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Ukhu Pacha
an electroacoustic music composition based on the pre-columbian fututo / waylla kepa instruments

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Abstract

Ukhu Pacha, a fixed audio media multichannel piece (8.0 system) of 21 minutes' duration I composed back in 2010-2011, is based on archaeo-musicological research on conch shell horns as paramount signalling and ritual instruments in the Chavín de Huántar historical context. The piece, inspired by pre-Columbian conch shell horns, reflects the interest in exploiting particular symbolic archetypes in their role as agents of cultural transmission. The work, based on prototypes from South American archeo-musicology, brings to light not only the acoustic characteristics of the *fututos* or *waylla kepa*, but also takes into account their particular socio-cultural roles. This document discusses not only the nature of the sound ele-

1 Herrera, Alexander; Espítia, Juan Pablo; García Moncada, Jorge Gregorio; Morris, Alejandro. *Arqueomusicología de las trompetas de caracol andinas de concha y cerámica: Distribución, organología y acústica*. Flower World - Mundo Florido, vol. 3. Music Archaeology of the Americas - Arqueomusicología de las Américas. Ekho Verlag, Berlín, 2014.
http://www.ekho-verlag.com/abstracts-flower3/flower-world-vol-3-herrera-et-al/

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ments and its sources but also comments on the consequences of including such material. Likewise, a descriptive analysis covering a selection of technical procedures alongside the compositional systems has been undertaken, placing special emphasis on discussing the rather idiosyncratic nature of the pre-compositional schemes in praxis, and their effect as determinant shapers of the musical output.
Keywords: archeo-musical research, fututos, *waylla kepa*.

Título: Ukhu Pacha: una pieza musical electroacústica basada en el fututo precolombino o waylla kepa

Resumen

Ukhu Pacha, una pieza multicanal para soporte fijo de audio (sistema 8.0) de 21 minutos de duración que compuse en 2010-2011, se basa en la investigación arqueomusicológica sobre cornos de concha de caracol como instrumentos de señalización supremos e instrumentos rituales en el contexto histórico de Chavín de Huántar. La pieza, inspirada en los cornos de concha de caracol precolombinos, refleja el interés por explotar arquetipos simbólicos particulares en su papel de agentes de transmisión cultural. El trabajo, basado en prototipos del arqueomusicología sudamericana, saca a la luz no solo las características acústicas de los fututos o waylla kepa, sino que también tiene en cuenta sus roles socioculturales particulares. En el presente documento se examina no solo la naturaleza de los elementos físicos y sus fuentes, sino también las consecuencias de la inclusión del material en la obra. Asimismo, se ha realizado un análisis descriptivo que abarca una selección de procedimientos técnicos junto con los sistemas de composición, haciendo especial hincapié en el examen de la naturaleza idiosincrática de los esquemas precompositivos en la práctica, y su efecto como formadores determinantes de la producción musical.
Palabras claves: arqueomusicología, fututos, *waylla kepa*.

Ukhu Pacha

Fixed audio media (8.0 multichannel format)[2]
Duration: 21:12

Figure 1: Voice of a deity out of a conch shell from the *Tello Obelisk* (detail).[3]

2 https://soundcloud.com/jorge-garcia/ukhu-pacha-stereo-version.
3 Doyon-Bernard (1997), 17.

> '*Ukhu Pacha*: pathways of the underground world by which deceased were believed to be on pilgrimage (it was transformed into [the concept of] "catholic hell" by the colonial clergy)'.[4]

Context

Ukhu Pacha, inspired by pre-Columbian conch shell horns,[5] reflects the interest in exploiting particular symbolic archetypes in their role as agents of cultural transmission. The work, based on prototypes from South American archeo-musicology, brings to light not only the acoustic characteristics of the *fututos* or *waylla kepa*, but also takes into account their particular socio-cultural roles.

The interest in making reference to pre-Hispanic cultures in 20th century music as a tool for cultural belonging can be identified in Latin America in cases such as Heitor Villa-Lobos' ballets-symphonic poems *Uirapurú*[6] (1917) and *Amazonas* (1917); Carlos Chávez' *Xochipilli*[7] —An Imagined Aztec Music— (1940) or Alberto Ginastera's *Panambí* (1935-37) and *Popol Vuh*[8] (1975-83). In more recent examples, Cergio Prudencio, Mesías Maiguashca or Coriún Aharonián, amongst many others, share similar positions. Likewise, contemporary Colombian composers such as Jesús Pinzón Urrea, who attempted to 'integrate Indian music from the Colombian Amazon [...] in his cantata *Goé Payarí* (1982) or *Bico amano*, based on [a] Hui-

4 Jacobs (2007), http://aulex.org/qu-es/

5 In South America, they are known as *Fututos* and/or *Waylla Kepa*. Herrera (2010).

6 Specially Uirapurú serves as a clear example of Villa-Lobos' interest in establishing himself as a [Brazilian] national composer by basing the piece on 'a legend involving an enchanted bird from the Amazons, considered by the Indian worshipers to be the king of love'. Béhague (2013).

7 A chamber piece requiring a 'variety of Indian drums, among them the teponaxtle, a wooden a two-tongued wooden slit-drum, and the huéhuetl, a large upright drum, as well as rasps made of wood and of bone, and a trombone simulating the conch trumpet'. Parker (2013).

8 The Popol Vuh is based on Mayan creation story, whilst Panambí 'conjoined indigenous elements with what were then radical references to Stravinsky and serial technique'. Schwartz-Kates (2013).

toto legend'[9] or Jacqueline Nova with her *Creación de la Tierra*, an acousmatic work based on Earth creation chants from the Tunebo Indians,[10] and more recently Ana María Romano in *Sin coincidencias I - silencio* (2004) have commonly embraced these concerns.

The piece

General remarks - The symbolic value

> Since art is timeless, the significant rendition of a symbol, no matter how archaic, has a full validity today as the archaic symbol had then. Or is the one 3,000 year-old truer?
>
> Adolph Gottlieb and Mark Rothko (with Barnet Newman)[11]

Canadian composer R. Murray Schafer argues that the horn, long before being conceived as a musical instrument, was a tool of communication through coded systems extending by these means the reach of the human voice.[12]

> The first horns were aggressive, hideous-sounding instruments, used to frighten off demons and wild animals; but even here we note the instrument's benign character, representing the power of good over evil, a character which never deserted it, even when it begun to be used as signalling device in military campaigns.[13]

Accordingly, it has been stated that the recurrent use of these type of sound signals generates *acoustic profiles*, understood as the areas over which a signal may be heard; they define acoustic community boundaries. These acoustic communities, behaving as systems

9 Béhague et al. (2013).
10 Romano (2002).
11 Doyon-Bernard (1997), 9.
12 Schafer (1994), Truax (2001), Herrera (1999), Bhat (1992).
13 Schafer (1994), 165.

in which sound plays a predominant role in defining the self, are further defined in spatial, temporal, social, cultural and especially linguistic terms.[14]

By evoking community demarcation through the reiteration of the sound of the *fututos, Ukhu Pacha* makes allusion to a theocratical soundscape, similar to the acoustic profiles demarcated by the bells of a church or the call to prayer of a mosque (adhan), bringing to light the dominant religious institutions of the community.[15] Given their ability to generate considerably high sound pressure levels (especially in ensembles), as well as their relative harmonicity,[16] *fututos* and equivalent instruments have been favoured as signalling and ritual instruments to a great extent by a diversity of cultures throughout history. Widespread civilizations located around the world such as those in the Indian peninsula, the Tibetan mountains, Philippines archipelagos, Yucatan gulf or the highlands of Peru, to mention but a few, have used this instrument in their ritual ceremonies.[17]

Schafer again notes: 'The sounds of the environment have referential meanings'.[18] The conch shell horn, while assuming its *signalling* function, conveys specific meanings and stimulates the community to react in certain codified ways. According to the *2013 Oxford Dictionary*,[19] the word *signal* denotes

> [...] a gesture, action or sound that is used to convey information or instructions [...]. Signs take form of words, images, sounds, [...] but such things have no intrinsic meaning and become signs only when we invest them with meaning. [...] Anything can be a sign as long as someone interprets it as *signifying* something - referring to or standing for something other than itself.[20]

14 Truax (2001), 66.
15 Truax, ibid.
16 Harmonicity: 'A property of a sound when its partials are integral multiples of the real (or imaginary) fundamental'. Wishart (1996), 58.
17 Rath and Naik (2009), Bhat (1992), Moyle (1975), Herrera (2010), Civallero (2008).
18 Schafer (1994), 169.
19 *2013 Online Oxford Dictionary of English*. www.oxforddictionaries.com.
20 Chandler (2007), 7.

Philosopher and logician Charles Sanders Peirce understands this concept in terms of a triadic relationship between 'the *representamen* (the form the sign takes), an *interpretant* (the sense made of the sign) and the *object* (something beyond the sign to which it refers, a referent)'.[21] Music semiotician Jean-Jacques Nattiez further defines the sign in terms of

> [...] anything which is related to a second thing, its object in respect to a quality, in such a way as to bring a third thing, its interpretant, into relation to the same object, and that in such a way as to bring a fourth into relation to the same object in the same form, ad infinitum.[22]

In addition, it is stated that 'a sign, or a collection of signs, to which an infinite complex of interpretants is linked, can be called a symbolic form'.[23] Furthermore, it is said that a sound is symbolic once it 'stirs in us emotions or thoughts beyond its mechanical sensations or signalling function[s]'.[24] Certain sounds, however, have the intrinsic power to unconsciously arouse intense human feelings, deeply affecting personal emotions. These types of sounds, mostly related to either natural forces or having divine connotations, tend to be culturally ubiquitous. The psychological power accompanied by the special mood or "aura" behind these sounds, known as "archetypal sounds", tend to be strongly retained in the collective memory of a diversity of cultures.

> Some level of explanation for their effect exists because there are always comparisons to human features or those of the natural soundscape, with their age-old associations, but ultimately a sound that functions symbolically achieves its power because of its simultaneous uniqueness and universality.[25]

21 Chandler (Ibid), 11.
22 Nattiez (1990), 6.
23 Nattiez (Ibid), 8.
24 Schaefer (1994), 169.
25 Truax (2001), 114.

These archetypal sounds 'are inherited, primordial patterns of experience, reaching back to the beginning of time'.[26] 'The conch shell is one of the earliest wind instruments found in nature'.[27] The *fututos*, due not only to their deep and harmonic sound, but also their denotative relation to water, and even more so, to the sea, heighten the mystical associations given to this archetypal sound. In the case of the Andes, their importance has been stressed because of their constant association with luxury and lushness linked to their oceanic provenance. This association with the sea, and by extension, to the survival of fundamental social activities such as agriculture or livestock through the natural cycles of water, has, throughout history, imbued these instruments with a rich symbology.[28]

Ukhu Pacha develops these principles by means of articulating a network of acoustic signs which, altogether, make reference to a particular physical and ritual environment embodied in one of the most predominant pre-Inca cultures, known as the Chavín empire.

> The term Chavín, derived from the site of *Chavín de Húantar*, has [...] been used to denote an art style, an archaeological period, a "horizon", a "culture", a "basic root culture", a civilization, and an empire.[29]

The Chavín influence embraces two important dimensional frontiers: a time based unit, spreading from ca. 900 to 200 BC and a geographic dimension encompassing most of modern Peru, spreading north towards the southern Colombia, and south covering partial territories of both Chile and Bolivia. With its political and theological capital located nearly 3 200 meters above sea level in the Mosna Valley (Peru), *Chavín de Húantar* holds unique emblematic symbols appertaining to this civilization.

26 Schafer (1994), 169.
27 Rath (2009).
28 Herrera (2010).
29 Willey (1951), 103.

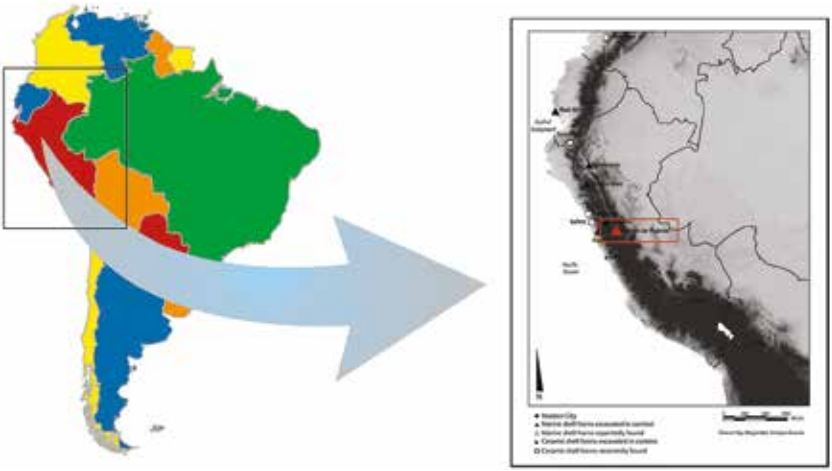


Figure 2: *Chavín de Huántar* site location[30]

'Due to its location, religious importance, and ceramic offerings found in Chavín, this site has been interpreted as a pilgrimage centre'.[31] *Ukhu Pacha*, therefore, unfolds as an imaginary ritual soundwalk towards-and-through this once sacred location, whilst the listener is placed as a silent witness of the pilgrim's final contact with the ancient divinities. The sounds of the conch shell horns, placed in their contextual outdoor and indoor natural forestal spaces which represent this archetypical soundscape, are constantly reiterated alongside the worshipper's footsteps throughout the duration of the work.

Referred to as Peru's Temple of sound effects,[32] Chavín de Huántar is located in the Andes highlands with its underground, sunken courtyard and plaza complexes connected through a number of 'dark, narrow passageways leading to small chambers, with no source of natural lighting'.[33] It has been hypothesized that the massive stone based architecture surrounded by its internal canals and galleries was part of a multi sensorial ritual space, where drained water streams roared through the canals projecting a 'thunderous sound onto the plazas below'.[34] Due to its marine origins, the

30 Internal picture on right, Herrera (2010).
31 Druc (2004), 344.
32 StarR (2012).
33 Paul (1993).
34 Paul (Ibid).

shell horns have been traditionally associated with the deep and hence, with the underworld.[35]

Having swallowed a bowlful of San Pedro cactus juice (a powerful hallucinogen), the worshipper descended into the black ritual maze where terrifying dancing shadows projected on stone walls were followed by the storming reverberations of the primordial sounds; surrounding streams of rumbling water collided with the ubiquitous blasts of the blown *fututos*. The deafening roar of the feline and reptile oracles (mimicked by the rumbling water) baffled an already overwhelmed pilgrim, excited by the vivid memories of the sumptuous iconographical representations carved all around the temple.[36]

Given its narrative[37] and connotational[38] character and somehow related to programmatic principles, *Ukhu Pacha*'s 'music is determined by the development of its theme [or subject]'; the design of the discursive material as well as the order of presentation of the contextual soundscapes observe a type of '[...] music mov[ing] in time according to the logic of its subject and not according to autonomous principles of its own'.[39]

Figure 3. *Chavín de Huántar* underground plaza (detail with artificial light).[40]

35 Ronnberg et al (2010), 212.
36 Solomon (2012); Starr (2012).
37 Differing somehow with Nattiez' dissenting position about fully accepting a *narrative* in musical terms (see Nattiez (1990), 127), Landy states in this regard that '*narrative* here is by no means to be taken literally; instead, it concerns the notion of a piece's taking the listener on a sort of *voyage*, one in which exact repetition of longer segments is rare. This is the source of Michele Chion's description of the experience as *cinéma pour l'oreille*.' Landy (2007), 27.
38 'The term 'connotation' is used to refer to the socio-cultural and 'personal' associations (ideological, emotional, etc.) of the sign. [...] Connotation is thus context-dependent.' Chandler (2007), 38.
39 Scruton (2011).
40 Chavín de Huántar Archeological Acoustics Project https://ccrma.stanford.edu/

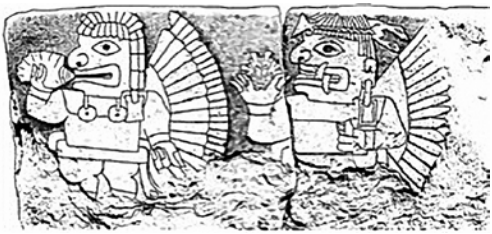


Figure 4. Drawing of engraved cornice from *Chavín de Huántar*, [...] showing an apparent procession.[41]

Figure 5. '*Chavín* art showing semirealistic human figures: the cactus-carrying individual from the *Circular Plaza*'.[42]

Manufacture and analysis of the instruments

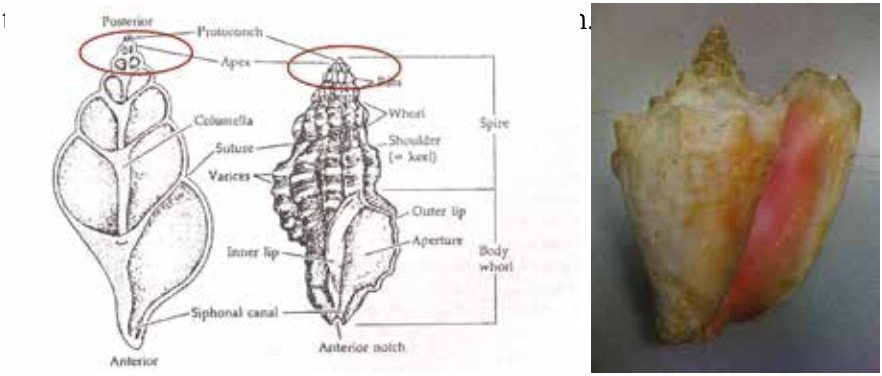
In 2010, a number of *fufutos* were manufactured at Los Andes University[43] following traditional techniques. A number of conch shells specimens from a variety of families, such as *Malea Ringens*, *Strombus Gigas* (figure 6), *Strombus Peruvianus*, *Strombus Galeatus*, *Pleuroplocacea* and a ceramic replica of a pottery Waylla Kepa, were collec-

groups/chavin/current.html. Stanford University. Accessed 15 November 2011.

41 Rick (2005), 85.

42 Rick (2005), 83.

43 This activity has its roots in the research project "Acoustic properties of the conch shell trumpets Fututo & Waylla Kepa" performed at Universidad de los Andes, Bogotá, Colombia; the project team included Dr. Alexander Herrera, Department of Anthropology, Juan Pablo Espítia and Jorge Gregorio García Moncada, Music Department, Universidad de los Andes. The project focused on the characterization of the sounds of these aerophones by means of performing analyses in-depth of their historical, cultural and technological contexts.



Figures 6 and 7. *Strombus Gigas* and *Morphology of the conch shell.*[44]

Figure 7 displays the cutting point on the protoconch section of the shell. In addition, a small longitudinal incision was performed on top of the apex with a conical drill bit, allowing the performer's incoming air column to pass through the instrument. The aforementioned procedure was equally performed for all of the sixteen available shells, therefore obtaining the same number of instruments.

Figures 8 and 9. Polishing of apex cut and instrument performance *in situ* (*Guatavita lake*).

Studio and field recordings were performed in contextual sites, such as at Guatavita Lake in the Sesquilé municipality of the State of Cundinamarca, Colombia, where the utilization of these

44 Figure 7. Reitz (1999).

instruments was recorded in documents dating back to colonial times.[45]

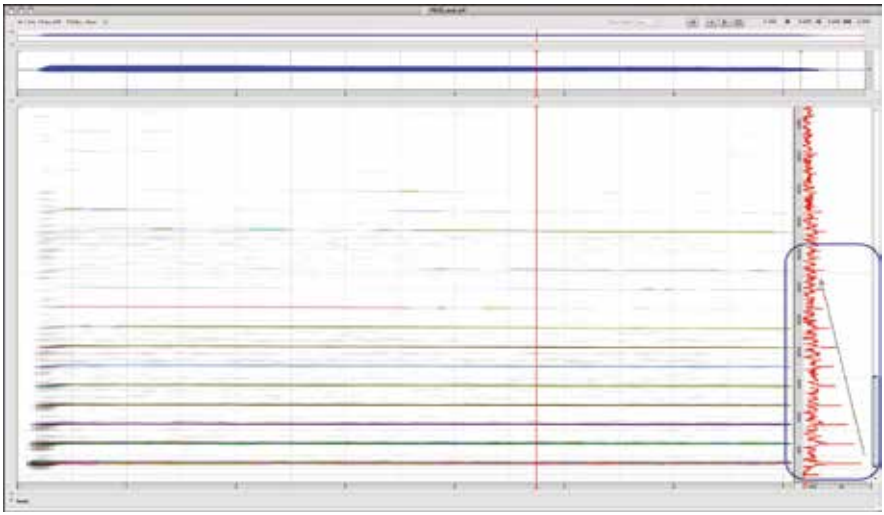
Figure 10. *Guatavita lake.*

Figure 11 displays a spectrogram of a *Strombus Galeatus fututo* FFT analysis with a fundamental tone around 297 Hz. The spectral energy's concentration on the first ten whole multiples of the fundamental tone provide evidence of the inherent *harmonicity*[46] of the instrument; the rightmost portion of the analysis window presents the dynamical crest of the spectral components showing a linear, gradual drop in the amplitudes of the higher harmonics.[47]

45 *El Carnero* [The Billygoat] by the American-born chronicler Juan Rodríguez Freyle (Santa Fe de Bogotá, 1566-1638) describing the initiation rituals of succession and inheritance of the Muisca leaders, commonly known as El Dorado: 'During the departure of the raft, little horns, *fututos* and other instruments began to perform, and with these a huge yelling that thundered mountains and valleys, [...]' Rodríguez (2006), 11. Translation, Jorge García.

46 Using Wishart's term related to consonance stating that 'an interval is more consonant the simpler the ratio of the frequencies of its components'. (Wishart, 1996: 71).

47 The data on the graph corresponds to the specific time indicated by the vertical red line in the spectrogram. Nevertheless, the spectral behavior tends to be similar throughout the total length of the sample with subtle oscillations as



FFT spectral analysis[48] of the samples obtained in the studio recordings displays a list of averaged fundamentals, in Hz, for all 16 instruments:[49]

301,9	368,8	332,8	339,5	337,2	357,2	342,5	351,2
259,4	297,2	299,0	290,1	347,8	328,5	327,5	445,9

Table 1: list of fundamental resonant frequencies

Rounding these values to the quarter tone,[50] the following pitches in standard music notation, in ascending order, make evident the relatively narrow tonal range of the ensemble obtained:[51]

already stated above.

48 The analysis was performed using IRCAM'S AudioSculpt, version 2.9.4v3.

49 As normally observed in lip reed instruments, there is no case of a single fundamental tone in time given the microtonal fluctuations resulting from the natural changes of air pressure produced by the lips. Hence, the fundamentals stated are to be taken as averages.

50 See *microtone* in List of terms and abbreviations.

51 Since the individual dimensions of the instruments did not widely differ, the predictability narrow nature of this range owes to the fact that the resultant frequency of the instrument is dependent on the driver's frequency of the performer (blower's lip vibration) adjusted 'so that one of the harmonics matches with the shell cavity fundamental frequency'. Bhat (1992).

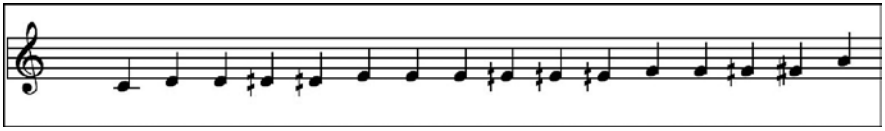


Figure 12. Average Fundamentals of instruments in ascending order.

The compositional relevance of the above relies on the fact that since these instruments were traditionally performed in homogenous ensembles,[52] it is usual to perceive the so-called *Tartini effect*. This is as a result not only of the typical high levels of sound pressure produced by these instruments, but also the proximity of their fundamental frequencies. 'When two tones are perceived simultaneously, other tones often appear, because of distortion effects in the ear; [...] high intensity levels are required for combinational tones to be heard'.[53] This phenomenon is particularly exploited in section 2 (3:30) and in the middle of section 7 (16:37 and 17:09), by adding synthetic material as well as transpositions of the instruments.

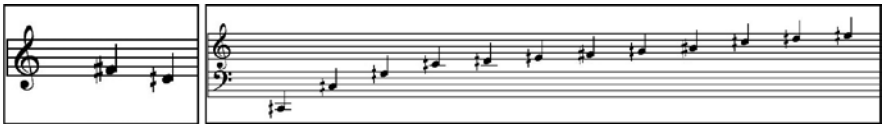


Figure 13. Original fundamental frequencies (left) and harmonic series from differential tone (right).

Figure 13 exemplifies the aforementioned concept: two *fututos*, with average fundamental tones at 368.8 and 301.9 Hz (left), are embedded inside a harmonic series which fundamental tone is the difference between both original fundamentals (66.9 Hz). The sounds of the original horns are mixed with transposed portions of their spectra (isolated harmonics) as well as synthesis-based material from which pitch material is derived in the aforementioned procedure.

52 Herrera (2010).
53 Truax (1999).

Form (pre)Definition

As a structural symbolic form, a link was built between the main sound sources (the conch shell horns used) and the form design according to the following mapping process: a transformation of the list of *fundamental resonant frequencies* of the instruments into a *time proportion grid*. This process of translation between a physical phenomenon such as the aforementioned resonant frequencies into a pre-compositional formal scheme was performed in order to propose a structural correlation between the main sound sources of the work, the *fututos*, and the form of the piece.

Appendix 1 summarizes the mapping procedure, explained as follows:

1. The list of fundamental tones is given in ascending order (16 elements in list).

2. The list above is transformed into intervalic values between the elements (15 intervals); an extra item, the sum of the elements of the list (186.6) is added in order to match the number of elements in the lists.

3. This new item (186.6) is multiplied by 3 = 559.8. Since the aim of the operation was to re-interpret the numbers in terms of durations of individual sections (given in seconds), the numbers were proportionally scaled in order to yield a more suitable result in the following terms: (1.0, x_2, x_3, x_4, [...] x_{15}, 186.6) into (1.0, y_2, y_3, y_4, [...] y_{15}, 559.8), when (186.6 * 3 = 559.8) and x_x represents the original value and its position within the list, whilst y stands for the new scaled value and its position.

4. All numbers are left in their original position and the list is unified.

5. All resulting numbers below 50 are combined and added together —this ensures that the smallest section would have a duration of 50 seconds. A first chart of section durations is given at this point. It is important to point out that the piece is macro-formally divided into two large sections. This serves the purpose of presenting the two main types of soundscapes introduced above; the first half of the piece, from beginning to 11:54 presents sounds inspired in open air, natural forest scenes. The shell horns are heard in the distance against the sound of birds and wind, the footsteps and breath of the pilgrim, whilst the storm is announced in the distance (2:48); the second section is based on rain sound and sustained harmonic material from the horns. All this material alludes to external setups, whilst the second part of the piece, from 11:54 to the end, presents large, enclosed reverberant scenarios, alluding to the subterraneous stone galleries where the heart of the ritual used to take place. —Further detailed descriptions per section are given below.

6. Since the last section of the piece is noticeably larger than the previous ones, it was necessary to partition it. This was done by recycling the same time proportions obtained in step 4 (as can be seen in the appendix) and reusing them (without grouping those lower than 50) in order to obtain the internal time proportions.

Micro-Formal definition of first part of the work (0:00-11:54)					
0:00-3:38	3:38-4:46	4:46-8:14	8:14-8:50	8:50-9:57	9:57-11:54
Micro-formal definition of second part of the work (11:54-21-12)					
11:54-12:40	12:40-12:47	12:47-13:02	13:02-16:03	16:03-16:29	16:29-16:55
16:55-17:06	17:06-17:22	17:22-17:55	17:55-18:13	18:13-18:51	18:51-20:10
20:10-21-12					

Table 2. List of time proportions obtained from Appendix 1.

For reference, figure 14 illustrates the aforementioned process as originally programmed in OpenMusic (Appendix 2):

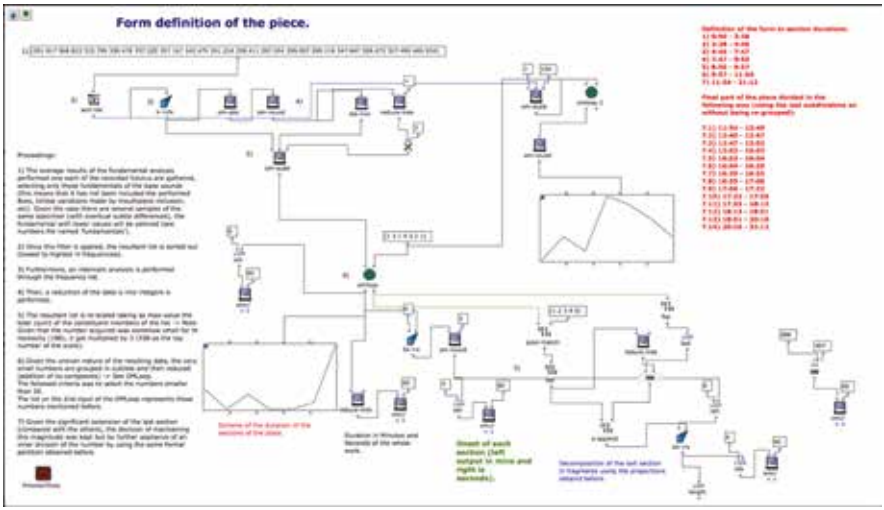


Figure 14. *Ukhu Pacha's* form definition OpenMusic patch.[54]

Appendix 3 displays in a graphic timeline the output of the operation above, where the durations of the individual sections as well as a brief description of their content is summarized.

"Filling up the containers"

The dramatic nature of the piece —the worshipper wandering through the imaginary forestal scenes being guided by the voices of the gods (the *fututo* calls)— brings to light the architectonic *directionality*[55] underlined by the rather narrative approach in which the piece was conceived. Authors like Nattiez or Abbate though, state that what could be considered as *musical narrative* relies explicitly on syntactical musical facts, given that, unlike music, linguistic syntax is grounded in the logical connection between subject and predicate, as well as the use of verbal tense.[56] *Ukhu Pacha*, nevertheless, whilst presenting the sound material articulated

54 Appendix 2 displays figure 13 in a larger size for convenience.
55 The piece begins and ends in quite different locations/scenarios, and the metaphoric displacement through them is an important part of the musical discourse.
56 Nattiez (1990), 127-28.

to deliver a perceptible idea of linear progression of events in time, fills up the empty structures above with the rich symbolic content typical of the archetypal sounds. Directionality in this case relies on cause-effect relationships compositionally intended throughout the piece, such as the *crescendi* of the *fututos* coupled with the suggestion of physical movement of the character, implying temporal and spatial displacements. Two examples illustrate the aforementioned notion:

1. In macro-formal terms, the second half of the piece follows the metaphorical arrival at the ceremonial centre preceded by the pilgrimage journey within the first half. The significant change of the acoustic architecture introduces the reverberant ritual chambers flooded by the sound of running water and the shell horns.

2. In micro-formal terms, the thick texture of the second section is based on cloudbursts and *fututo* sounds, announced as approaching distant events in section one in the first half of the piece.

Poietically, the characteristics of the extra-musical references as well as the evocative soundscapes provide the work with a chronological discourse. In my opinion, it is precisely in the act of placing such a sequence of related events that actual meaning is given to the formal structure described above. In this way, a meaningful musical discourse arises when these '*empty* [temporal] *containers*', a term applied to John Cage's early approaches to structural organization in indeterminacy situations,[57] are posteriorly loaded with coherent sound structures which interact with each other in the temporal axis in different ways.

This interplay between an *indeterministic - formalistic* approach (i.e. the calculation of abstract time durations prior knowledge of the actual sound material allocated in them) and the *bottom-up* approach to composition[58] (*on the go* compositional de-

57 Morgan (1991), 360.
58 Landy (2007), 34.

cisions based on the aural qualities obtained through the sound manipulations) is characteristic in this case. By mapping the fundamental resonant frequencies into time values, an allegoric correlation between the sound sources —the *fututos* in this case— and a pre-compositional form sketch was performed in order to allow me, as a composer, to have an abstract graphic skeleton as an a priori visual aid that will later be fed with the output from the several sound manipulations. A constant feedback between the resulting sound materials and those abstract sketches is performed during the compositional process, in a similar way the final output from a couturier's initial basic paper model is usually adapted to the nature of the materials, influencing in meaningful ways the initial design. By these means, the sketch represents to me an abstract point of departure instead of specific rules. In other words, these time proportions work as a pre-compositional referential map instead of a *lex scripta* list of constraints; decisions such as the choice of a sharp contrast rather than a smooth cross-fade transition between adjacent sections in a given location or the constitution of the internal gestalt structures are 'tuned by the experience of aural feedback [...]'.[59] I would like to stress that, since what is to be appreciated (and judged) by the general audience is the aural output, whatever pre-compositional conceptual structure eventually used will remain in the poietic[60] domain, relevant in the composition or analysis orb but mostly meaningless in the concert scenario. To me, as a composer, I do not feel compelled to make structures audible in order to consider them legitimate; structures help me to take decisions instead of constraining or validating the musical output.[61]

59 Wishart (1999), 123.

60 The semiological model offered by Nattiez, after Jean Molino's semiology theories and others, presents the study of musical meaning as a *tripartition* process of analysis (dimensions of symbolic phenomenon): The *poietic* dimension (study of the intentions of the author), the analysis of the *neutral level* (description of the morphological properties of the examined symbolic phenomena) and the *esthesic* dimension (construction of meaning by the receiver). Nattiez (1990).

61 Discussions about this topic in contemporary music are addressed by a number of scholars. Schwartz (1982); Landy (2007); Emmerson (2000); Wishart (1999).

Conclusion

Ukhu Pacha, an acousmatic piece based on South American archaeological sources, takes as its point of reference the contextual soundscapes around the *fututos*. Their historic function as important signalling and ritual instruments in the pre-Columbian Andes brings into the piece a whole set of sound references articulated in a succession of events representing the act of pilgrimage. For the realization of the project, a collection of instruments was built, recorded and described, while attempting to make symbolic bridges between the sound sources, formal design and musical content. Given the work's special emphasis on the construction of *imaginary contextual soundscapes*,[62] the multichannel setup allows the audience to experience a considerable degree of immersion into the proposed soundworld.

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62 A tangential reference to John Cage in the form of homage, especially considering his Imaginary Landscape N.º 5, for any 42 phonograph records (1952). See *filling up the containers* in *Ukhu Pacha*.

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