

# **Stony Brook University**



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# **Acusmacia**

A Dissertation Presented

by

**Felix Pastor**

to

The Graduate School

in Partial Fulfillment of the

Requirements

For the Degree of

**Doctor of Philosophy**

in

**Music**

**(Music Composition)**

Stony Brook University

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The Graduate School

**Felix Pastor**

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Abstract of the Dissertation

**Acusmacia**

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**2010**

*Acusmacia* is a Spanish word of Greek origin that denotes an auditory hallucination. A hallucination is the apparent perception of something not present. In the case of sound, what is perceived and what is present can differ tremendously. The perception of pitch is already the result of an extreme filtering of what is present.

*Acusmacia*, the piece, begins with a roll on two snare drums. This sound is perceived as noise: an erratic, intermittent or statistically random oscillation. However, the actual method of production, the roll, is a periodic beating of drumsticks on a drum head.

This paradox is the starting point for the piece and, through oftentimes hallucinatory procedures, it describes a journey from noise to pitch and from the acoustic to the acousmatic.

duration: ca. 18 minutes

I dedicate this dissertation to my wife Carolina del Rio for making it possible and to my three daughters Violeta, Maia and Olivia for making it worthwhile.

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## **List of Performance Notes**

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## **Pitch and Measure Labeling Conventions**

Middle C is C4.

All instruments are written at sounding pitch except Glockenspiel (G) and Crotales (C) that sound 2 octaves above the written pitch.

Accidentals apply to full measures and are register specific.

♯ is 1/4 tone sharp and ♯♯ is 3/4 tone sharp.

Measure numbers are in the format: section.measureNumber. Therefore, measure '6.23' is the 23rd measure of section 6.



## Instruments

### **Percussion I**


Snare Drum (snDr)  
High Tom (hT)  
Mid-high Tom (mHT)


6-8 Woodblocks (B)  
Ratchet mounted on a stand (R)


2 Cowbells approximately tuned to F#5 and A5 (cB)  
Glockenspiel (G)  
Vibraphone (V)

Mallets:

2 drum sticks 

2 mallet/drum stick 

4 semi-hard mallets\* 

2 metal beaters\* 

2 chopsticks\* 

### **Percussion II**

Snare Drum (snDr)  
Mid-low Tom (mLT)  
Low Tom (lT)

4 Woodblocks mounted on stand (B)

4 Crotales tuned to F#7, G7, G#7 and B7 mounted on stand (C)  
Marimba (M)

Mallets:

2 drum sticks 

2 mallet/drum stick



4 hard, semi-hard and soft mallets\*



2 metal beaters\*



## **Electronics**

4 microphones (2 for Vibraphone and 2 for Marimba).

Computer with Max/MSP ([www.cycling74.com](http://www.cycling74.com)) and stereo outs.




2 speakers.


2 MIDI footpedals to trigger electronics.

\* Refer to the Analysis Notes section for an accurate description of the sound needed and choose the specific mallet or beater accordingly.






## Staves, Barlines and Noteheads

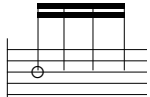
### General

<p>(no staff)  </p>   	<p>don't play</p> <p>standby or <i>control</i> staff</p> <p>regular barlines (normal or dashed)</p> <p>separate beats visually</p>
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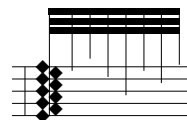
**Drum head staff** 

hT or mLT	edge
	center
snDr	edge
mLT or IT	center

	regular hit
	hit with stick side
	hit with stick tip
	rim shot
	combine all hits on all drums

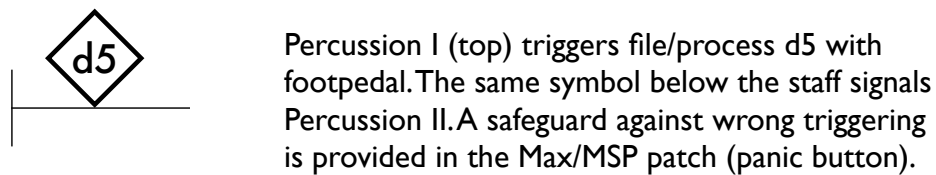
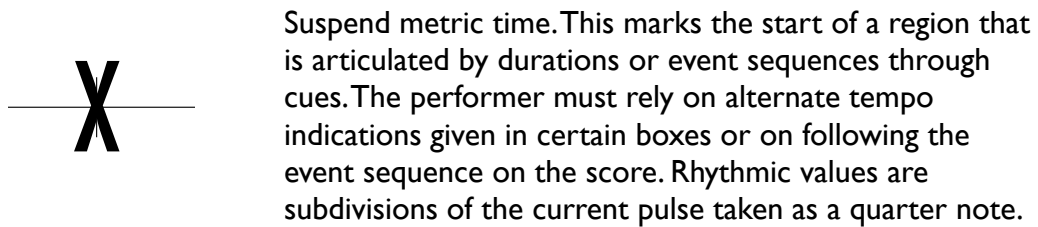
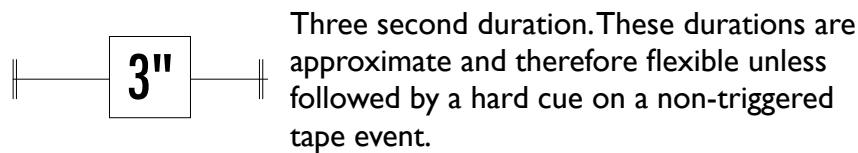
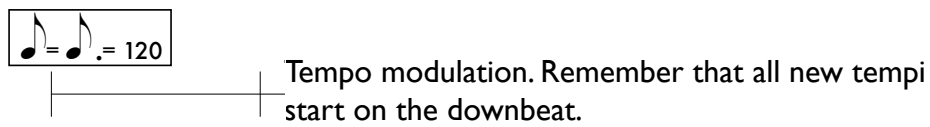
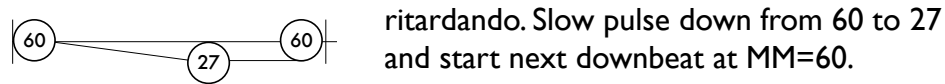
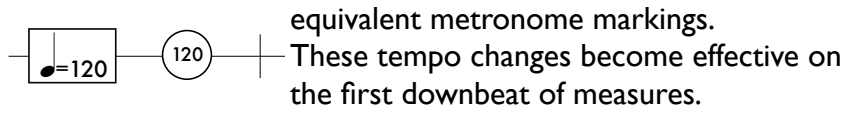
	repeat same hit on same head with modifiers (hairpins, glissandi, etc.)
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	woodblocks
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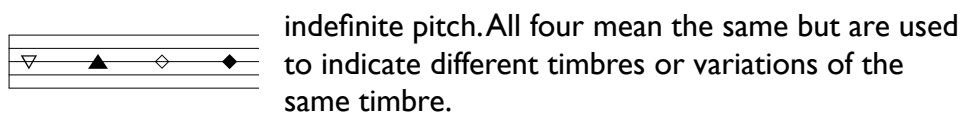
	woodblock cloud (pg. 9): play all woodblocks in any order as fast as possible. It might be convenient to scatter the woodblocks on a music stand instead of mounting them on a percussion stand.
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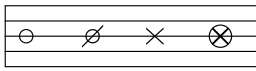


**Control** - this staff contains all the tempo, duration, metric and trigger information.

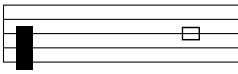


**Electronics**

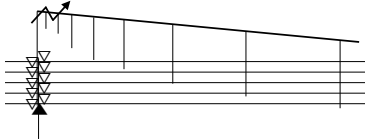




drum head sounds. Refer to Percussion stave notes for exact meaning.



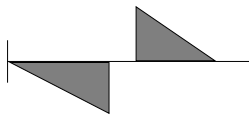
cluster and frequency band. The staff region where they are placed indicates a relative measure of the center frequency location.



cowbell and woodblock burst. A cloud of metallic and wooden sounds in different frequency regions; sounds like broken glass.

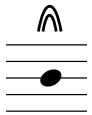


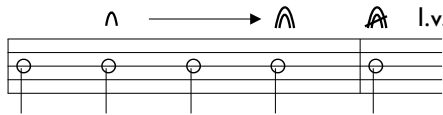
decelerating ricochet.

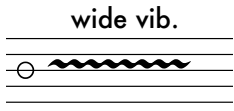


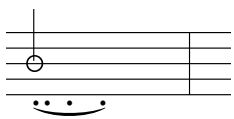
audio file envelopes. These sound like gongs. The shapes roughly indicate the amplitude envelope. The placement above or below the staff shows relative register and the darkness its peak loudness.

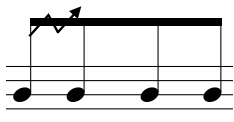
## Articulations, Arrows and Cues

 dead/muffled hit. Mute drum head as much as possible and apply pressure to achieve a muffled hit.

 dead/muffled hit sequence. Progressively apply more pressure, release for last hit and then let vibrate (l.v.)



**wide vib.**  
 pitch vibrato. Lightly press drum head to vibrate sound without stopping it.

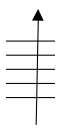
 ricochet


 variable speed. Play notes in different spacings.

 continue in the same manner.

 transform into.

 continue like morse code  Morse code. Continue playing Morse code patterns emulating electronics.

 hard cue. Precise timing cue; should be temporally locked.

 soft cue. Flexible timing cue.

**[mp]** match dynamics. Performer should match dynamics of the electronics.

## **Software and Samples**

Analysis: Audiosculpt (IRCAM) and SPEAR (Klingbeil).

Editing: LogicPro 7 (Apple).

Audio Processing: SPEAR, LogicPro 7, Max/MSP Iana module (Cycling74) and GRM tools (GRM).

Modelling and Computer Assisted Composition: Open Music (IRCAM) and SpectralFun (Pastor).

Score Editing: Finale 2010 (MakeMusic).

Performance: Max/MSP.

The drum samples used were recorded at the Stony Brook percussion studio by Russell Greenberg on March 19th, 2008.

All other samples (doors and locks) are taken from the Freesound Project ([www.freesound.org](http://www.freesound.org)):

By acclivity (<http://www.freesound.org/usersViewSingle.php?id=37876>)

SqueakyDoorNR.wav (<http://www.freesound.org/samplesViewSingle.php?id=16454>)

By cmusounddesign (<http://www.freesound.org/usersViewSingle.php?id=1059930>)

je\_creakydoor.wav (<http://www.freesound.org/samplesViewSingle.php?id=71900>)

By gregswinford (<http://www.freesound.org/usersViewSingle.php?id=1020728>)

large\_creaking\_door.wav (<http://www.freesound.org/samplesViewSingle.php?id=70101>)

By UATAudio (<http://www.freesound.org/usersViewSingle.php?id=195066>)

hugeSlidingDoorSlamSM57.wav (<http://www.freesound.org/samplesViewSingle.php?id=31155>)

By HerbertBoland (<http://www.freesound.org/usersViewSingle.php?id=129090>)

Creak\_9.wav (<http://www.freesound.org/samplesViewSingle.php?id=29696>)

By banjoboy (<http://www.freesound.org/usersViewSingle.php?id=34905>)

doorslam\_5\_lock.mp3 (<http://www.freesound.org/samplesViewSingle.php?id=19972>)

## Analysis Notes

### **General remarks:**

The piece explores the relationship between two poles: the acoustic and the acousmatic. It begins in the purely acoustic and ends in the purely electronic. Each step of the way is guided by a different approach to the relationship between the composer, sound, technology and, of course, the final product: music.

### **Rehearsal 1** - *periodicity vs. aperiodicity*

Performers (I&II) sit at the front of the stage with a snare drum each. The roll should begin imperceptibly and slowly create an even surface of noise: a drum roll with the snares on.

This is the acoustic image of two known sound sources producing an aperiodic sound in the frequency domain. However, the method of production is extremely periodic. By filtering this sound, certain patterns emerge as ripples in the surface. These are the notated rhythms. They should be played maintaining the roll as steady as possible. As the ripples become more intense, the surface will eventually shatter. The tempo should be respected but some liberty in timing (slight ritardandi) can be taken at moments of less activity (i.e. to separate phrases).

### **Rehearsal 2** - *periodicity vs. aperiodicity revisited*

This is essentially the same concept as in section 1 except the starting point is a roll on the rim and the ending point a roll on the head. There should be no tempo flexibility and, as before, the roll and the hits should be kept as steady as possible with a final disintegration right before rehearsal 2B.

### **Rehearsal 2B**

This closes the first period with an arrival of I&II to a locked 16th note pattern (periodic) that fades out and returns as a roll (a surface of noise). A final sequence of rim sounds ends with a two second pause of absolute silence that ushers in the first electronic statement at rehearsal 3.

### **Rehearsal 3** - *acoustic to electronic: 1st electronic transformation*

This section transfers the sound from the acoustic to the electronic. The electronics (E) start as a snare drum roll (as did I&II) located in the same place as I that opens up in space as it separates into different streams. These streams converge 3 times into an implosion-explosion gesture that will develop into the *burst gesture* mentioned in section 5. I&II should consider 2 things:

- i. The cross fade between acoustic and electronic should be almost imperceptible. Let the electronics take over before dropping out and don't give any visual indication of it.
- ii. During the first implosion, I&II should get up vigorously and move the snare drum to their stations. This should be done as quickly as possible but without undue haste.



#### **Rehearsal 4** - *electronic to acoustic*

This is the transfer back to the acoustic. It starts with the 3rd implosion-explosion which is actually just an explosion or release. Electronic cues (eC) b1 and b2 trigger two audio files with two short cues. The first sets off a chain of events moving from E to I to II. The second (given by II) is a motive echoed by II and developed by I until eC b3. Ideally the tempo will remain the same throughout **4** but, if necessary, the phrase can be played as two semi-phrases with a slight breath (no silence) before eC b2. In any case, there should be nothing that threatens the sense of arrival at rehearsal **5**. Electronic cue b3 is simply a ramp in E that reinforces this.

#### **Rehearsal 5** - *1st acoustic transformation: the burst gesture*

This section is structured in phrases made up of a sequence of 3 events or event types that are gradually developed and extended. Each of these events emphasizes an aspect of the phrases:

- i. the *burst*: from loud to soft and *molto ritardando*. This gesture starts all the phrases in this section. The first time (at **5**) it should sound as an ending of the previous section. Therefore, the final rim shot should sound as if it stops time. However, in subsequent instances this rim shot begins the phrases so the deceleration should sound as a building up of energy.
- ii. the *groove*: this part of the phrase follows the *burst*. In its embryonic stage it is merely a ricochet. Unlike the burst, it conforms to a grid no matter how unstable this grid may be. This is where the stable grid of sections **7** and **8** will come from.
- iii. the *lock*: this corresponds to the closing material of each phrase. It is meant to sound small. Therefore, each phrase has a dynamic structure that imitates itself: the energy profile of the *burst* is the same as the that of the *groove-lock* pair.

The third phrase (eC **c2** and forward) deserves some attention. It is split in 2 parts by an interruption of silence and a snare noise. Each of these two parts must sound very crisp to bring out the conflict between the grids and therefore the plasticity of the groove. The interruption (about 2 seconds) should be absolute stillness. The silence is broken by I strumming the snares or putting them off and on again in the approximate rhythm given. The entrance of II should sound as a direct consequence of this. The rhythm is extracted from the recording session with Russell Greenberg and is used later on in the electronics. The exact sample is found on the CD that contains all the other material of the piece.

The end of section **5** becomes the beginning of section **6**.

#### **Rehearsal 6** - *2nd electronic transformation: developement of the burst*

This section is a developement of the phrase structure of section **5** with more E. It alternates between metric (regular time signature) and ametric (X time signature) events. I&II should sound as a single compact object regardless of their metric relationship to E. Below is a more detailed breakdown of these parts:

6.1-6.2: no metric. E reinterprets the *burst* and I&II fill in as notated graphically.

6.3-6.21: I&II provide the meter and dissolve into a sequence of events starting at 6.15.

6.21-6.22: E establishes pulse via the tempo cue.

6.23-6.30: I&II lock into the tempo given by E and come to a sudden stop at 6.30.

Electronic cue d4 stops E so there is some extra time in the file for I&II to clearly hear the tempo cue and come in. However, the least time the better since it should be I&II that establish the tempo cue with the groove. In other words, for the audience, I&II should be the ones giving pulse meaning to the E sound.

6.31-7: gradual dissolve and birth of pitch in E. This is an extension of the *lock*. The final section with the glockenspiel and crotales imitating E and finally themselves should be a moment of calm. I&II should try different ways of playing the instruments so that each note unique.

**Rehearsal 7** - *2nd acoustic transformation: towards the grid*

This section is a single expanded version of the phrase at rehearsal 5. As in section 6, I&II should be considered a single object.

**Rehearsal 8** - *periodicity: the grid*

This section crystallizes the *groove*. As in section 6, the tempo is cued by E but it should only become apparent with the entrance of I&II.

**Rehearsal 9** - *3rd electronic transformation: beginning of definite pitch*

This section explores the pitch content of the spectral analysis of the different drums. It is a long crescendo until rehearsal 10 where I&II and E merge. The tempo is constant and E serves as

an event guide. Electronic cues f2 and f3 are stepping stones in case timing gets off. Throughout this section, the pitch content is fairly stable (even registrally specific) reflecting its origin.

Rhythm, dynamics and articulation should be primary to ensure forward drive.

**Rehearsal 10** - *musique concrète*

This section is an optional breather for I&II. It is an elaboration of the first E section at 3 reinforced with a noise collage. I&II may choose to react to these events but always keeping

in mind that this is a reverence to the origin of acousmatic music and that they should dissipate.

**Rehearsal 11** - *3rd acoustic transformation: from frequency to pitch*

This transition section brings us back from the physical world of sound to the musical world of tempered pitch. I&II should begin emulating the high pitch tingling and low pitch

rumbling in E.

**Rehearsal 12** - *burst gesture revisited*

This revisits the idea of *burst* in a more delicate context. I provides the sharp impulses and II rolls the diads in the most resonant way possible. Each impulse releases a wave in the marimba that should nearly fade out before the next impulse. The tied off-the-beat 8th notes should receive a slight accent so we hear a subtle rocking pattern underlying the larger ramp shape.

**Rehearsal 13** - *pattern and phase*

This is a development of the new *burst* from section 12. I&II have slightly varying patterns of fixed length: 12 beats for I and 11 beats for II. Each of these patterns is punctuated by a sharp impulse: a C6 pitch. This impulse should be as sharp as possible so it should either be played by a harder mallet than the rest of the phrase or like a rim shot. These impulses, which mark the beginning of each phrase of II and the end of each phrase of I, tend to a synchronization that is frustrated by the arrival at rehearsal 14. The individual tempi of I&II are a little flexible in this section as long as this helps I&II shape the phrases better without straying too far from each other: the effect of the impulses getting further apart and then closer again should be audible. II should take care to bring out the line notated with the stems down. The entrance at rehearsal 14 for I&II should be crisp.

E is a patch that resonates with the pitch collections being played by I&II and confronts them with their non-tempered versions from the analysis.

**Rehearsal 14** - 4th acoustic transformation: *liquidation*

This section transforms a figuration of a fixed group of notes gradually. The difference between accented notes and non-accented notes should be exaggerated for best effect using a heterogenous set of mallets.

E is a patch that, as in section 13, provides mostly resonance with a slight rebounding and spatializing of certain attacks above a threshold.

**Rehearsal 15** - *final transition*

This is an acoustic moment that is essentially a dissolution of the previous texture.

**Rehearsal 16** - *epiphany*

This is the end of the journey from frequency to pitch in the form of a final declamatory statement by I before being absorbed by E. It is the last glimpse of the acoustic pole before the last step to the acousmatic.

**Rehearsal 17-22** - *clocks*

These clocks are the final remnant of the groove, which gave order to the pitch collections but is falling apart. A heterogenous collection of mallets is necessary.

**Rehearsal 23** - *the chimera*

This is the section that provides conceptual closure to the journey from acoustic to acousmatic. Two possibilities came to mind when thinking about the best way to represent the acousmatic pole (a sound without source):

- i. Creating a sound with no known source. I believe this is almost impossible since we strive to apply to even the strangest timbers some sort of mental source image.
  - ii. Frustrating the association of a sound and its source. With a visual cue of a source we anticipate its sound but get something different: a different sound (a keyboard triggering a drum sample) or silence (end of Gerard Grisey's *Partiels*).
- I chose a third which is actually a combination of both.

During this section, the performers will construct, with any available material (used or unused until now), an instrument or machine that doesn't make a known sound (or any sound at all). This is done to create an expectation that is purely a product of the listener's imagination. E is an electronic texture similar to a clock that can sustain for about 1.5 minutes. More than this will break the flow of the piece so performers should strive to complete the instrument within 1 minute.

When the instrument is assembled, the performers trigger the last audio file and pretend to play this instrument until the sound fades out completely.