfectly the actions of two performers: even when using a video recording of the performance, the two players can be playing so fast that it can be very difficult to detect whose stick hit which plank at any event. With a descriptive notation system that picks up amplitude, timbre, location and more, txalaparta performances can be analysed at a much deeper level, for example analysing the relationship between performers, comparing the play of a performer over a longer period of time, comparing different performers' playing, studying the difference between human-human and human-machine relationships and many more.

This can be useful for teaching purposes, and in general it would allow txalaparta users to be more self aware of the different ways they play and it would open up an space for musicologist analysis with greater possibilities than that offered by simple video recording, as we see in Euba's analysis [6]. There is clearly value in precise numerical data here.

## 5. CONCLUSION

Software development in the domain of music is a highly effective research method for both music and musicology. By having to formalise the rules of the txalaparta in order to create a digital version of it, we had to analyse the play, understand the general practice and the player communication. We had to think about ergonomics, human-machine relationships, and the quality of sound. Reciprocally, when we had early versions of the system running, the computer helped us, but also txalaparta players who used the system, to better understand the rules that govern the playing of the txalaparta.

Through the software development we have become acquainted with different levels of rule sets: on a lower level there are rules that determine the musical material (e.g., how many subdivisions are in the phrase, how to construct the computer response) and on a higher level there are rules that define how the interpreters interact each other during the play to construct long term structures. We have seen that some characteristics of the txalaparta are easy to translate to the digital domain (rhythmical characteristics) while others are more difficult (timbre). Writing software that effectively implements all those rules requires generative algorithmic systems to get closer to the way the txalaparta interpreters interact with each other during the play.

Considering the historical evolution of the txalaparta – in particular the current 'xylophonisation' process where pitch has been added and the rhythm becomes quantised – it is interesting that the digital txalaparta, where the practice is translated into the digital domain, is closer to the origins of the txalaparta in operating with fluid rhythms and non-metric bars, both in its internal algorithms and graphical notation.

Creating a system that analyses and stores the characteristics of the txalaparta play can help understanding better this ancient but modern music. The Txalaparta Score System is still limited but it has already allowed us to get a different and new insight into the way the txalaparta is played. Further developments should provide more detailed data allowing for further research on this matter.

The digital txalaparta is work-in-progress. Future plans include improving the machine listening algorithms in order to make the response system richer and more engaging. We are interested in the cultural reception of the digital txalaparta and studies will be conducted in that area. Finally, since some of the key limitations of improvising with a computer derive from the fact that physical presence is limited and response tends to be audiovisual, we are interested in exploring robotics for both the usability and the cultural studies purpose.

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