The following presentation is part of a vaster research project that focuses on the design of learning materials for an ancient whistling form of language.

A hundred kilometers off the border between Morocco and Western Sahara into the Atlantic Ocean one will find the small island of La Gomera[1], home to a whistled form of language known as the *Silbo Gomero.* The historic origins of this linguistic form are difficult to trace. Despite the fact, most islanders address this practice to the Guanches, pre-Hispanic inhabitants of this Atlantic region. As recently confirmed by bioacoustician Julien Meyer (2005), this linguistic form is part of a vast family of whistled languages that span the globe, from: Mexico, Greece, Turkey, Papua New Guinea, Vietnam, Guyana, China, Nepal and Senegal. Besides particular traits that characterize these geographical milieus – such as the abrupt *mountainscapes* or extremely dense forests – these places show very little in common. This difference is further strengthened by the present livelihood of the whistled language of La Gomera. The *Silbo* – as most Gomerans call it – has slowly, since the 1950's, shifted from the fields where it was once used by most peasant islanders, to the space of the classroom as part of a project of cultural preservation. This shift – between the field and the classroom – is tied to the continual disappearance of agricultural life, processes of immigration and the introduction of tourism as main source of economic sustenance; a transformation that has compelled world organizations such as UNESCO (2009) to recognize the *Silbo Gomero* as Intangible Cultural Heritage.

[1] The island of La Gomera is part of the Canarian Archipelago, Spanish territory.

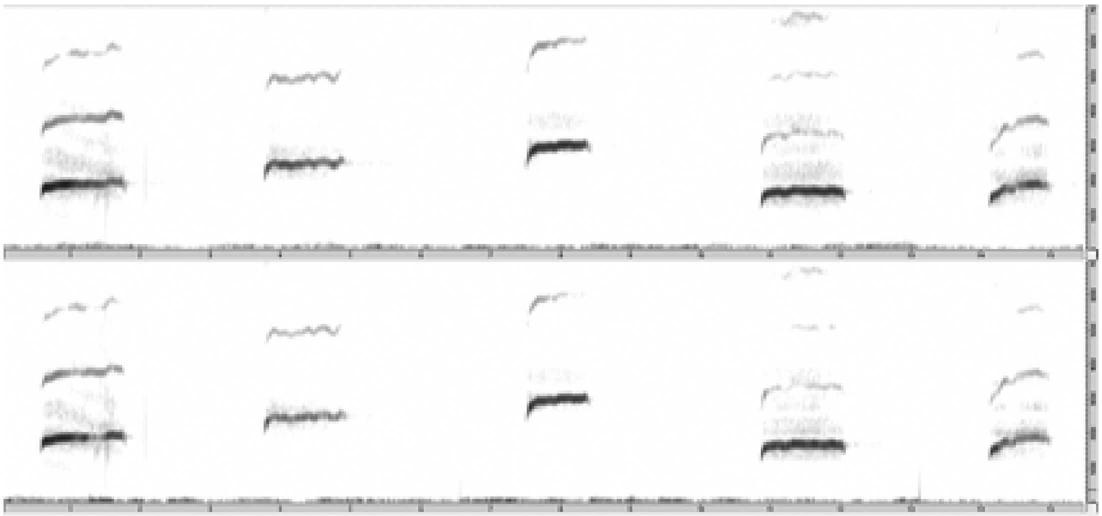
1. The island of La Gomera is located at 28°06'N 17°08'W.

It is pertinent to recall – or maybe present to others – what is a whistled language in the first place. Professor Ramón Trujillo (1978, 2006) one of the most prominent figures in the phonological study of the *Silbo Gomero* presents this linguistic form not as 'natural language' – at least not in the orthodox sense – rather as an independent phonological system. According to the words of Professor Trujillo himself: the *Silbo Gomero* " (...) contains a reduced number of phonic-schemes that are used to produce different sonorous substances (...). The *Silbo* is not a direct imitation of the underlying linguistic code, the spoken Castilian Spanish, considering it has "(...) a rigorously articulated structure which clearly distinguishes it from standardized sign-systems and whose most notable attribute is that the meanings of its smallest consistent units cannot be analyzed" [Trujillo 2006: 31]. What is important to add to this previous description is the fact that this complex system of telecommunication would not be possible without reconfiguring the body through a modification of the conventional linguistic medium. Here, instead of relying on the lips, the whistled form relies on the interior oral cavity, elevating the tongue against the palate or teeth and supporting it with none, one or two fingers, according to the desired intensity [Meyer 2005, Trujillo 1978]. This process clearly disturbs the formal-structural qualities of the underlying code – the regional Castilian Spanish spoken in the island – without disturbing its semantics.

As presented further on, and even though it is difficult to outline the systems smallest constituent (phonic) units, the study of this whistled form of language has been largely exploited from this same perspective. In fact, this relation with the spoken language of the island has lead to the most common description of the *Silbo* as a 'surrogate' of speech [Carreiras et al. 2002] A description that is intimately tied to the formal modification of the underlying code – while exploiting a series of new bodily techniques – and its main usage by peasants and shepherds as form of telecommunication. A relation that has also instigated a profound misconception: the idea that the *Silbo* – and other whistled languages – can be reduced to a set of stereotyped whistled signals. One of the authors to draw attention towards this same topic was linguist Annie Rialland (2005) while strengthening the idea that a whistled form of language is: "(...) a system of whistled communication which allows fluent subjects to transmit and exchange potentially unlimited set of messages over long distances. In this respect, they are quite different from communication systems limited to a repertoire of stereotyped messages. For example, the whistled formulas used by certain herders or animal trainers do not constitute whistled languages as such" [p.1].

According to a phonological approach, the *Silbo* contains two skeletal vowels. The 'grave vowel' that corresponds to the /a, o, u/ and the 'acute vowel', corresponding to the /i, e/ vowels. Here, the limitation of the whistling apparatus is presented as the main reason for a strict possibility of 'differences in tonal frequency', where a vowel can only be 'grave' or 'acute'. According to these same insights, the spoken word relies on a different set of physical resonators, allowing us to distinguish between acute/ grave, open/ closed, partial/ intermittent and complete vowels. The whistled vowel is shaped by, and depends solely on one resonator, the mouth. Further reading through Professor Trujillo's most prominent phonological insights: "while some might find, that within the *Silbo Gomero* phonological structure, only "(...) two 'whistled vowels' or groups of frequencies; two blocks that behave as they would in ordinary language (...) where functional confusion is impossible from a phonological perspective (...) properties that are always distinctive and those that are not consistently distinctive (depending on the context, the situation or what the whistler knows) cannot be considered (...). Obviously, these latter properties (...) do not form part of the structure of the whistled language because they depend on external factors". [Trujillo 2006:15]

[o]



2. Spectrographic image of whistled vowels [a], [e], [i], [o] & [u] (Matos 2007).

Despite the provided contribution, in conversation with both *Maestro*[2] Isidro Ortiz Mendonza and *Maestro* Lino Rodriguez – two proficient whistlers that teach the *Silbo* to young children throughout the island – when recording out in the fields or attending the classes for both children and adults, one slowly starts to acknowledge that intrinsic to this whistled form of language are exactly these same 'external factors'. In strict co-relation, most whistlers can produce and perceive two more groups of vowels within the acute and grave blocks initially proposed by a phonological reading of the proposed whistled form of language. Recognizing this 'disagreement' inevitably opens space for a new investigative hypothesis. To further explore this same paradox, it seems pertinent to suggest an investigation of the embodied knowledge each subject – phonetician and whistler – brings to the core of particular modes of analyses, most crucial when delineating the scientific representation of this complex linguistic event. Particularly pertinent when one considers that this same 'phonological stage' [Trujillo 1977, 2006] is highly influential within the community involved in the educational preservation of the *Silbo* Gomero while presenting one of the most complete linguistic and historical resources. However, within the context of the proposed discussion, this body of work will be largely explored for distinct reasons. Here, what becomes most relevant to acknowledge, is that this same 'phonological stage' carries within particular intuitions in the study and documentation of language.

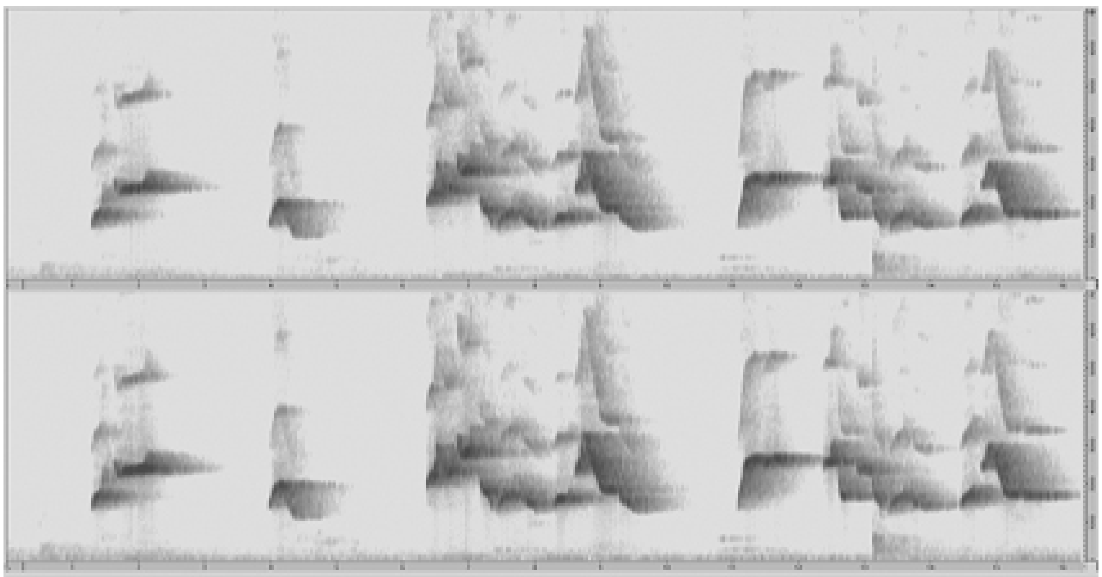
[2] *Maestro* is the Castilian Spanish word for 'master' or 'teacher'.

Further dissecting this particular body of work, will further instigate the recognition that behind this linguistic approach lies hidden a particular techno-scientific intuition, where language, in line with an information-processing paradigm, stipulates communication as a highly formalized system prone to quantification [Shannon 1948]. Here, what is relevant to outline is the periodical function of the unit of analyses, now composed by sound-frequency rules that abide through out the systems code. With the clear intent of outlining its phonetic and phonological axiomatic structures what is dismissed as 'external' are the highly contextual aspects involved in the process of learning, perceiving and performing the *Silbo Gomero*. Particularly, the relation each whistler develops with the abrupt environment characteristic of the island, an infinite and unpredictable resource that, at times, escapes the grids of formal techno-scientific methodologies and their representational efforts. In fact, intrinsic to the referred techno-scientific methodologies are spectrographic modes of analyses of collected acoustic data. To further explore the relevance of this same instrumental mode of analyses within the linguistic field it is important to understand that spectrographic analyses is fruit of a very particular moment within the history of Western scientific experimentation, particularly within the domain of physics and its relation to mathematical praxis. Here, it is important to refer to the development of 'Fourier analysis' and the application of its functions to the study of body heat-flows. Following the work of Trevor Wishart in 'Sonic Art' (1996): the first attempt can be found in the midst of the XIX^th^ century when French polymath Jean Baptiste Fourier devised a way of representing "(...) an arbitrary mathematical function by a sum (of possibly infinite) simpler functions" [p. 48]. Later, in 1843, German physicist George Ohm shifted the application and theory devised by Fourier from the analyses of body heat-flows into the domain of sound. To provide an accurate 'translation', Ohm would count with the 'Fourier transform' – a mathematical function that translates one variable into another.

Later on, in the XIX^th^ century, German physician and physicist Hermann von Helmholtz developed through Ohm' s studies a 'method of harmonic analyses based on mechanical-acoustic resonators' – a device that oscillates given precise and specific frequencies [Wishart 1996]. Considering the present discussion, what is important to understand is that these achievements lead to the idea that 'instrumental timbre is largely determined by the steady state portion of instrumental tones'. To set an example of the overall conceptual implications, in music this was translated into a scientific conception of tone, where the 'held part' was decisive for the perception of timbre (the quality of a tone that is difficult to quantify). Following this same line of thought, also in the XIX^th^ century, physicist John Tyndall – influenced by Helmoltz ideas concerning harmonic stable states – would work towards the creation of new techniques of sound visualization. In fact, Tyndall would experiment with 'the idea of timbre as an add mixture of two or more tones to create imaginative experiments' with intent of actually visualizing sound. From these experiments various forms of mechanical 'visualization' of sound were developed and it was only in the 1940's that scientists, working with the oscilloscope (an electronic instrument that visualizes signal voltages in to two-dimensional wave graphs), would actually apply the principles of 'Fourier analyses' to the visualization of sound, once again sought as a 'wave'. A new era of sound visualization appeared however, still influenced by Helmholtz paradigm of harmonic structures. [Roads 1998:545-546]

It is important to understand that this same faith in the analyses of sound as harmonic structure dates back to the work of ancient Greek philosopher Pythagoras and the development of his own thesis dedicated to the study of the 'Harmony of the Spheres', one that proposed a formal mathematical study of the universe [Wishart 1996:47]. Following the words of British polymath Alfred North Whitehead in 'Science and the Modern World' (1925): according to Pythagorean cosmology "the logical Harmony involved in the unity of an occasion is both exclusive and inclusive. The occasion must exclude the inharmonious, and it must include the harmonious. (…) He insisted on the importance of the utmost generality in reasoning, and he divined the importance of number as an aid to the construction of any representation of the conditions involved in the order of nature. (…) Pythagoras is said to have taught that the mathematical entities, such as numbers and shapes, were the ultimate stuff out of which the real entities of our perceptual experience are constructed. (…) Number lies at the base of the real world (…)" [p.27-28]. Greek mathematician Euclid also further developed Pythagoras ideas, while proposing that all proportions and shapes fit into a projective logical system – space as it is 'mathematized' in opposition to space as perceptually experienced. Further, into the development of Western scientific thought, this would provide tremendous impact, particularly within the domain of physics where movement was rendered imperceptible through numerical measurements of 'space, time, mass, energy, charge, gravitation, information' [Rotman 1993:11], just to name a few possible formal-logical processes of categorization.

In the XVIIth century, with the project of Enlightenment this same harmonic principle was further developed by German polymath Gottfried Leibniz (1989) in '*Universal Characteristic*': "there is an old saying that God made everything in accordance with weight, measure and number. But there are things that cannot be weighed (...) there are also things that cannot be measured. But there is nothing that cannot be numbered. And so number is, as it were, metaphysical shape, and arithmetic is, in a certain sense, the statics of the Universe, that by which the powers of things are investigated" [p.5]. This same faith in logico-mathematical thought was fueled by the continual construction of new complex mechanical devices that further deployed the proposed quantifiable principles of number and further codification. Finally, one could explain the workings of 'nature' through 'mechanistic' formulations and the calculative potential of two reduced decimal numbers or axiomatic lines.



3. Spectrographic image of whistled utterance (Matos 2007).

Spectrographic representation of sound departs from this same tradition of calculation and its inherent formal-logical nature as it provides an elegant and precise representation of complex and evolving spatial-temporal phenomena. With this same intuition in mind, the use of the spectrogram in speech analyses also became an extremely valuable tool, even more when one would consider that it might represent an accurate model of organic ear functioning, simulating very accurately the way human beings hear. It was also here that both the ear and the 'Fourier transform' would be inevitably approximated. [Roads 1998] This same principle has largely persisted, even though most recent accounts within the psychoacoustic field force us to acknowledge that frequency/periodicity may not always simulate how we actually hear a sound [Bregman 1994].

At this point, it is impossible to ignore the work of physicist Dennis Gabor, initial founder of more recent accounts of microanalysis of sound. The physicist, largely influenced by

Einstein's atomic structure of the universe, took even further the decomposition of sound into constituent units, now on the level of micro-particles. This brought revolutionary implications: "the orthodox method [of analysis] starts with the assumption that the signal is a function s (t) of time t. This is a very misleading start. If we take it literally, it means that we have a rule of constructing an exact value of s (t) to any instant of time t. Actually we are never in a position to do this (...)." Gabor's revolutionary experiments strengthen even more the idea of 'uncertainty' in the process of analyses of time frequency relations: "time and frequency resolution are bound together; the more precisely we fix one magnitude, the more inexact is the determination of the other." [Roads 2001:58] Today, and in face of a new uncovered dimension of sound, psychoacoustic researchers are able to recognize that the 'first half-second of the attack portion of a tone is actually more perceptually relevant than the so called steady-state portion'. [Roads 2001] This takes us back to spectrographic analysis, its effects on scientific conception of sound – the figure – and what counts as the 'unsound' [Maharaj 2002] – the foreground – the, yet, inaudible. In fact and taking here the audible beyond the domain of frequency and its inherent mathematical measurements, microsound synthesis has enhanced the role of rhythm (of infrasonic frequencies) and pitch (the audible frequencies) [Roads 2001:55]; this last one, subject to great degree of variation across distinct acoustic cultures [Deutsch et al. 2009]. To a certain extent, while the Fourier transform would position sound as a timeless event, characteristic of the abstracted formal-logical methods of the Enlightenment, the Gabor transform would position sound and hearing as temporal and situated phenomena – hence the paradox between actual experience and mathematical description.

Considering a contemporary recognition of the physical dimension of sound as particles, it seems most relevant to recall Heisenberg's 'Uncertainty Principle', best known in the domain of physics. As presented by Trevor Wishart (1996), the principle states that: "(...) the position and momentum of a particle cannot both simultaneously be known exactly". If one is to take the sonic event as 'stream' rather than a fixed 'object' [Bregman 1994] – it seems reasonable to ask: "(...) how can we measure the frequency of the system at particular instant in time?" The answer is: we cannot. Frequency is a property of the system dependent on its actual evolution through time, "hence, the instantaneous energy of a system is not definable." [p.55] What is most relevant, this considering the analysis of a whistled form of language as proposed, is that the 'Uncertainty Principle' is mostly used in modern physics when attempting to account for the interference of observational instruments. In this sense, the technical apparatus may actually 'disturb' the object under observation, changing actual modes of perceiving its inherent modes of organization. In similar vein, the Nobel Prize atomic physicist Neil's Bohr had already presented in "Atomic Physics and Human Knowledge" that within a modern representation of the physical theory of light (and the same can be said for sound) one could either conceive this as a wave or as a particle (known in Physics as the wave-particle duality). This same distinction is solely dependent on the nature of the measuring apparatuses [Barad 2007]. In other words the making of knowledge cannot be sought along the lines of a '*Characteristica Universalis*' as Leibniz proposed, rather the making of knowledge is intrinsic to the very nature of representations, measuring apparatuses (and here one should include the body as such). To quote philosopher of science and physicist Karen Barad in 'Meeting the Universe Halfway' (2007): "According to Bohr, apparatuses are macroscopic material arrangements through which particular concepts are given definition, to the exclusion of others, and through which particular phenomena with particular determinate properties are produced. The far-reaching conclusion of Bohr's proto-performative analysis is that the apparatus play a much more active and intimate role in experimental practices than classical physics recognizes. Apparatuses are not passive observing instruments; on the contrary, they are productive of and part of phenomena" [p.142].

- New Ecological Approaches to the Study of Whistled Languages

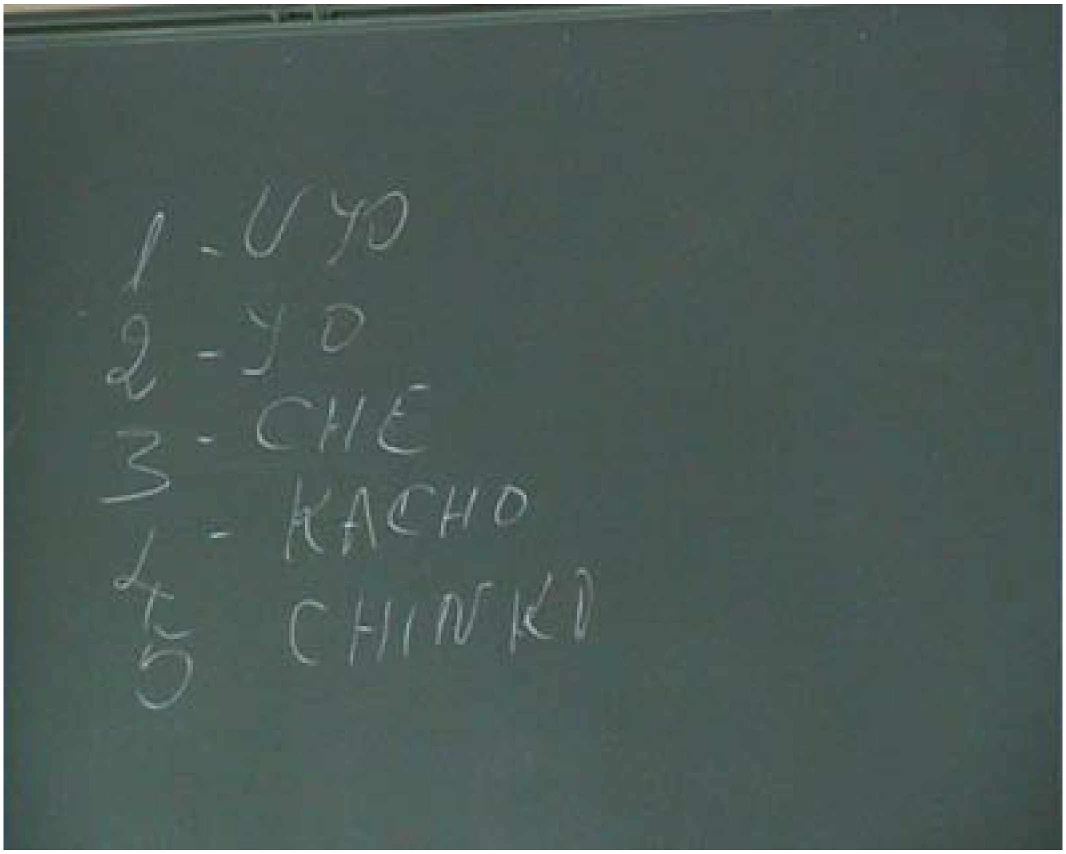
Recognizing this same paradox, particularly as further deployed by a 'phonological stage' and reading of the *Silbo Gomero*, will further mobilize the proposed analysis into new heterogeneous accounts. In this sense, it is relevant to add to this presentation and further discussion the bioacoustic data proposed by bioacoustician Julien Meyer (2005), extensively supported by recent work done within the field of neurology [Carreiras et al. 2005]. While proposing a particular reading of such frames of research will set a new agenda, pushing even further the intuition that the whislters acoustic cosmology is a complex and situated practice that extensively exploits the peculiar environment of the island of La Gomera. Taking into consideration the proposed bioacoustic account, it is important to outline two important contributions: first, and dwelling beyond the problematic of phonetic morphology as presented by a 'phonological stage', the provided research will outline as main object of study the role of intelligibility; second, as a consequence of this shift the data presented by a bioacoustic approach will increase new degrees of sonic information. Here, the analyses of whistled utterances recorded throughout the island of La Gomera, will take into account the role of environmental noise in the construction of the process of intelligibility. If spectrographic analyses would limit an understanding of hearing while stopping at the ear, bioacoustics will take the problem of intelligibility beyond, by situating the ear within specific environments.

4. Barranco de La Matanza (Island of La Gomera), one of the former agricultural regions of the island and where the *Silbo Gomero* was largely used by local peasants and goat herders (Matos 2007).

Here, it is important to note and while further investigating the sampled data [Meyer 2005] that the *Silbo Gomero* and the whistled language found in the village of Kuskoy (Turkey) show very similar results. This is even more pertinent when considers that each language developed as response to very similar mountainous terrains. However, what is important to frame is that, within the field of bioacoustics, noise will qualify as all the 'acoustic objects' in flow of action at the moment of each process of communication. On a bioacoustic level the quantified relations presented above suggest that information appears as an emergent phenomena, one that counts with both the intensity of the whistle and the level of environmental noise. To discern what Gestalt psychology would call the 'figure' from the 'foreground' whistled languages count with a refinement of the auditory system towards its own embodied relational logic. This same logic cannot be modeled on exact relations between the frequency band of the utterance and the level of noise; rather, this process is situated, uniquely modeled on particular circumstances.

Hence the value of previously neglected 'external factors' most relevant when attempting to understand the discussion concerning the number of perceived and whistled vowels between particular phonological approaches and the whistlers own accounts. This same hypothesis can be further supported by recent neuro-imaging scans where proficient whistlers while hearing distinct whistled utterances have shown that speech regions of the brain are easily adaptable to non-speech signals, further supporting the claim that whistlers exploit distinct levels of pitch and melodic line perceptible in the formant glides (transitive consonants) [Carreiras et al. 2005]. While presenting this account the proposed discussion runs closer to the idea that whistlers exploit the ambiguities provided by the utterance/environment through a complex and ecologically situated matrix. One can finally conclude, that there is complex and embodied difference between whistlers and non-whistlers. In fact, what is at stake is a profound difference in terms of techno-scientific methodologies, presupposing distinct ecological relations and the further construction of distinct conceptual-bodies. Here, one should be sensitive to the fact that most whistlers were peasants and, at the time, did not have access to formal education. The whistlers were individuals who were not acquainted with the written alphabet; they did not posses a 'textual body' as such [Rotman 2008]. To set an example, only *Maestro* Isidro Ortiz Mendonza will use the Roman Latin alphabet when teaching the first whistled utterances to young children. According to the *Silfateo*[3] the alphabet is best conceived as an onomatopoeic contraption, as if presenting the notes of a 'foreign' musical instrument.

[3] According to the *Silfateo* the consonants t, ch and s, used in spoken Castilian Spanish, are represented by 'CHE'. When, for example learning how to whistle *sientaté* (sit) the word is better understood if written as *chiénchache*. In this way, different whistles correspond to the group of consonants CHE (t, ch, s); YE (d,n,n, l,ll, y, r, rr); KE (p, k, f) and GE (b, m, g, j).



5. Image of *Maestro* Isidro Ortiz Mendonza's *Silfateo* (Matos 2007).

- Perception, Moving from a Passive to an Active Approach

Even though both bioacoustic and neurological approaches recognize – and to quote Julien Meyer (2005) himself – that: 'on the level of the ear, the received whistle is only the visible part of a linguistic and acoustic iceberg of which the immersed part is the brain of the actors of the dialogue' (translated from French) [p.236], it seems rather more pertinent to emphasize that the importance of bioacoustic or neurological data is to force scientific analysis beyond the ear or even the brain and adopt a distributed approach to the development of human perception. This situated account will further challenge a conventional idea where perception is confused with sensation. If for long we have accepted the idea of sense organs as receptor of stimulus neatly tied to specific nerves and neurons, a class of neurobiology will present a rather more complex scenario. As set forth by ecological psychologist James J. Gibson in 'The Senses Considered as Perceptual Systems': one has to consider that the organization between nerves and neurons 'does not serve anatomical necessities but rather functional ones' [Gibson 1966]. In fact, for long, the static anatomical description took the organization of nerves and neurons through a hierarchical organization that would stop in the brain. Considering this approach presupposed the existence of a 'central processor', with time, this theory became an increasing obstacle. It did not solve the problem of perception since it could not dwell beyond an already refuted 'homunculus argument', one that assumed that this same central processor would effectively exist [Searle 1997]. Most tragically, the theory seemed to set forth the idea that sense organs would only be passive receptors, when they actually executed multiple and sometimes overlaying tasks, from mobility, exploration and orientation, tasks that demonstrated emergent qualities rather than centralized and executive ones. Taking into consideration the proposed body of investigation, this impossibility will render the relevance of context and action, further improving a discussion of environmental noise and its role in the study of perception and cognition. This appears in response to a phonological approach as it pushes the role of environmental noise to the 'foreground', further outlining a contextual and ecologically immersed understanding of whistled languages and their complex relations with surrounding environment.

Given that the whistler's relation to environmental noise has been most interestingly presented [Meyer 2005] it seems pertinent to understand that this same relation uncovers a much wider debate, one that has impregnated the empirical study and further conceptualization of human cognition in general. Once again and returning to the classics, the passive approach to the study of perception and cognition draws its line of investigation from a philosophical problem posed by Plato in the 'Allegory of the Cave'. This allegory presupposes that the real world contains forms (or ideas) that cannot be truly known through situated experience, one can only grasp their reflection, meaning also, that when passing beyond reflection – through the instruments of reason – we might access the real truth of these forms [Freeman 2000]. Just as in the linguistic autonomous project where phonology is embedded [Newmeyer 1988], the only way to access these forms is by setting sense-perception to the 'foreground' while bringing to the 'figure' the skeletal remains of a given linguistic code. Transposing this to contemporary discourse within philosophy of mind, this means that cognition is not a direct process and that a 'central homunculus' – here occupied by our brain, the organ of reason – is responsible for converting the information given by our sense-perception into coherent and stable representations. Throughout an individual's life, cognition will amount to a collection of representations that can be taken on whenever necessary. Relegating this information into a reliable neurobiological account, this will amount to the idea that distinct patterns of neurons, when triggered, will average out noise – here represented by the excessive bits of information – and create clear interconnected patterns that match a 'correct version' of the required representation[4]. [Freeman 2000]

The problem with this interpretation is that in real-time experience the distinction between 'figure and foreground' is not clear cut, particularly when we consider that our experience is in constant flux and not prone to dissection into spatial-temporal and 'absolute' instances [Whitehead 1961]. In fact this method of averaging out 'external factors' [Trujillo 2006] or noise has been commonly deployed within the field of neurology, particularly when using EEG (electroencephalography) to analyze mammalian brain and its underlying electrical activity. And to quote neuroscientist Walter J. Freeman (1990): "(…) in the 1950s signal detection theory was, introduced into brain studies. Computer averaging of transient responses of brains to brief stimuli such as clicks and light-flashes became and remains the most common procedure for experimental testing of brain function in human cognition. Its aim is to retrieve a sensory induced "signal" from the brain noise in which it is embedded, thereby relegating the EEG to the status of noise, something to be eliminated by averaging" [p.4]. Here, it seems pertinent to note an interesting parallel between the frequency signal detection proposed by spectrographic analyses of aural phenomena when attempting to average-out inconsistent signals or 'external factors'.

Returning to the proposed body of work, while setting a new active approach in the study of perception and cognition one defines a new trajectory of research. And rather than exploring the noise free environments that perpetuate the presupposed stable qualities it seems relevant to suggest a new paradigm, further exploring the activities that ensure whistler's complex acoustic body of knowledge, one that is intimately tied to the auditory intricacies of the surrounding environment. These actions, rather than passivity, imply active exploration, where ecological 'interaction' becomes a problem of understanding emergent coordination; that, in the particular case of whistled languages implies particular acoustic-exploratory modes. To further emphasize this passage, my personal research conducted with *Maestro* Lino Rodriguez has played a crucial role. In La Palmita a remote and abandoned village of the island, where the whistler lived for

[4] It is interesting important to note that neuroscientist Walter J. Freeman (University of California Berkeley) has been pioneer in the use of dynamical systems theory, chaos theory in the analyses of brain activity. Walter Freeman has ventured into the use of an unconventional tool, stochastic mathematical equations, when analyzing brain activity. These same equations to not average out noise rather exploit its defining characteristics while shedding light on non-deterministic behavior of cognitive activity.

more than thirty years, I became acquainted with the (un)conventional practices associated with the given environment. The most curious subtleties became central in better understanding 'cognitive the tip of the iceberg' as proposed by Julien Meyer (2006). In fact, when attempting to understand the cognitive plasticity provided by this complex ecological milieu, *Maestro* Lino was able to reconstruct the aural mapping of the topographic environment of La Palmita while recalling the different 'tricks' each distinct spot required when projecting a whistled utterance. As presented, this practice was highly personal and through a continuous mode of aural-spatial exploration each member of the community developed their own 'techniques'. Finally, what I found in the village of La Palmita was that by taking into account the whistlers knowledge, its exploration of the geographical milieu, each echo and reverberations became intrinsic to the formation of this emergent body of knowledge.

I have moved rather swiftly through a vast body of valuable and extensive research – between the instruments of knowledge, interference, noise, signal, communication, language, perception and sound. After the course of this presentation what is important to keep in mind is a rather simple thesis, one that attempts to value the unpredictability and infinite possibility of our bodies of knowledge…

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