Cygnus X-1

An assistance music composition system

A small dossier

1-1

-Cygnus X-1 platform is a group of programmes written in FutureBasic by Carlos Satué and Carlos Frías over the last 20 years. It is an assistance music composition group of programmes. We tried to retake some of the most important ideas of Francisco Guerrero, like the work on graph-paper and also the very precise music piece calculations. Using this system it permits us to easily apply a lot of math concepts into the music.

-Once we get used to seeing the piece under the programme codification, we are easily able to control big complex music architectures. When we decide, a special programme passes all this code into the traditional music notation.

Working with Guerrero´s ideas in the programmes, new gates opened for us, but we have evolved a lot if we compare the first computer attempts with the programmes of today, although we keep the same enthusiasm and surprise capacity we had at the beginning.

The majority of Carlos Satue´s pieces have been made with the help of the Cygnus X-1 platform.

-Cygnus X-1 permits us to use several programmes with a lot of functions. We can work the music piece from different points of view. In this way, composers having contrary aesthetic ways of composition could work well with this platform. They could use only partial functions to calculate some part of their pieces.

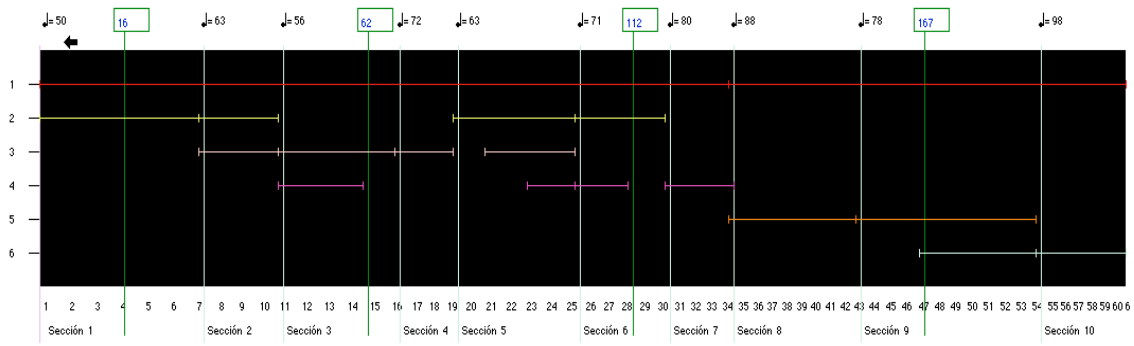
-Every programme is specialized for different types of work. For instance, “Generador de gran forma” works with the big frames and general processes of the piece, “Fractales” works with images and it captures orbits of condensed colours and converts them into a music architecture, “Campos” which is the biggest programme, works with the coded score (we will see images from this programme later), “Pre_enigma” converts the coded score into an Enigma Transportable File, etc.

All these programmes are communicated by text files. We can build a special music architecture in one programme and continue the piece in another one.

2-1

-In the following, we show a general map of “Laberinto de la noche I” (by Carlos Satué) which has been made by using the programme “Generador de gran forma”. In this map, we can see the sections, the “tempi”, the proportional time spaces containing the correct number of measures (which are based on Guerrero´s underlying rhythms) and the different amounts and types of music materials.

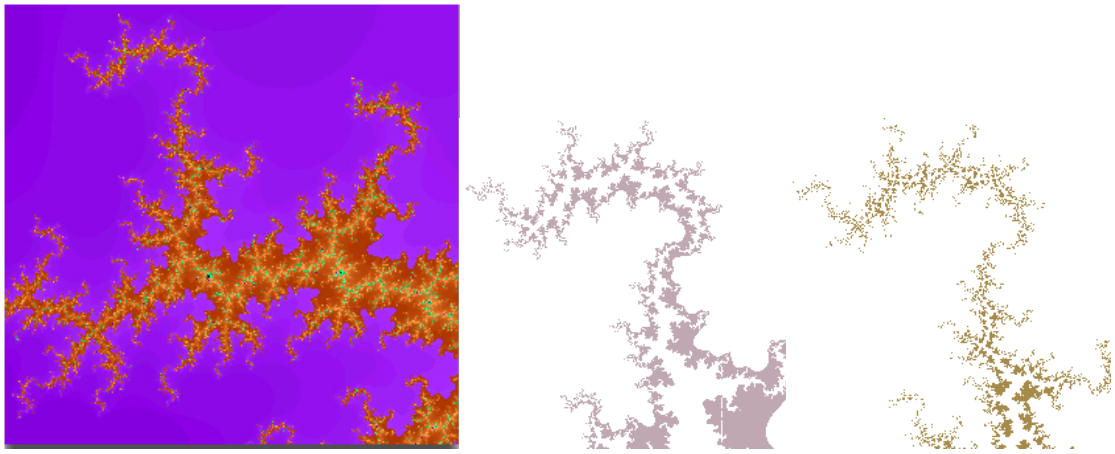
For this example we don´t need anything else. The next steps will be done in other programmes, although we could calculate a deeper planning with this one.



3-1

-The next example has been worked with the programme “Fractales”. We started to work with an image extracted from the Mandelbrot Group. We isolated grouped orbits of different colours and transformed them into music material.

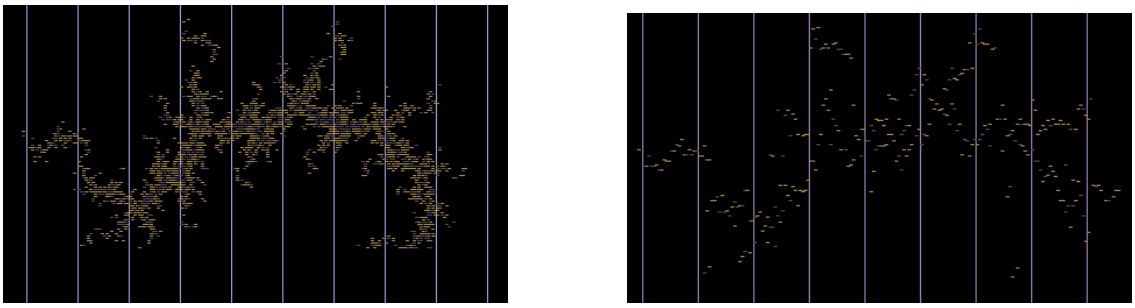
-We can see the original image on the left, and then on the right we have two images extracted from the left top corner of the original picture. They are grouped orbits of several colours.



3-2

-The following images show the captured architecture once it has been assigned to a big group of instrumental lines (vertical lines are the measure bars). In order to sense the richness of the process, we can see in the right picture the pitch representation of the two instrumental lines taken from the left picture.

-This architecture can take several directions, it could convert into a shape, into pitches, into durations, instrumental patterns, distribution processes etc, or to remain as a music architecture in itself.



4-1

-“Campos” is the most important programme in the Cygnus X-1 platform. It has a large number of functions to be applied to big music spaces or to minimal details. We give great relevance to the colour parameter which helps us to build big abstract music processes.

-“Campos “ works by imitating the old Guerrero´s graph-paper system. The score in fact, is shown in a coded way. This idea permits us to have a clear and full view of the piece, as well as some smaller parts of it.

4-2

-In the following diagrams, we show a global view of the "Campos" programme. We have at the top, access to a big number of functions by pushing buttons and scrolled menus. The yellow left top corner indicates the mouse position through the coded score (x position, note, quarter tone, colour etc). The blue-green rectangle in the top right corner is a space to communicate with some functions of the programme.

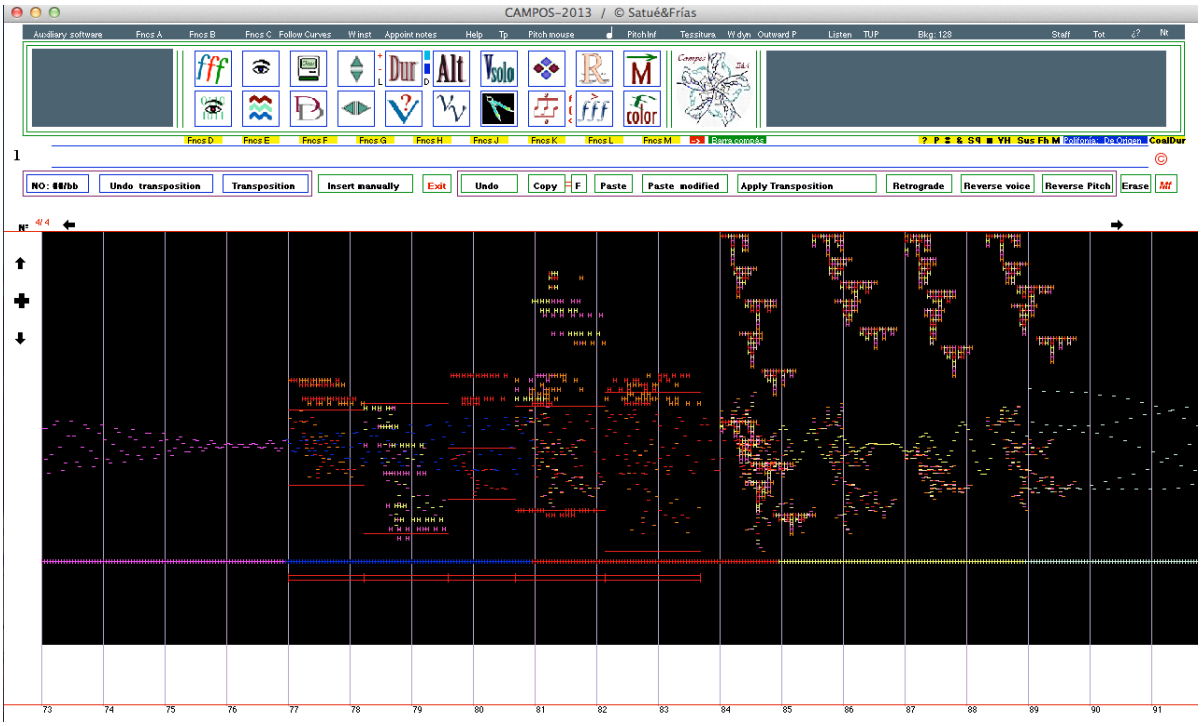
-The big black rectangle contains the coded score. It is cut by vertical lines which are section marks and measure bars, in order to find very quickly the area that we need.

-We have several types of view:

1-Instrumental lines- colours- durations. We can see this in the first eight horizontal lines at the top of the big black rectangle.

2-Pitches-colours- durations. In this example, we can see this from the shape placed in the middle of the big black rectangle.

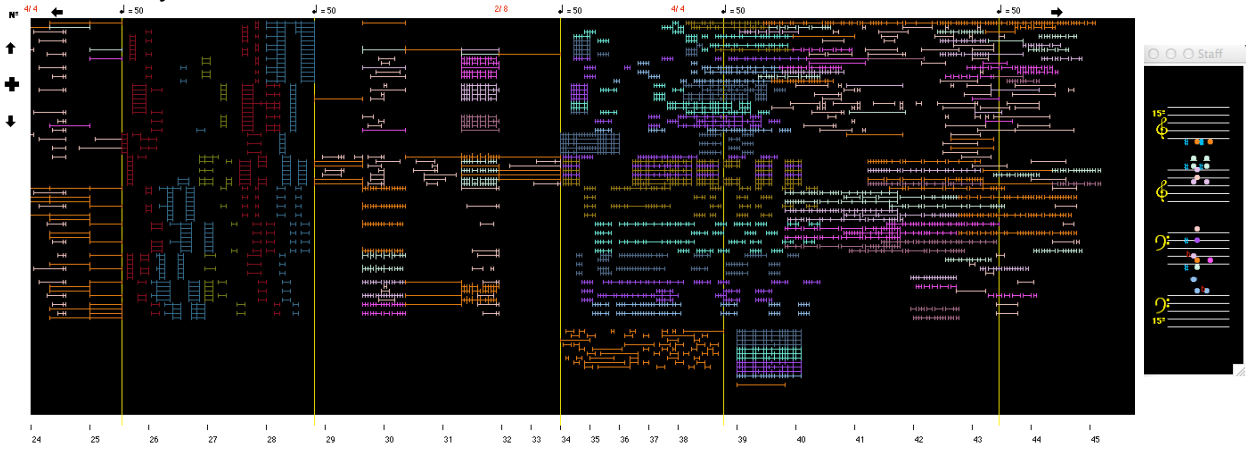
-We can combine several view types at the same time, as shown in the example. We can also easily control the size of view to work in.



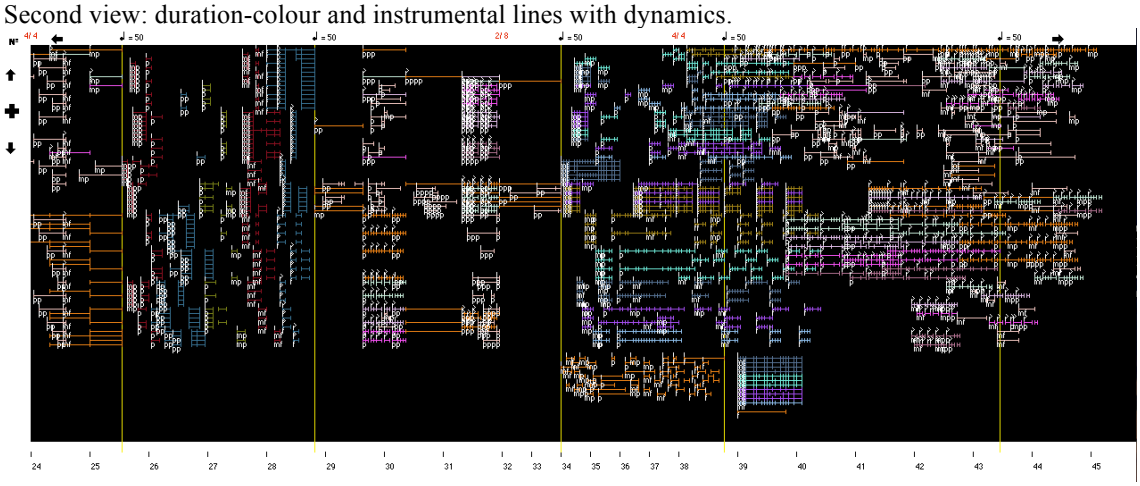
-The next image is an enlargement of the previous. It is the image of the first coded measures of the Carlos Satué´s work for orchestra titled "Ad astra per aspera". We can see dynamic symbols worked with special functions, which help us to control the dynamic world. A black rectangle on the right, shows the pitch in traditional notation at the point where the mouse is resting (with the colour of the materials and notes).

-"Campos" has a lot of instrumental lines. Normally, we would only work with a small number of them, but we can use the remaining lines to try other calculations, to keep ideas and others operations. We only pass the lines that we are interested in, to the traditional notation once we are at the end of the processes.

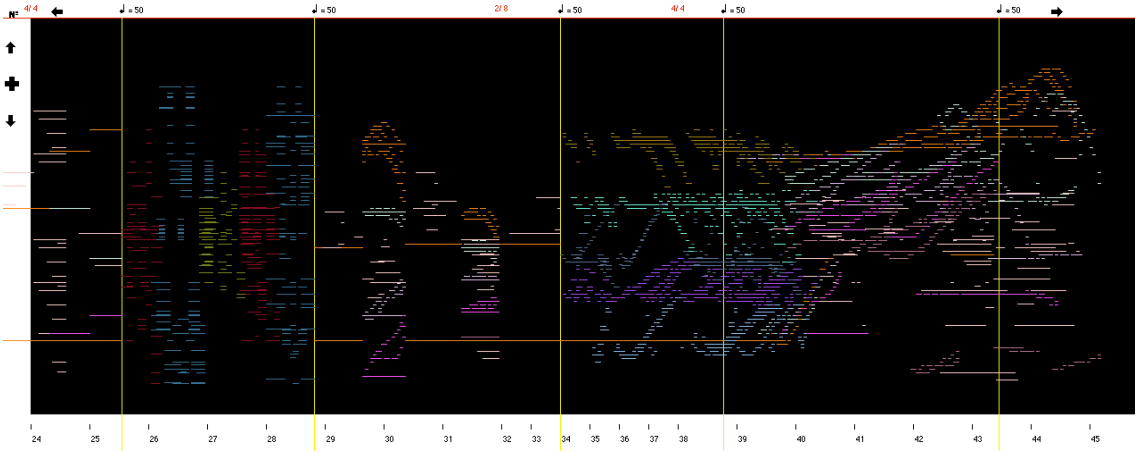
First view: only duration-colour and instrumental lines.



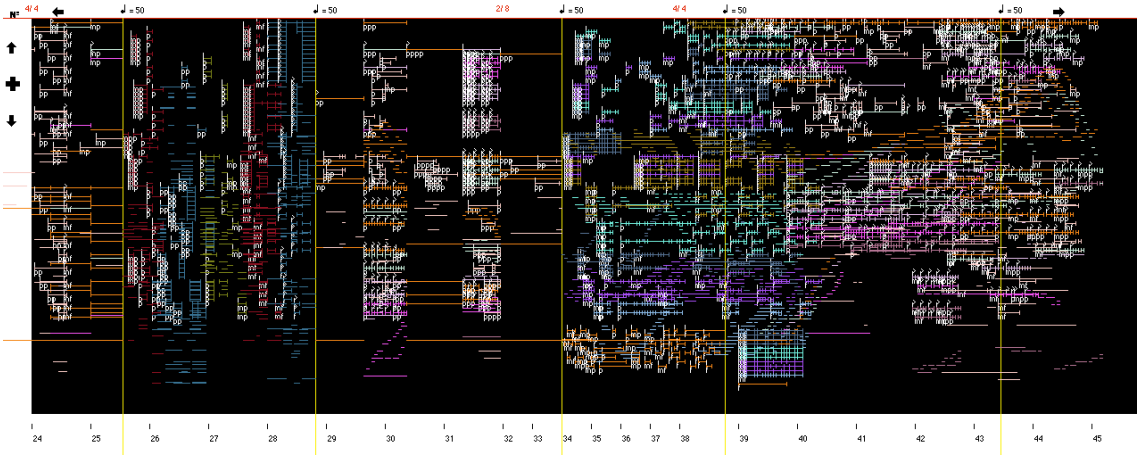
Second view: duration-colour and instrumental lines with dynamics.



Third view: duration-colour and his pitches.

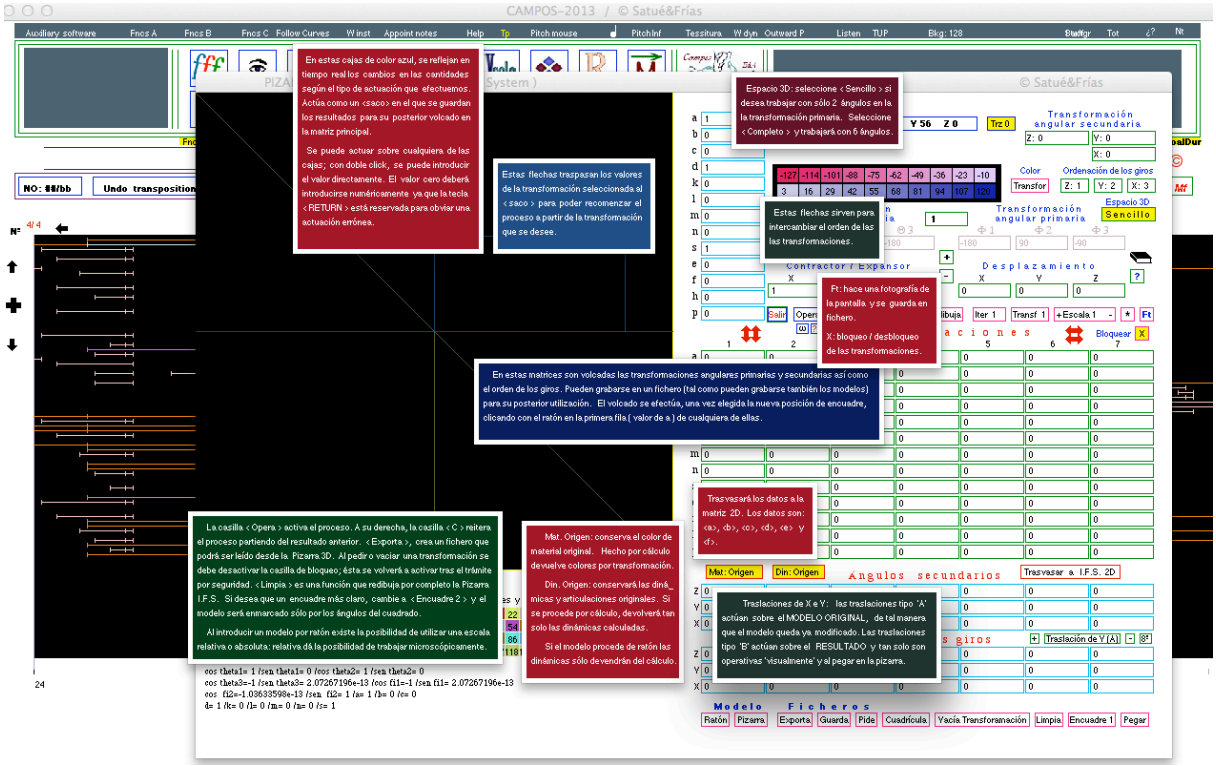


Last view: superimposition of all maps.



4-3

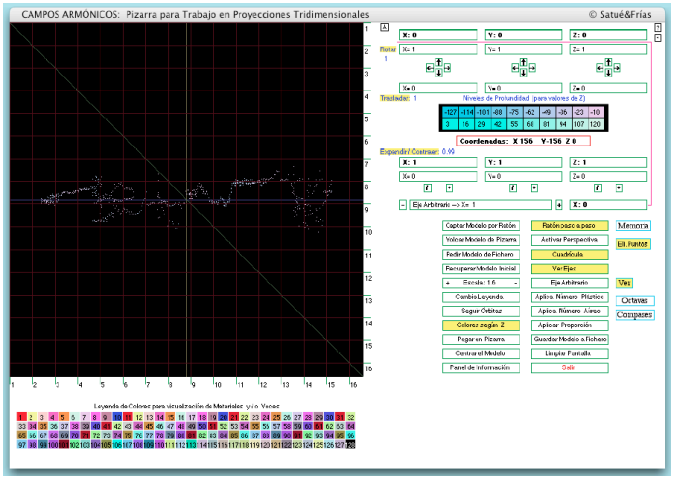
-The interface programme has been designed for efficiency, the aesthetic aspects are of secondary consideration. The programme is very intuitive, but the major part of the functions have explanatory rectangles in case we need them.

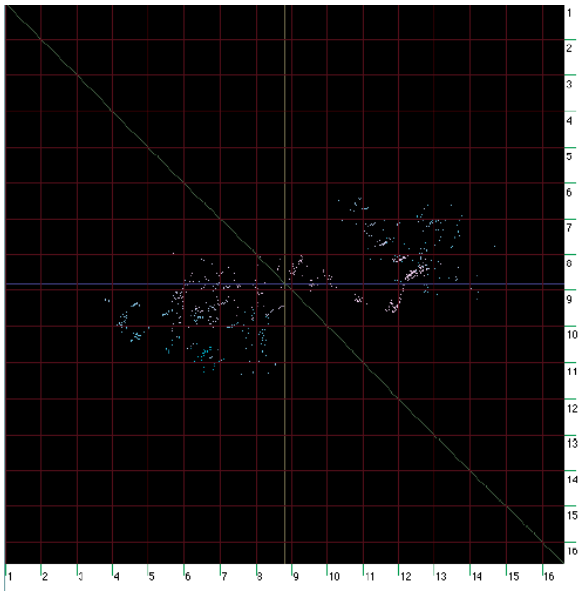


5-1

-Next, we show some images of the relevant functions of the “Campos” programme.

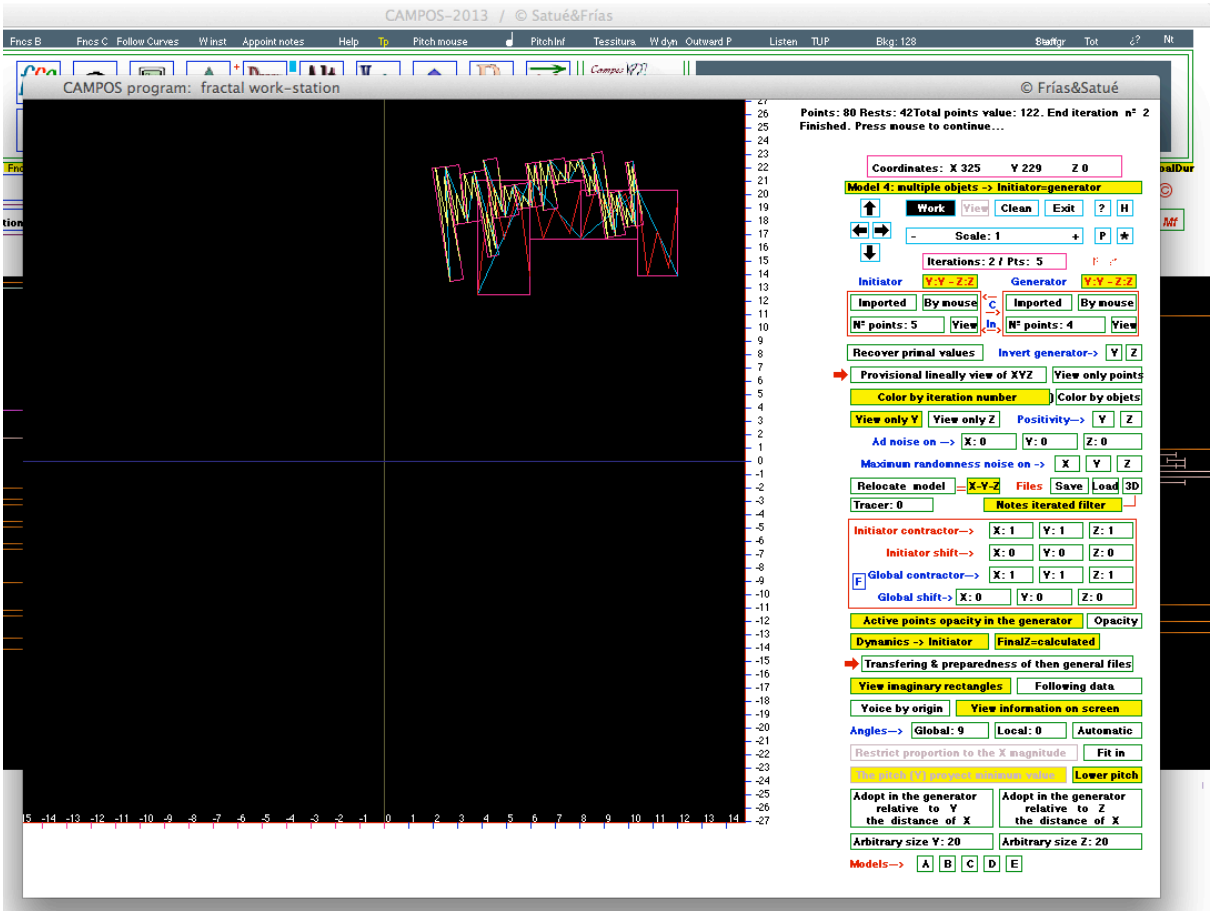
-We can see in the two following images the transformation of a music architecture by using 3D transformations. We have changed the music points in the three axes (x,y,z)
The left picture is the original music architecture and the right one is its transformation.

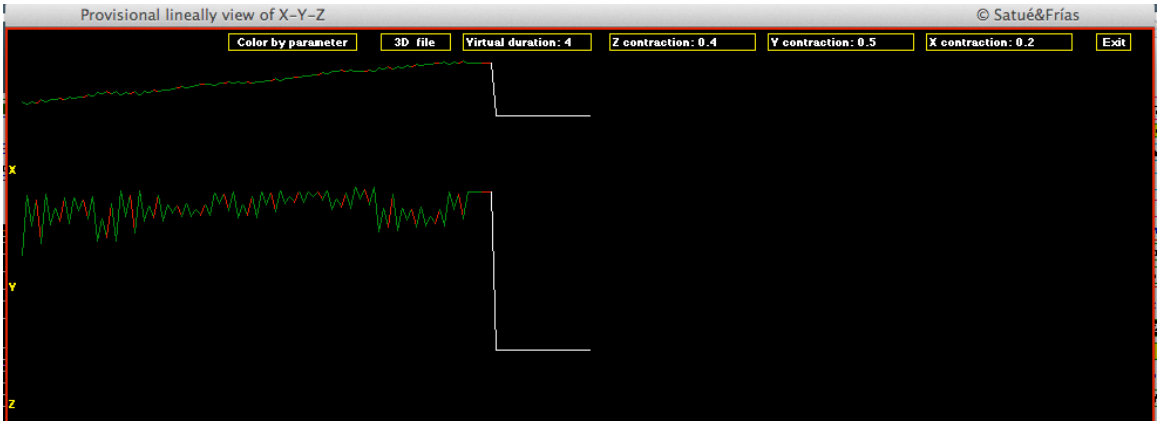




5-2

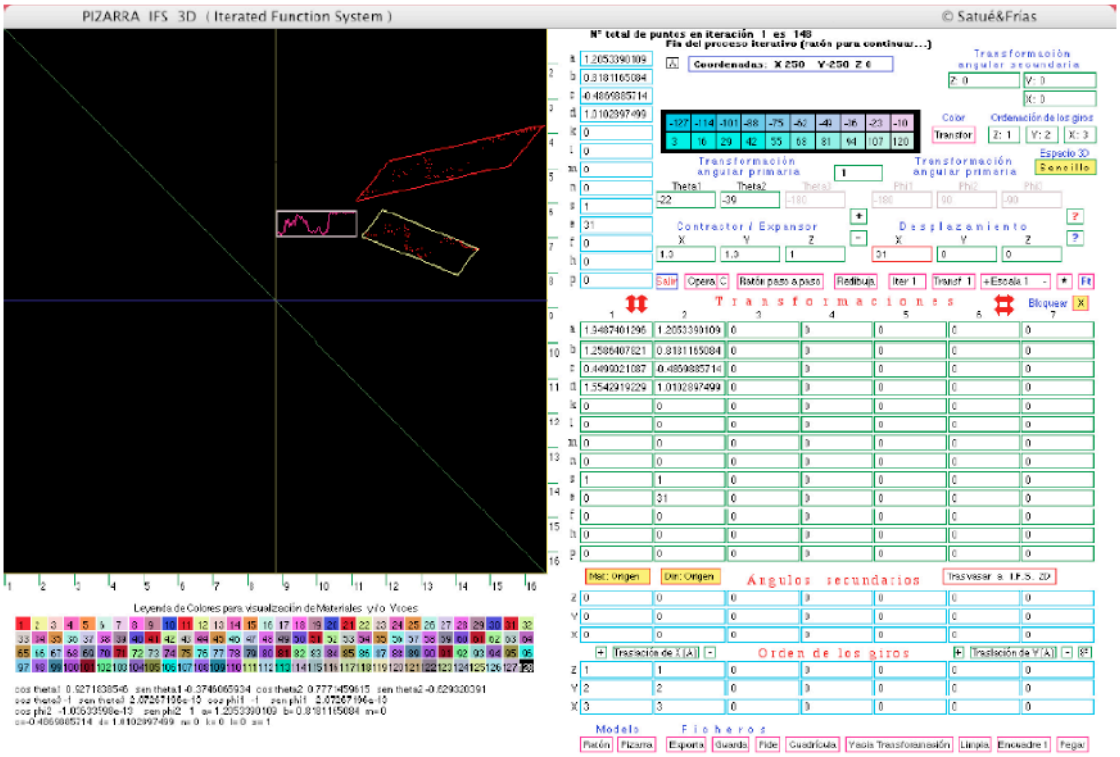
-The next picture shows a way to get a fractal architecture in two iterations, the model coming from the coded score. The small rectangles represent the work area of the different deep levels of the algorithm. The black rectangle at the bottom of the picture contain the route of the x and y parameters.



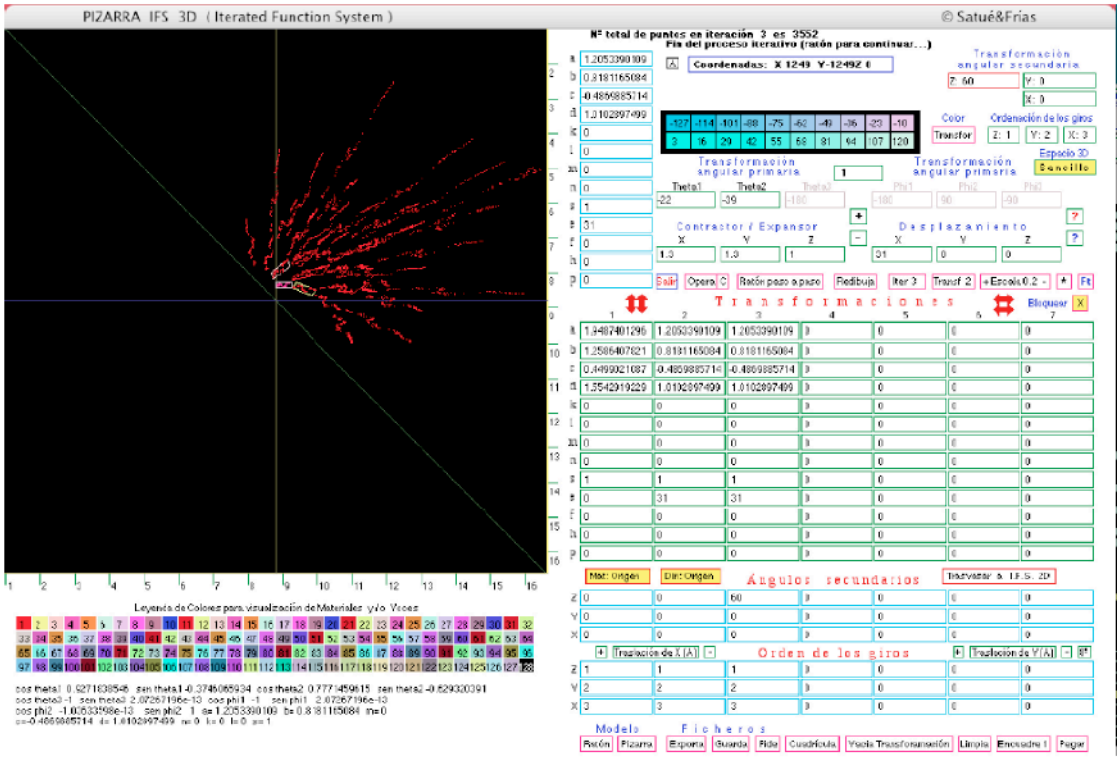


5-3

-The following images show how a music architecture is transformed by a group of Iterated Function Systems in 3 dimensions.



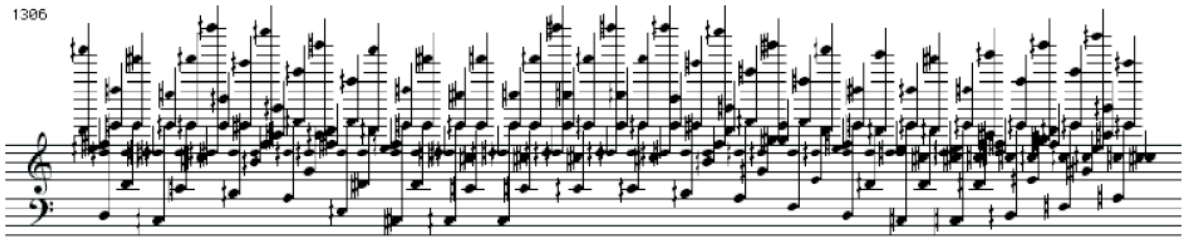
-Here, we can see in a shorter size another IFS attempt, but we have introduced into the algorithm many more transformations, iterations, and angle movements.



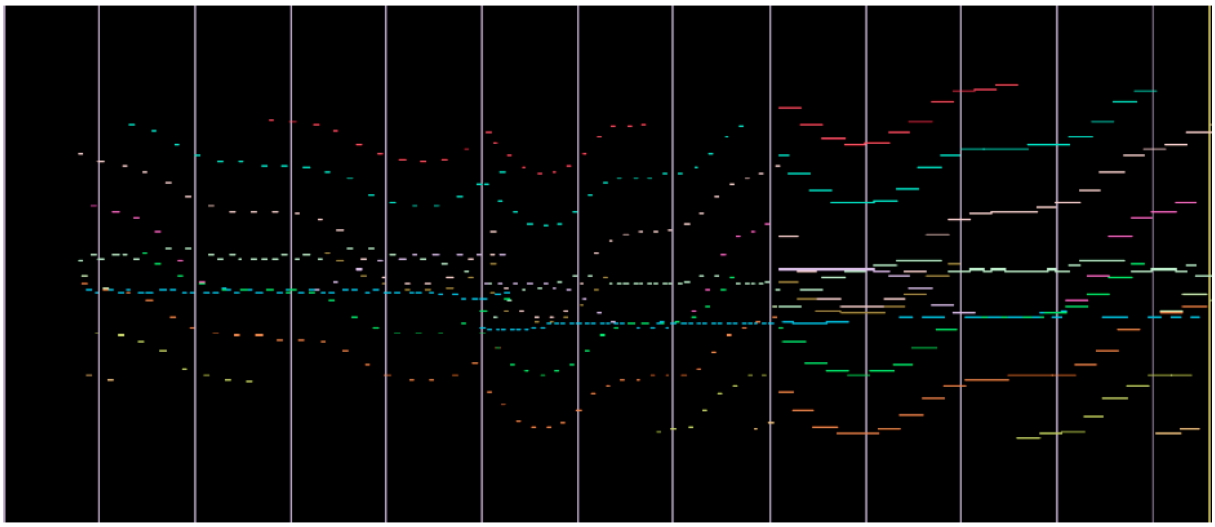
5-4

-We have developed some functions which allow us to share information with OpenMusic, AudioSculpt and Max/MSP. The next example comes from "Laberinto de la noche" (by Carlos Satué) and it shows us how a music material, originally calculated in OpenMusic, was passed to the "Campos" programme to be reworked.

-Music architecture in "OpenMusic" programme.



-Three transformations of the same architecture in "Campos" programme.



6-1

-The "Campos " programme has a lot of functions in order to apply the Guerrero´s underlying rhythm. We have been very interested in this concept from the beginning and we are continually trying to find new computer solutions to improve it, although it is a very abstract concept.

6-2

-The following picture shows us the first measures of one of the previous images in which there has been included the Guerrero´s underlying rhythm net. When we apply this net, the music crumples and the durations are modified. It is a specific characteristic of this type of music. This net uses a matrix with numbers placed in every beat of every instrument line. Every number modifies the standard frame value of the graph-paper inside the area that this number controls. For instance, the frames influenced by a five will take the value of sixteenths of a quintuplet.

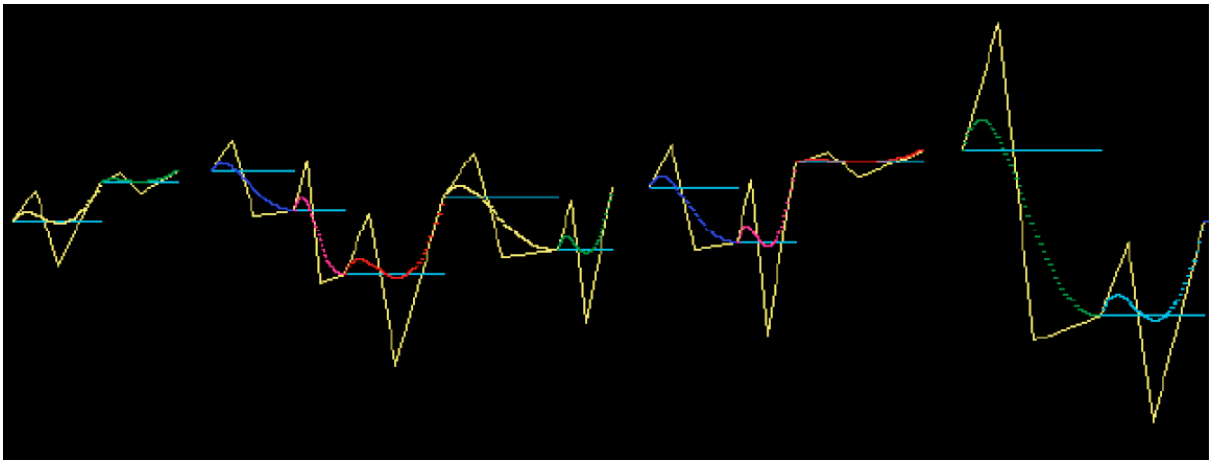
-The Guerrero´s underlying rhythm net is represented by a number in every beat of every instrumental line. We can see this, in the following picture.

7-1

-The Cygnus X-1 platform is in constant expansion and renovation. Next, we show some of the latest proposals.

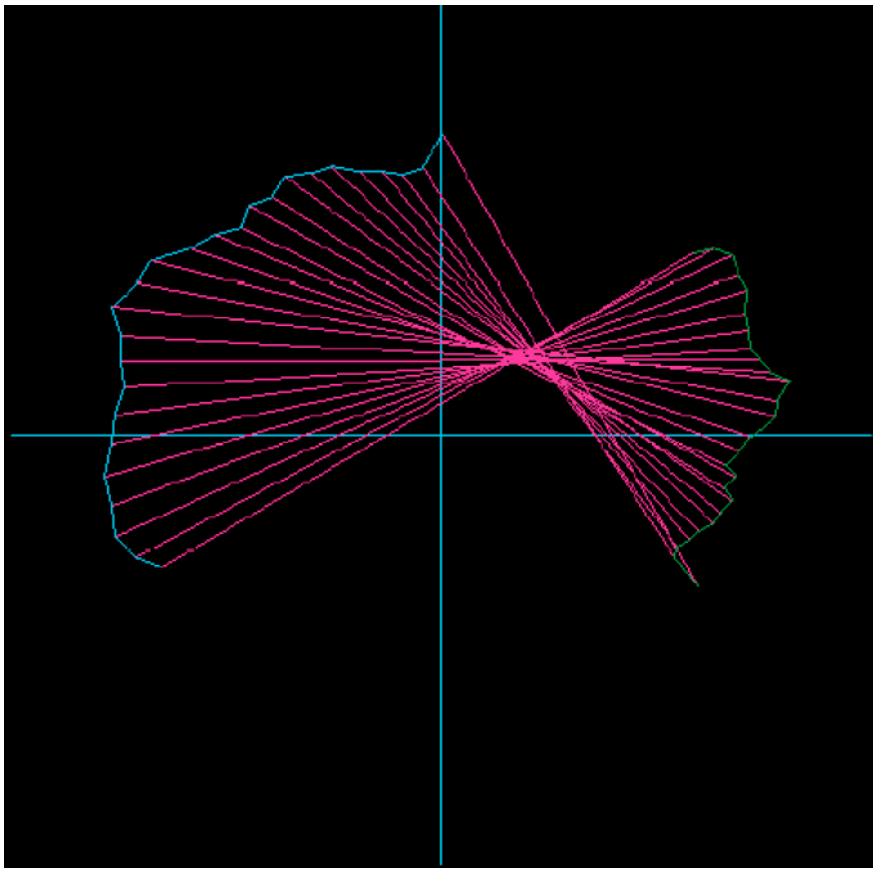
7-2

Bezier curve interpolations. A Bezier model serves to calculate a curve pitch between every two notes of a music sequence. We show in the next picture the Bezier model in yellow, the note sequence in blue, and the different colour curves are the result once we have worked with the algorithm.



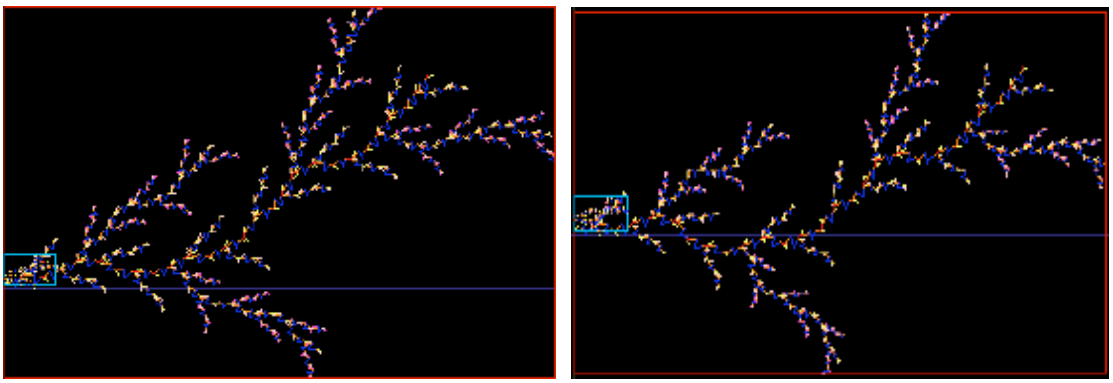
7-3

-We took the idea of lined surfaces to build this new function. The algorithm includes a lot of variations. We can work with dynamic transformations in every new point of the calculation. The next picture shows a model on the right (in green), and the result on the left (in blue). Every new point of the transformation accumulates an angle increase of two degrees and an increase of 1.2 units in every new x parameter.



7-4

-We have started to experiment with L-systems in order to apply them to big frame calculations, pitches, harmonic fields or any other parameters. The result, we can use like music architectures themselves. The function allows us to introduce a graft (a small sequence of music) then this graft is multiplied and transformed together with the internal elements of the system. The next picture shows two L-system images including a graft with a minimal angle variation at the beginning of the process.



8-1

-The “Pre_enigma” programme passes the coded score worked in the previous programmes to an Enigma Transportable File. Then, we are ready to work the score in the Finale programme with all necessary details that a finished piece needs. We are now working in a much more standard file named XML which allow to work in several platforms of music editors.

8-2

In the following image, we show an extremely forced example (the Mandelbrot architecture shown in 3-2) in which the only interest is to show how the coded score passes to the traditional music notation by using the “Pre_enigma” programme.