HIDDEN

for fretless electric guitar and electronics

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***Abstract*—"Hidden" is a piece for fretless electric guitar and electronics. The piece is developed through a graphic score structured on multiple layers that can be recombined to create a variable multi path sonic narrative. In this paper I will present the compositional process and the technological and aesthetic implications.**

I. INTRODUCTION

There are two main purposes behind the composition of this piece: the investigation of writing for microtonal instrument in an open form and a biographical and affective implication.
The research concerning the open form is related to the idea that there is an implicit possibility, opportunity for relationship, between the act of composition and the one of performance. My purpose was to create a sonic space where the performer is a co-composer of the work, drawing the microform of sounds accompanied by a drafting of the macro-form in the partition. The score includes a sound plan to explore each time new different music possibilities, not closing the perspectives concerning a habitable sound environment in a re-shaped and constantly transmutable artistic expression.
All of this is developed in a form that concerns not only the horizontal and temporal drafting of the piece, but also the aesthetic quality of the sounds that can be discovered and renewed by the performer.
Finally the composition was accompanied by a lecture and analysis of a poem by Milo de Angelis called "Guerra di Trincea" in which there is a statement that moved many of the sounds and sonic situations researched in this piece: "*You cannot imagine, my friend, how many things remain hidden in an end*".
All these "things" that are hidden in an "end" are those that moved my sonic imagination for the creation of "Hidden."

II. BUILDING THE INSTRUMENTS

A. Fretless electric guitar and others

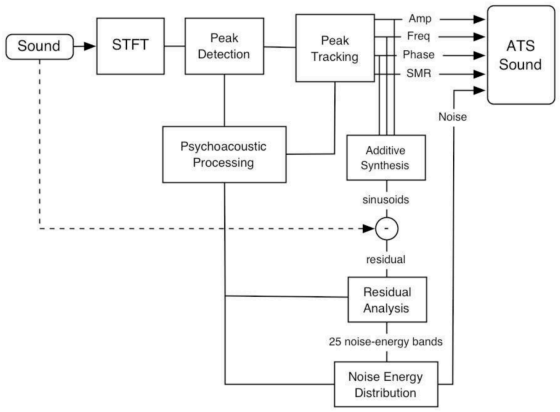
In this piece the main instrument is a fretless electric guitar, tuned according to the partials of two starting frequencies (46.7 Hz and 70 Hz).

STANDARD TUNING	HIDDEN TUNING	HARMONIC
e	280 Hz	4th harmonic of 70 Hz
B	187 Hz	4th harmonic of 46.7 Hz
G	140 Hz	2nd harmonic of 70 Hz
D	140 Hz	3rd harmonic of 46.7 Hz
A	70 Hz	Fundamental frequency
E	46.7 Hz	Fundamental frequency

The guitar I've used was previously a regular guitar from which I have removed the frets. During the performances I used E-bow and other objects/materials for creating different timbral materials (drum sticks, aluminium, metal objects, crazy bugs - small vibratory systems). The performer has complete freedom to decide when and whether to use additional instruments (even their own) to recreate the sound gestures proposed in the score.

B. Algorithmic devices

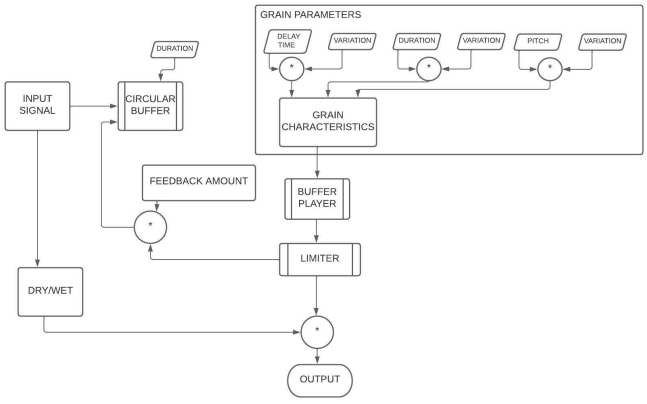
Electronic instrumentation processing can be divided into two major macro categories: pre-performance preparation of fixed media and real-time electronics.
The pre-performance work involves improvisation with the electric guitar, researching noise and stochastic sounds, then recorded and edited. They can be processed in many ways and finally they are played in the section of the score called NOISE(S). Some of the samples I worked with are recordings analyzed and processed through a particular technique called ATS (Analysis Transformation Synthesis) [1]. The codes for analysis and resynthesis were written in Csound, thanks to the atsa utility and associated resynthesis opcodes [2].
Starting from the pre-recorded sample, I used the ATS technique to search and process the deterministic and stochastic (residual) components of the audio signal. The deterministic part analysis is to plot the trajectory of the sinusoids with the variations in amplitude, frequency and phase. At this point, the stochastic part can be established by subtracting the deterministic data from the original signal. The residual part is represented with "noise variable energy values" along 25 critical bands. For my purposes I reworked only the stochastic part, analyzing and then working in editing and montage to construct samples to use during the performance.



Block diagram of the ATS workflow.

During the evolution of the compositional and executive process I decided that ATS reworking should not be a binding element for the performer. Nevertheless, since my interest for such work is that it should be accessibile even if the performer doesn't have any specific computer music skill, my proposal as an alternative to the ATS technique would be to previously record samples with the guitar, edit and assemble them maintaining a stochastic and noise matrix in the sound creation. All of these samples are used in the section of the score called NOISE(S), and can be played through a section of the Max patch that involves playing back samples with the ability to read it at 8 different speeds, pitchshifting, timestretching on/off, by accessing a user folder on the computer.

In fact, real-time work is developed through a Max patch. The main process managed by the patch is real-time granulation with feedback (beyond the playback of pre-recorded samples).



Block diagram of the real-time granulation process with feedback.

All these processes can be finally spatialized into a stereophonic or multichannel system up to 4 channels. The two granulators are operating in real time on the sound input, whose parameters can evidently be different, and there is a frequency shifter in one of them.
Finally, preset code and instructions for mapping the midi mixer and pedalboard are included in the patch.

III. SCORE AND PERFORMANCE

A. Open score

"Hidden" has a graphic score composed of different modules. The partiture consists of a first sheet, called “MAIN", which provides the basis for the possible sound paths. Two transparent sheets can be placed on it, one showing tablatures for the guitar and/or sound gestures (respectively named TABLATURES I, II, III, IV), the other showing a map with different time paths to go through the different processes (NARRATIVES I, II, III)[1].
Through the overlapping of the main and the sonic gestures and time path sheet, the performer will be faced with a performative map to cross with indications of timbral and frequency possibilities, time directions and sonic landscapes. Thus the execution of the piece requires the main sheet plus a "TABLATURE" plus a "NARRATIVE" of choice, which can be paired up in whatever combination (e.g., Tablature 1 with Narrative 3, or Tablature 2 with Narrative 1, etc.). It is up to the performer's sensibility to decide how and in what extent traverse this sonic path, in how much time and where to linger more to investigate sonic possibilities or proceed further.

Since this piece originates from a sentence in a poem by Milo De Angelis (Guerra di trincea) "You cannot imagine, my friend, how many things remain hidden in an end," I decided to take some fragments of the poem and incorporate them into the score as well (as if they were part of the "TABLATURE" section) to give the performer also a poetic reading view of the work.

B. Performance

Therefore the instrumentation needed for the performance is: fretless electronic guitar, computer with sound card, midi pedalboard and midi mixer, any other instrumentation for playing guitar (E-bow etc).
The time duration depends on the performer, and so is the choice of how to recombine the modules.

REFERENCES

1. https://ccrma.stanford.edu/~juan/ATS_manual.html
2. https://csound.com/docs/manual/SpectralATS.html

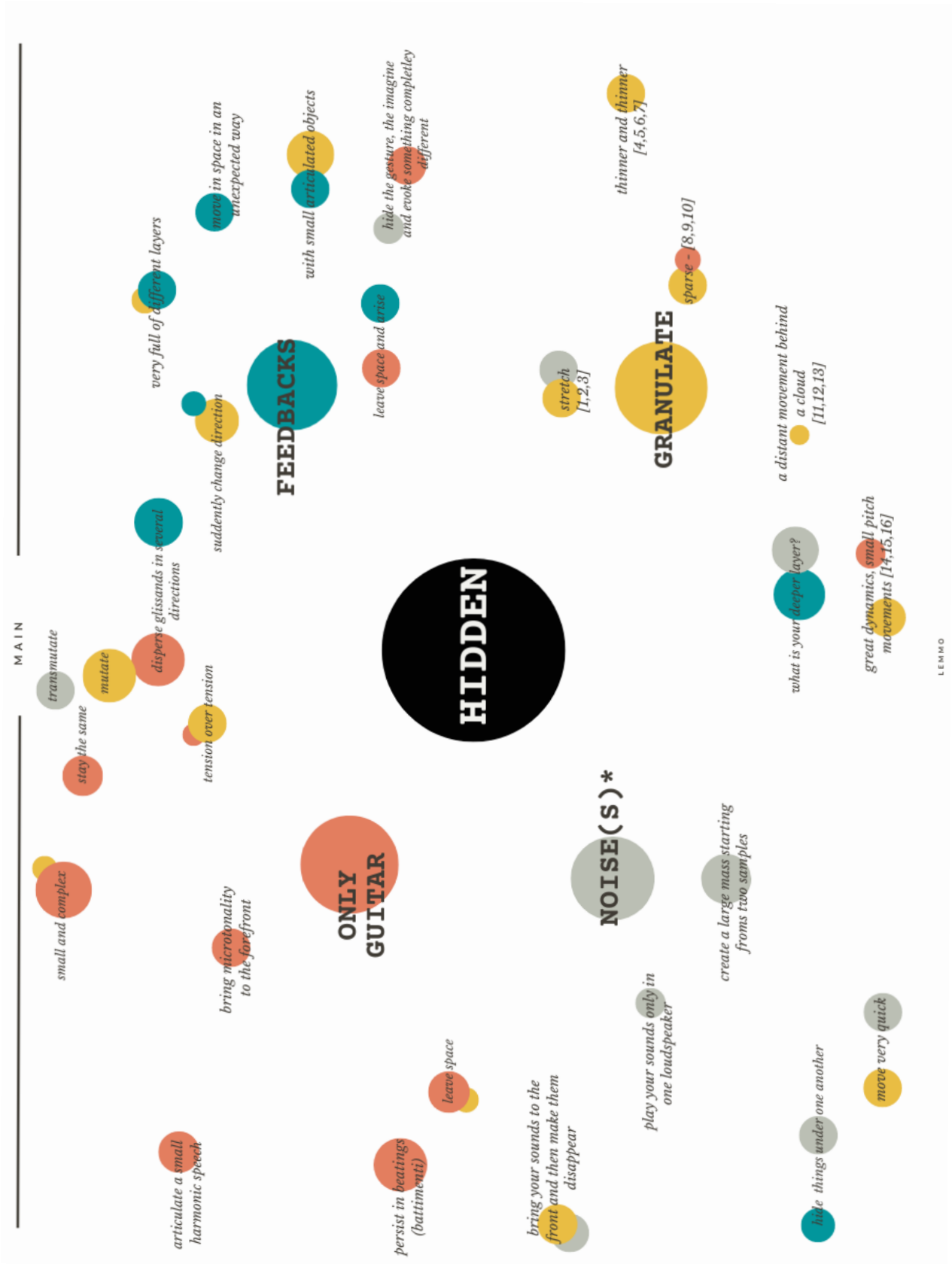
BIBLIOGRAPHY

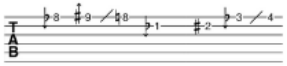
- *Musica Elettronica e Sound Design vol. 3*, Alessandro Cipriani e Maurizio Giri, 2021, ConTempoNet
- *The Physics and Psychophysics of Music*, Juan G. Roederer, 2009, Springer-Verlag New York)
- https://www.researchcatalogue.net/view/300929/300930 Creating open form scores for improvising musicians, Author: Cynthie van Eijden

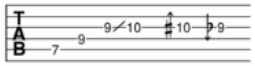
[1] see Appendix for a snapshot of the score

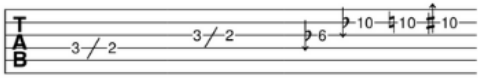
APPENDIX: SCORE EXAMPLES

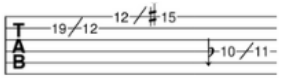
Main

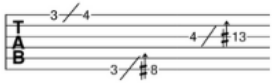




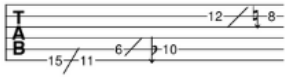


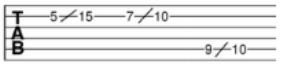






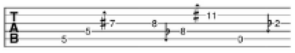
how small and hidden
are they?



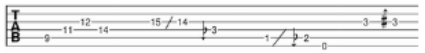


create small movements
in one speaker

little noise in
a large space



explore textures
removing pitches



TABLATURE I

Tablature I

altri
saliscendi
della
mente,
altre
maree

nel fischio
micidiale del minuto.

era lei con un sapore di mandorle bruciate
iniettava nell'alba il suo buio primitivo.

un povero fiore di fiume

ha diffuso
un canto di puro gelo

ha cominciato a muoversi caso per caso poi ha
cominciato a intonare una canzone cantata in re.

Non puoi immaginare, amico mio, quante cose
restano nascoste in una fine

materia che non trema e ti guarda impassibile
e avvicina muta i due estremi.

Ho cercato il punto
fermo
che fissa un confine
e non lo supera

sostare, sostare e attendere
una soluzione nuova per il guasto.

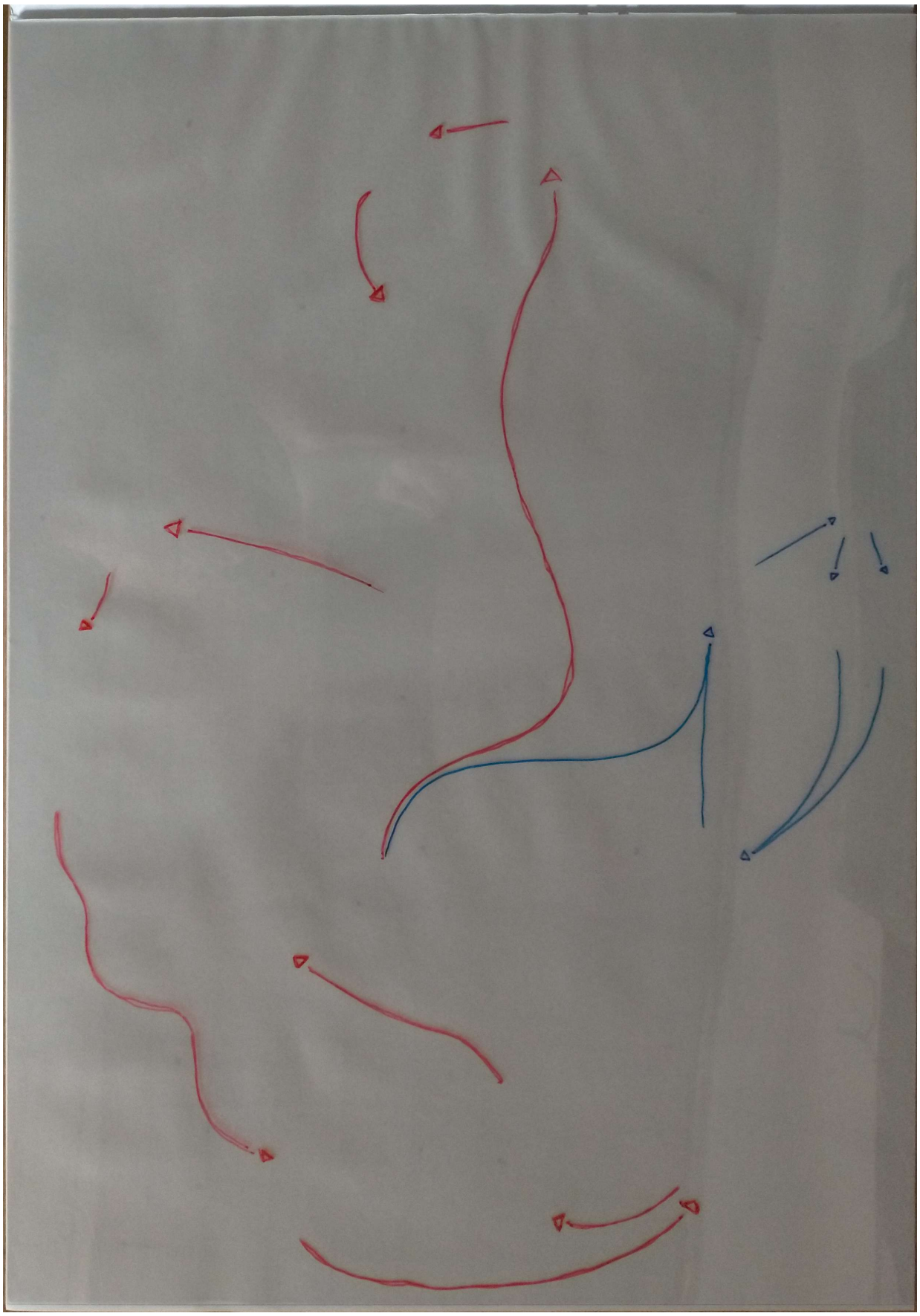
e non parli
cerchi un arcano
e trovi solo materia

"Sarai una sillaba
senza luce,
non giungerai
all'incanto,
resterai impigliato
nelle stanze
della tua logica"

Ascolta,
vienimi vicino

ma lei era astuta e discontinua appariva nei traffici
dell'amore,diventava giallore e numero fisso

Narrative One



Link to full score: https://drive.google.com/file/d/1fsTMqRmuCN7rXNahLclZC7Zs2aNR1A5r/view?usp=sharing