

INTRODUCTION TO PHONETICS AND VOICES TIMBRE

The effect of the use of phonetics in compositions for vocal ensemble and its application in
my own music

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ABSTRACT

This research studies the relation of phonetics with the voice in the context of choral and vocal ensemble music. The study consists on one hand, of an overview and analysis of scientific and artistic material linked with the introduced topic, and, on the other hand, the presentation of my own artistic work. The aim is to give solutions, ideas or techniques for composers principally, as well as for any musician with an interest for the voice.

The material collected and examined is taken from relevant papers about voice timbre, phonetics perception in spoken or sung voice, and phonetic notation. The artistic analysis is focused on several musical works where the use of phonetics has a significant importance on voice timbre, chosen by their interest and distinctive concept. These analyses will help to have a general knowledge about different perspectives –methodical, technical or conceptual– to approach timbre from phonetics.

Finally, to complete this research, I show my own artistic creations. First, some musical sketches, and second, two pieces composed considering the impact of the use of phonetics in the timbre of voice.

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1. Introduction

This research embraces two fields widely explored: phonetics perception, frequently from the physics and acoustics perspective, and the vocal ensemble or choral sound.

There are three purposes of this research. First, the achievement of a completed knowledge about the use of phonetics as a musical material, from an objective point of view. Second, a table of resources with the possibilities of phonetics as musical material; these resources can be useful for composers, choral conductors and singers. And, third and most important, artistic creations that include the findings of this topic and can clarify the impact of the use of phonemes in composition. The second and latter of the purposes will intend to expose the results of the research as well the followed process.

Phonetics are a tool to change the timbre of a vocal sound. In any sound produced by the human voice, mostly vowels, there are frequencies that we perceive as shape of the sound apart from the fundamental frequency, which is perceived as pitch. The overtones – any frequency greater than the fundamental frequency – give us information about the quality of the sound, but at the same time, this acoustic information can be musical material. As we shall see later, Wolfgang Saus (2015, p.22), taking as an example a tone sung by a baritone¹, describes this phenomenon comparing the perception of timbre –a single sound– with chords. Then, he affirms, that with a hearing control, through a training, a change of the focus of this perception from the single tone to the overtones is perfectly possible.

There are many examples of the use of phonetics in vocal works, mainly works for solo voice (with or without instruments or electronic), but less in vocal ensemble or choir. Two of the most relevant pieces are *Clocks and Clouds* (1973) by Ligeti and *Mouyayoum* (1985) by Anders Hillborg. However, there are also non-choral works which are closely related to the topic presented here. One example is Paul Lansky's *Six Fantasies on a poem by Thomas Campion* (1979), where he achieves a clear perception of the timbre differences between phonemes. The notes in the booklet that comes with the album of the work state that Lansky does not refer to a phonetic material but shows an interest in the sonority of the recited poem: "Each of the fantasies attempts to musically transform a single reading by Hannah MacKay of

¹ Saus, W. (2015). Chorphonetik - wenn Vokale die Intonation steuern. *Vox Humana - Fachzeitschrift für Gesangspädagogik* 11 (1): 22-26. Translated by the author.

a well-known poem by Thomas Campion, and to musically highlight some aspect of her speech: contour, vowels, resonance, articulation, consonants, etc., explicating the implicit music within.”² Jones (1987, p.145) describes this process as slow motion technique: “[...]”slow motion” speech provides listeners with a slowed rate of phonetic and syntactic information and thus gives them the time necessary to “hear out” harmonics in the vowels and, in general, to focus on *timbral* information in the signal”.³

The human voice and its derivative possibilities have played a significant role in composition throughout the 20th century. Focusing on the music in relation to phonetics, to the use of accurate speech or to modifying vocal sounds to achieve a deliberate sonority, it can be possible to make a retrospective. Speech, speech-music, *sprechstimme*, electronic manipulation of voice, simulation of electronic manipulation and pure focusing on voice timbre with or without semantic values are several procedures to increase the voice potentials.

Since the end of 20th century until today, many composers work in order to achieve a specific timbre playing with the blurred boundaries of speech, phonetic language and overtone singing.

My research aims to know and comprehend some works where phonetics is part of the material used by the composer. These works have been chosen by their singularity and interest, either because of their connection with other fields as electronic music or because the composers intend to use all the possibilities that phonetics can offer.

Other than some literature about the topic, there do not seem to be many sources that give insight in the point of view of the composer. How do composers use the resources of phonetics in music? How have composers in the past linked voice and phonetics in their works? Which results can be obtained by looking deeper into this topic?

After a preliminary literature review, questions around the following issues remain unanswered:

- The intelligibility of the difference (and interconnection) between overtones and formants as timbre (sonic perception), as chord (harmonically, pitched) or as phonemes, mostly vowels phonemes (related to morphemes, language).

² Lansky, P. (1994) *Fantasies and Tableaux* [CD]. Composers Recordings, CRI683. (Booklet notes)

³ Jones, D. E. (1987). Compositional Control of Phonetic/Nonphonetic Perception. *Perspectives of New Music* 25, 1/2, 145.

- The fact of focusing on the origin of the sound as a starting point for creating compositional material.
- The effect of choral blending with regards to phonetic parameters.
- A deeper look into language utterance: understanding how the timbre of phonemes in singing voice can affect and influence interpretation and perception.
- Combinations of phonemes (different formants): what is the perceptual result?
- The combination of the following two factors: first, the resultant frequency of a phoneme (the overtones of the fundamental pitch and the formants frequency) and second, the influence of vocal technique on the same phoneme (from a veiled to a bright sound).

In order to achieve the exposed purposes this research intend to answer the following question: “How can the use of phonetics as a musical material impact upon composition for vocal ensemble?”. This main research leads to two sub-questions. Firstly, “Which complete vocal sounds are derived from phonemes, and what is the impact on timbre, blend, etc.?” Secondly, “In which ways can we use these resources or materials as composers?”

Through an artistic creation I will intend to answer the research questions. This artistic creation is enlarged with several musical sketches and draughts with different combination of vocal sounds in many phonemes, combination of phonemes, voice types, pitch ranges, etc. Part of these data will be analysed through the sound analysis software PRAAT⁴. This software will allow me to create visualisations of the harmonics and formants, to associate the vocal/musical perception with the physics of sound, etc. The purpose of this part of the research is to provide the purest examples of the use of phonetics as a musical material.

The main artistic creation is the composition of two works: one for a mixed chamber choir with a minimum of twenty-four mixed voices and organ, and another work for an ensemble of non-specific voices and electronics. These works will be a humble example of the use of phonetics for artistic reasons endowing the vocal music an extended field to grow and explore.

⁴ PRAAT is a free software created by Paul Boersma and David Weenink with functionalities as speech analysis (spectrograms, formant analysis, etc.), speech synthesis, speech manipulation etc.

2. Theoretical overview

Timbre, phonetics and its perception

In this study it could be understood that phonetics is a representation of sounds, or, at least, one of its possible representations together with the notes on the staff in a score, a spectrogram, etc. While notes and staff are graphics that convert a pitch into visuals, phonetics, through symbols, are graphics that approach the sound itself, the timbre. Yet, there is an essential difference: the pitch can be defined by an acoustic scale, the frequency, while the timbre is something unclear, difficult to define in precisely arranged units (Fales, 2002, p.58). In her paper, *The Paradox of Timbre*, Fales adds: “We may have difficulty describing, or even conceptualizing timbre as an independent musical parameter on the basis of direct examination”. On the other hand, timbre contains a lot of information that we use it easily to distinguish or characterize sounds (Fales, 2002, p.60). Indeed, timbre is a universal parameter for the listeners; someone without music education or a sensitive listening can distinguish a sound according the timbre, rather than distinguish pitch or duration, at least, in the unconscious level of perception. Timbre contains information about the source of the sound and its location (Fales (2002, p.57) quoting Butler, 1973) and it also carries the most information about the environment through which the sound has travelled (Fales, 2002, p.58).

About the perception of ordinary speech, Jones (1987, p.138) says that we interpret a continuously variable stream of diverse timbres (the auditory speech signal) in terms of categories –phonemes, syllables, words, slogans– which we recognize. But, in our translation of the speech signal to verbal meaning we have little attention about the sonic information: in making the categorizations necessary to understand verbal meaning, we reduce somewhat the overwhelmingly complex sonic interactions which characterize actual speech [...] (Jones, 1987, p.138). One step further, it can be understood that we have two different types of information: sonic and phonetic. According to Jones, this is so because of the contrasting nature of the two perceptual processes the listener brings to bear. The perception of the phonetic information brings us to a codification to the “word”, a meaning: “The acoustic signal is decoded into separate and serially ordered segments [...] by the listener”. Instead, the sonic perception cannot be labelled because there is no system to decode it or at least, a language to describe it. Concerning timbre Fales (2002, p.57) adds: “with no domain-specific adjectives, timbre must be described in metaphor or by analogy to other senses, and this is true in many, many languages of the world”.

The association of phonetics and timbre is clear: when we describe the acoustic attributes necessary for a sound to be perceived phonetically, we are, in general, describing characteristics associated in music with timbre (Jones, 1987, p.147).

Discussing about sonic perception, we must have in mind the differences in ear training between listeners, as well as knowing that we are discussing about something subjective; since sonic perception is a process of interpretation and evaluation of a physical stimulus. The perception by a musician differs greatly from a non-musician albeit as educated humans we cannot hear any sonic information in a pure way as a machine, and we need to give some explanation of each sonic information (source, phonetic or morphologic structures, etc). From an observation of Friedrich Kittler (1999[1986], p.23) an understandable basis point can be established: “The phonograph does not hear as do ears that have been trained immediately to filter voices, words, and sounds out of noise; it registers acoustic events as such.”

The human perception has distinct degrees of evaluation and interpretation but always with some intellectual processing, whether consciousness or unconscious. For example, the “ordinary listeners with no special training possess an extraordinary amount of knowledge about sound and its sources” (Fales, 2002, p.59) whereas the musicians focus their attention further in terms of pitch or durations. Moreover, depending on the skills of each musician the perception may become very different, as well as depending on the modes of listening and predisposition of the listeners some sonic characteristics are ignored, and others heightened. Nevertheless, we have to start from the fact that human hearing has, as Fales points out, “innate or learned early in life, [...] the absolute certainty that a human vocal tract produces only one pitched sound at a time” and “the disruption of that certainty [...] must constitute a brief violence to a listener’s faith in perceptual constancy” (2002, p.71), either overtone singing, as Fales refers, or singing with an explicitly timbre purposes. Adding to this, Saus explains plainly this perceptual experience: “We do not perceive the chord [the harmonic spectrum of a single tone in the voice], because the brain has recognized since primeval times that its harmonics derive from a single sound source. The tone contains information about the source of the sound, which were more important for survival than the individual harmonics. The brain does not focus on the overtones initially; therefore we must train it by the aligning of focus in our hearing.” (2015, p.22). Then, even though our hearing is not educated to hear

timbre as pitches information but as source information, with training or audition attention it is possible to change the point of view, or better still, the point of hearing.

Phonemes and voice

Here, the interest lies in the perception of the sounds of voice, specifically those sounds that can be qualified as phonemes on musical contexts. Hence, the voice or the vocal system is something unalienable to the purpose of this study together with the phonemes.

A phoneme is the unit of the sound in speech or rather, a writing representation of a specific sound. By itself, a phoneme has no meaning but, in association with other phonemes, the words –and consequently, the language– can be created. The phonemes are between the sound and the meaning and by their nature can be a useful and concrete tool to specify the shape of a sound in musical notation.

As we shall see later, there are several ways of notating the phonemes but the most extended, useful and effective is the International Phonetic Alphabet (IPA) created by the International Phonetic Association (Fig.1). The IPA is a system of notation based on the Roman alphabet with additional symbols to transcribe any sound of speech. There are two major categories of phonemes: consonants and vowels. Consonants are those “sounds in which the flow of air out of the mouth is impeded at least enough to cause disturbance of the airflow [...]. Conversely any sounds in which the air flows out of the mouth unimpeded are vowels” (IPA Handbook, 1999, p.6).

These symbols give information about basic properties of speech, the position of the mouth and the point of articulation in the case of the consonants. Other properties such as pitch, loudness and perceived timing, essential in music, are transcribed in a set of symbols called *Suprasegmentals*. And possibilities of speech as voiceless, voiced, aspirating, creaky voiced, nasalized are represented through the *Diacritics*. However, in this study the subject matter is focused on consonants and vowels since the *Suprasegmentals* and *Diacritics* are useful in the context of speech and phonetics science but not so much in musical contexts, where there is a more refined and exact notation to transmit these properties.

clinical purposes, where there are transcribed sounds that are found in disorders of speech but which can be useful in musical purposes, since these sounds are not transcribed in the standard IPA chart.

An approximate virtual simulation, or at least, the explanation of the virtual imitation of the voice can be useful as a starting point to clarify the functions of vocal system; the other element along with the phonemes to take into consideration:

The source module produces a raw signal intended to simulate the waveform produced by the vibration of the vocal folds, which in turn is shaped by the acoustic response of the resonator module. The resonator is implemented as an arrangement of band-pass filters, each of which is tuned to resonate at the frequencies of the most prominent standing waves of the vocal tract. These standing waves correspond to the distinct resonance that confers the characteristic timbre of the human voice. (Reck, 2005 p.9)

The “source module” is the simulation of the vocal cords, the “resonator module” is the mouth, the tongue also the entirely body by extension. The band-pass filters are the different positions that produce any phoneme. This approach of identifying the vocal system with a virtual simulation is not casual, since, as we will see later on, the link between the voice and the electronic vocabulary and conception is very close.

Therefore, our mouth shapes the sound created by the vocal cords creating any kind of phonemes without forgetting those consonants, as [s], [k] or [t] among others, which do not need the vocal cords to be sounded because “they are made almost entirely in the mouth, and their spectral content is created almost exclusively from the shape and size of the mouth and tongue” (Cassidy, 2013 p.49). Contrarily, those phonemes where the use of vocal cords is necessary, vowels and voiced consonants, “engage the body; their character, weight, and color come not only from the size and shape of the vocal folds, tongue, and mouth, but also from the chest, head, and bone structure of the speaker or singer” (Cassidy, 2013 p.50).

From a musical viewpoint the voice is usually used for singing, and the common singing implies, largely, the use of long vowels while consonants are used as very short articulation points. In vowels, the sonic information is purer, less noisy, than consonants; in other words, the spectrum of the tone is easier to perceive. Starting from this fact we can include the voice

technique of overtone singing, closely related with this study and deeply explored by researchers as the singer Wolfgang Saus: “Overtone singing is a vocal technique that creates the auditory impression of polyphony by filtering individual overtones from the sound spectrum of the voice by controlling the resonances in the vocal tract in such a way that they are perceived as separate tones.”⁵ (Saus, 2004).

In the sound spectrum there are some spectral peaks, called formants, which, in the case of the vowels in the human voice, give the distinctive quality of each vowel. To perceive the quality of the vowel are needed, broadly speaking, the first three formants, which, contrarily to the harmonic spectrum, “they tend to stay essentially the same when the frequency of the fundamental is changed”⁶ (Nave). The differences of frequencies of the vocal formants come from the resonances in the vocal tract and “are variable depending on the tongue, lips, jaw and larynx position up to more than one octave” (Saus, 2015, p.23).

Like the harmonic spectrum, the formants are not easily or consciously perceived, at least, without an attent hearing, because “our trained language centre first attempts detection of a vowel” (Saus, 2015, p.23); but changing the pitch of the formants, the perception as a vowel changes to the perception as a pitch (or pitches). Saus adds “the vowel perception is widely flexible, so that little pitch shifts of the formants cause only barely perceived changes in nuances. For some vowels the resonances can be shifted by as much as a fifth and still be recognized as the same vowel. If you turn on your pitch perception, though, such a change in timbre turns into a clearly audible musical interval.”

Table of resources

Before going to the artistic applications, whether case studies or my own works, a table of resources regarding voice and phonetics can serve as a basic compendium of the possibilities that exist.

Three perspectives are presented to show the resources that the voice can produce: first, according to type of voice; second, according to the source of text (any kind of text); and

⁵ <https://www.oberton.org/en/overtone-singing/what-is-overtone-singing/> (Accessed December 17, 2019).

⁶ Nave, C.R. Hyperphysics. <http://hyperphysics.phy-astr.gsu.edu/hbase/Music/vowel.html#c4> (Accessed December 17, 2019).

third, according to internal or external manipulations. All these techniques originate from the voice although some are in their limits.

[Table 1]: Voice (and body) resources table.

ACCORDING TO TYPE OF VOICE		Spoken voice	Including all types of spoken voices: male, female, baby, child, adult, elder, etc. with any characterizations.
		Sung voice	Trained voices. Any kind of training and styles: western classical styles, modern music styles, etc.
			Non-trained voices. Any kind of timbre voices depending on the linguistic and cultural heritage.
		General change of timbre voice	Dark or covered voice.
			Natural voice.
			Bright or more nasal voice, harmonically rich.
		ACCORDING TO THE SOURCE OF <i>TEXT</i>	
Non-verbal communication (e.g. laughing, crying, shouting, etc.).			
Use of sounds of speech beyond language	Phonemes (through International Phonetic Alphabet, transliterations or other symbology).		
Use of sounds of the body	Sounds created by the mouth, throat or the body beyond phonetics and voice itself (e.g. breathing, blowing, whistling, clicks, hits, etc.)		
VOICE WITH MANIPULATION	INTERNAL	Any kind of voice techniques	Dynamics, vibratos, tremolos, etc.
	EXTERNAL	Manipulation through electronic devices (recorded or in live performance)	Amplification
			Any kind of sound manipulation (timbre, envelopes, reverb, etc.).
			Language manipulation (cutting words, repetition, reordering, etc.).
		Body and object manipulation	Use of hands, fingers to obstruct, amplify, create tremolos, etc.
Acoustic space intrinsic manipulation	According to the resonance and reverberation of the space where the voice is emitted.		

Going deeply into phonemes, the charts of the IPA are useful tools. Taking this material as a basis, resources regarding phonetics are quite wide. Vowels can be understood as a sound without air impediments with three kinds of modulation: according the position of the tongue and the mouth space (open and closed vowels) and the openness of the lips (rounded and unrounded vowels).

The consonants are ruled by more precise positions of the point of articulation (from bilabial to glottal) and the point of manner (plosive, nasal, trill, fricative, etc.) as well as if the phoneme is voiced or voiceless. Moreover, there are the non-pulmonic consonants that can be used –in a way that we will see later– like any other sound.

Each of these phonetic possibilities have their own timbre; with specific formants, some overtones are enhanced and others attenuated, in both cases with more or less noise.

3. Artistic application: case studies

Stimmung

“I began humming, did not sing loudly anymore, began to listen to my vibrating skull, stopped writing melodies of fundamentals, settled on the low B flat, started again and wrote STIMMUNG, trying out everything myself by humming the overtone melodies. Nothing oriental, nothing philosophical: just the 2 babies, a small house, silence, loneliness, night, snow, ice (also nature was asleep): pure miracle!”⁷

Karlheinz Stockhausen wrote those words in a letter to Gregory Rose in 1982, fourteen years after he composed this piece explaining a part of his composition process of *Stimmung*.

Stimmung is a piece for mixed vocal ensemble of six voices written in 1968. The literally translation of the German word ‘*Stimmung*’ is ‘tuning’ but also connotes, in the composer’s words, “‘atmosphere’, ‘ethos’, ‘spiritual harmony’ [...] moreover, in the word ‘*Stimmung*’ is hidden ‘*Stimme*’ – ‘voice!’”⁸ (Wörner, 1973, p.65).

The piece has two conception levels; the first one is the sound itself presented from B flat fundamental and the pitch or timbre variations on it, and the second level is about an experience that Stockhausen lived in ancient temples of Mexico as well as the silent environment around his family, specially his children. This experience was before the composition of this work and it is connected with the month spent walking through ruins of ancient places of Mexico. From this trip Stockhausen took “[...] the sounds, the whole general feeling of the Mexican plains with their edifices going into the sky- the quietness, on the one side and the sudden changes, on the other.”⁹ (Cott, 1974, p.163). This spiritual experience influenced the composer on the levels of sound, structure, time, as well as for text and words added in the work.

The spirituality in *Stimmung* is quite relevant both because of the connotation that the author gives to the title, as well as because of his time in Mexico and the familiar atmosphere around him when he composed the work. This spirituality is visible –audible– through the texts chosen by Stockhausen. There are four poems written by himself, three of them in erotic topic

⁷ Words by Karlheinz Stockhausen from a letter to Gregory Rose written on 24th July of 1982 (Quoted in the Booklet of the Singcircle CD).

⁸ Stockhausen’s notes in Wörner, K.H. (1973). *Stockhausen: Life and Work*. London UK: Faber and Faber.

⁹ Stockhausen’s words in Cott, J. (1974). *Stockhausen-Conversations with the composer*. London, UK: Robson Books.

and another aphoristic poem about bird's fly. Along with the poems there are the *magic names*: names of gods in different religious, cultures and locations around the world. In addition, there are sections where Stockhausen uses single words that could have a spiritual connotation for their religious or cultural sense such as *hallelujah* or *salemaleikum*.

Stimmung has an unfixed duration and an open-form structure that changes in each performance. Depending on the singers the piece can last between 20 minutes to 70, or even longer. The structure of the piece is based on 51 sections that combine 51 syllabic-phonetic-rhythmic models of which, in 29 models, the singers have to call a magic name. In addition to this, the poems are spoken by the singers in some models. Moreover, there are numerous isolated words in the models that are a basis for the phonetic pattern. The singers must choose the order of the models, the duration and the magic names that they will pronounce (each singer has 11 names to choose). Each model is led by one of the singers who will guide the change of one model to the next once the group is in identity with them. This identity is achieved merging in the model chosen by the leader in dynamic, rhythm, tempo and character. Each singer repeats periodically and individually the model and when the integration is achieved by the whole group and they are singing as a collective the leader indicates the gradual change to the next model, creating an overlapping between the models.

The whole piece is harmonically based on the B flat as fundamental and some of its harmonics: 2nd, 3rd, 4th, 5th, 7th and 9th, creating a major ninth chord on B flat. As we shall see later these harmonics are converted in fundamentals as well. There are no melodies and pitches changes, apart from some soft *glissandi* in several models. From the harmonic perspective the piece is extremely static, but this fact helps to arise the importance of timbre, that is in change and evolution constantly.

The use of phonetics in Stimmung

Stockhausen wrote several works where the voice and its timbre have a leading role or at least some importance. There is a significant part of this production where the voice is incorporated to electronic and electroacoustic technology. An example is *Gesäng der Jünglinge*, written in 1953, where Stockhausen used the electronic possibilities in the WDR (Studio für elektronische Musik) in Köln to research about the alterations of the voice with the electronic

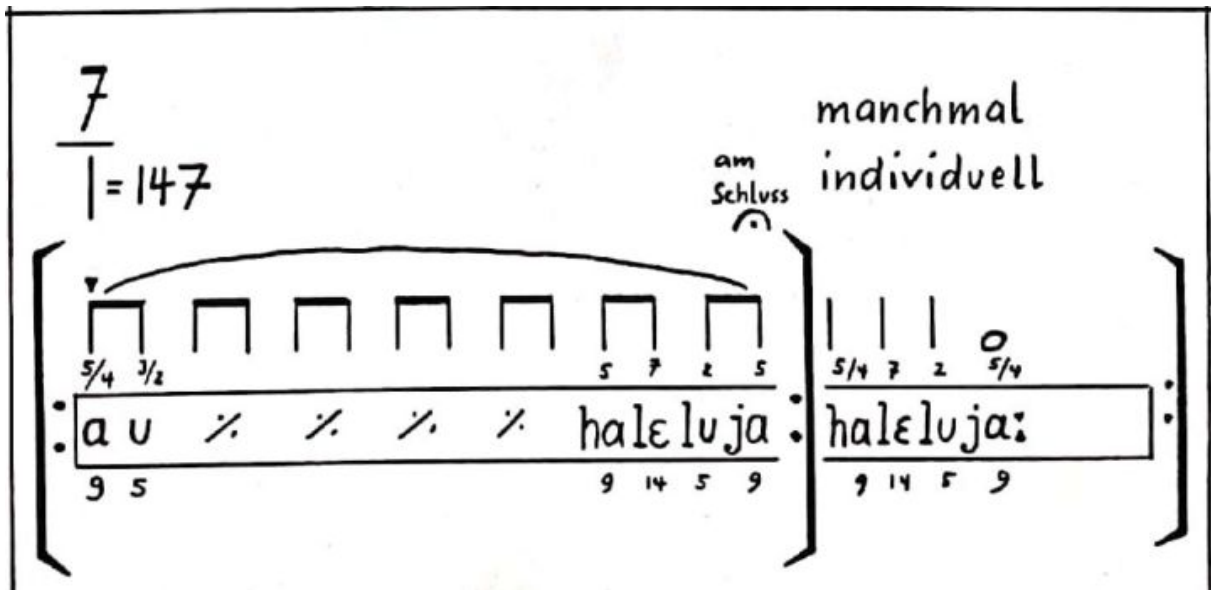
possibilities. During this time Stockhausen studied phonetics and phonology with Werner Meyer-Eppler at the University of Bonn becoming one of the most distinguished students and a future partner in the electronic studio. Yet, *Stimmung* is the first work that includes phonetics and overtone singing explicitly.¹⁰

Comparing the use of the voice in *Gesäng der Jünglinge* (1953) with *Stimmung*, a huge difference in the basis of the voice application can be seen. In *Gesäng der Jünglinge* Stockhausen uses the voice as material to be modified, broken, split, etc. for an electroacoustic sonority purpose, to research about it and find new horizons that the modern technology could give to music. Certainly, the timbre in the voice has a main importance in this work but in *Stimmung* the voice and the sound emitted by the voice is the purpose itself. As a meditative work, Stockhausen advocates for a sonorous contemplative experience: “Time is suspended. One listens to the inner self of the sound, the inner self of the harmonic spectrum, the inner self of a vowel, *the inner self*” (Wörner, 1976 p.66).

For this piece, Stockhausen detailed in a very strict way how the singers have to deal with it. He demands few vocal techniques such as the absence of vibrato, maximum softness possible and long breathings to help the singer to hear himself, the pitches and the other singers. Overall, the most complex technique that he demands is the voice emission, the timbre through phonetics.

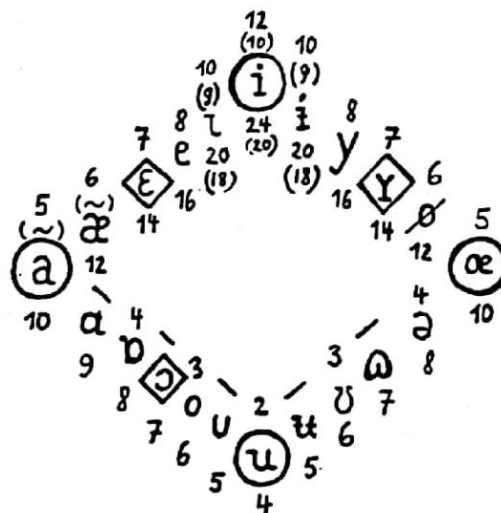
The phonetics in *Stimmung* is notated following the International Phonetic Alphabet (IPA). Basically, he takes vowels and occasionally, some consonants. In some models he uses words like ‘hallelujah’ (Fig.1) or ‘Saturday’ to convert them into phonetic patterns. In a specific model he introduces the non-erotic poem, in which the constituent phonemes of the lyrics are repeated until they become a music pattern. Though, the normal use of phonetics is in non-sense patterns that configure a fluid timbrical design.

¹⁰ “STIMMUNG ist der historische Anfang des Obertonsingens in der Kunstmusik (mit Partitur, durchkomponierter Oberton-Notation, spezieller Vokaltechnik)”. “STIMMUNG is the historic beginning of overtone singing in art music (with score, through-composed overtone notation, special vocal technique). K. Stockhausen, in a letter to Martin Hebart (cited in a paper at the Johann-Sebastian-Bach-Gymnasium Windsbach 2001). (From Saus, W. (2009, p.471). *Karlheinz Stockhausen’s Stimmung and Vowel Overtone Singing*)



[Figure 2]. In this model the phonetic-rhythmic pattern can be seen along with the word ‘hallelujah’ converted in phonetic material.

Along with the phonemes, Stockhausen indicates to the singers which overtones they must emphasize in each phoneme (Fig.2). The numbers above and below of the phoneme “indicate the overtone that is heard as dominating while singing the vowel”¹¹ (Stockhausen, 1968). He introduces, through the phonemes and the specific overtones to hear, the technique of overtone singing, and he is aware about the effort that this technique requires: in the explanations he describe how the singers have to be able to “hit the overtone positions with a good degree of accuracy”.

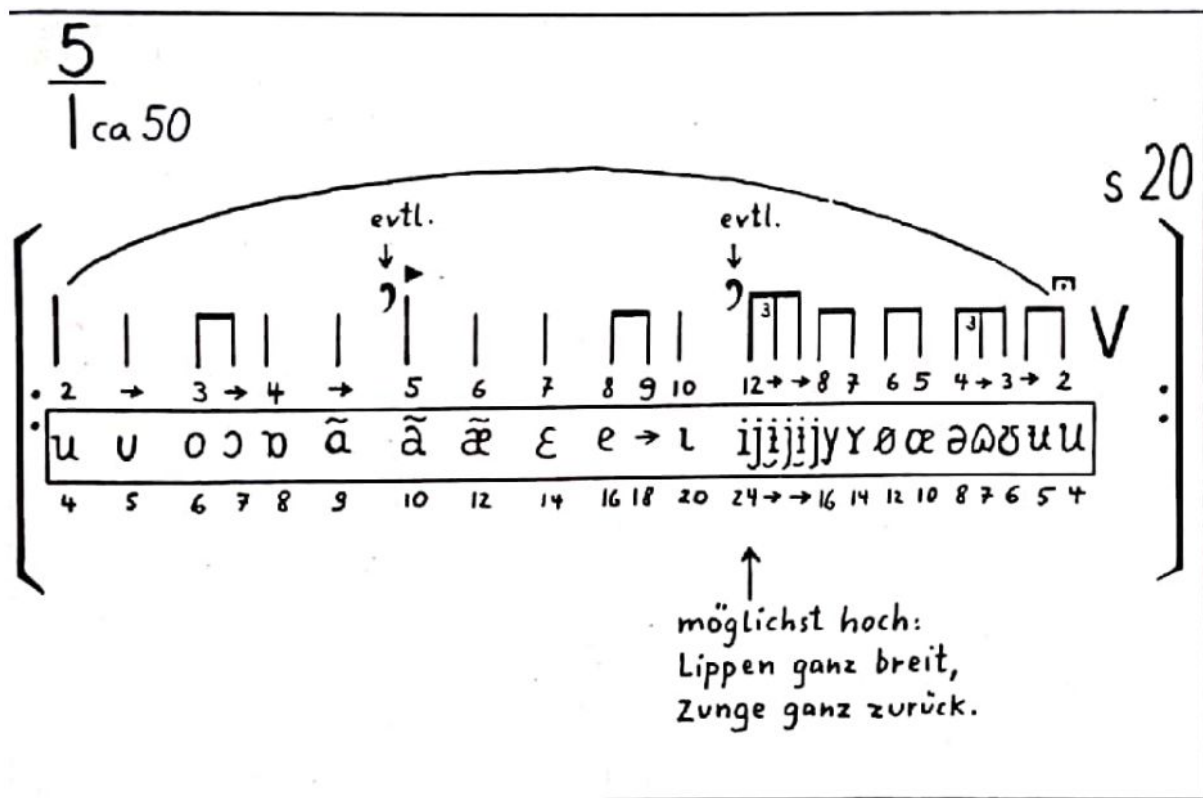


[Figure 3]. The vowel-square written by Stockhausen in the score explanations with the phonemes and the overtones.

¹¹ Notes by Stockhausen in the *Stimmung* score.

The composer's consciousness of the inherent relation of phonetics, overtones and timbre is undeniable. Stockhausen describes this: "You will hear my work *Stimmung*, which is nothing for seventy-five minutes but one chord - it never changes - with the partials of natural harmonics on a fundamental, the fundamental itself isn't there, the second, third, fourth, fifth, seventh, and the ninth harmonics, and nothing but that. And then the timbral changes of these fundamentals. And the timbres are precisely notated with the International Phonetic Alphabet and numbers. So when I sing, let's say [sings a single pitch with many inflections] you can focus on each partial very precisely. [...] I've written the numbers up to the twenty-fourth harmonic and [given] the singers six months to learn precisely how to hit the ninth harmonic, or the tenth, eleventh, thirteenth, up to the twenty-fourth. You see, that's a real composition with timbres where the timbres are rhythmized the way we formally rhythmize pitches [sic]". (Cott & Stockhausen, 1974 p.38).

Nevertheless, Stockhausen doesn't mention directly, on the score or in conversations about the work, anything about the formants produced by vowels. Saus (2009, p.1) clarifies how is the connection of formants and overtones in *Stimmung*: "Stockhausen uses the fact that the vocal formants represent pitches. They work like filters which always resonate when an overtone falls into the frequency domain of a formant. The overtone then can be heard prominently. The position of the formants is independent of the fundamental tone, it is only determined by the shape of the vocal tract. So it can happen that in a certain combination of fundamental and vocal timbre the formants do not meet overtones. When none of the overtones fall into the formant range, the tone colour seems more pale, softer, and less brilliant. Conversely, if one maintains the same vocal timbre and sings a portamento, then the formants remain constant on their pitch and the overtones emerge one after the other as their frequencies fall into the range of the vocal formant". After a study of numberings written by Stockhausen in the score and the vocal analysis, Saus concludes "that Stockhausen intended the emphasis of the overtones by the second voice formant F2". Saus proves that with the Stockhausen explanation regarding to the flexibility that he gives to the singers: "The singers may therefore, depending on the register of their intonation, shift the overtone numbers (the higher the register, the smaller the number, that is, the fewer of the prescribed vowels can be articulated)" (Stockhausen, 1968). Saus understands that "the vocal timbre is adapted respectively so that F2 meets the figured overtone".

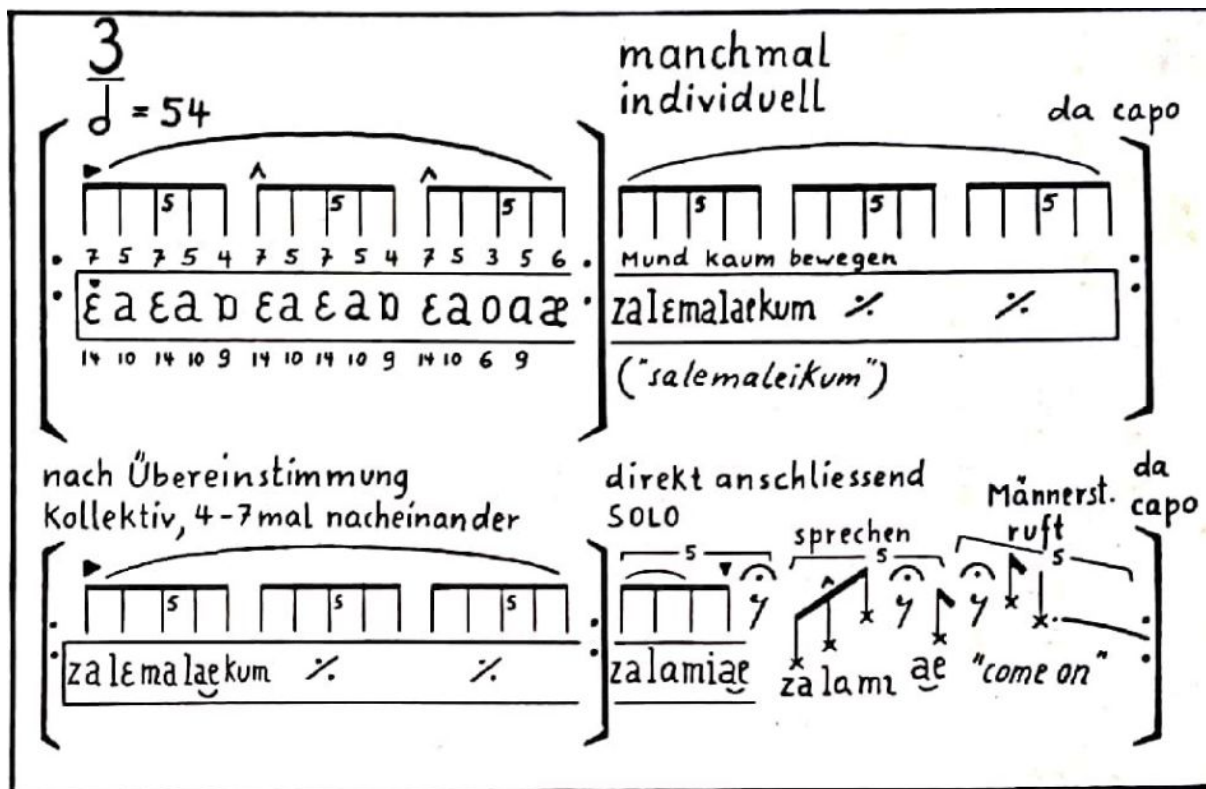


[Figure 4]. The numbers above the phonemes are the overtones for the high voices and the under ones, for the lowest.

Listening any performance of *Stimmung*, the connection of electronic filtering with the piece can be appreciated. The modulation that the voice is induced through the phonemes and the emphasis of some overtones is the same with a low-pass filter applied in any tone on a synthesizer or computer system. This analogy occurs continuously thanks to the distortion of the basic chord provoked by the timbrical rhythmatization.

This characteristic of modulation is explained by Robin Maconie (1990, p.153): “The movement, the constant activity going on in the music in consequence of the modulation of the ‘carrier frequencies’ by the chanted and spoken texts. There is always something in transition, and usually at quicksilver speed: syllables chasing one another in canon, condensing into words, fusing into vowel based harmonic mixtures, or disintegrating in a tissue of consonantal percussion.”¹²

¹² Maconie, R. (1990). *The Works of Karlheinz Stockhausen*. Oxford, UK: Clarendon Press.



[Figure 5]. In this model Stockhausen specifies when the singers can sing individually or in group or a solo.

Observing this model (Fig.3), one of the simplest, is easy to understand how this filtering or modulation works. With one breath –eventually two– the singer has to change with the notated rhythm the vowels sequence and the overtones to hear. When an arrow is notated means “continuous transition in the overtone spectrum”. At the same time Stockhausen adds an extra indication for the third part of this model: *möglichst hoch: Lippen ganz breit, zungans zurück* (as high as possible: lips very broad, tongue straight back). This specification goes further in the timbral requirements and enhances the greater vocabulary of harmonics that contains the phonetic patterns and the overtones.

The other example (Fig.4) can show us more variety to modulate the timbre. The common way with phonemes and also with a “real” word –*salemaleikum*– that is the mouth hardly moving (*Mund kaum bewegen*) and then with the addition of a solo spoken fragment.

To finish, *Stimmung* is the first work where, explicitly, the composer is controlling the voice timbre through phonetics, along with other techniques. In this case, the composer’s background proves that there is a tight connection between electronic filtering and voice

timbre, an intention to imitate the new technologic possibilities with the transparency of the voice. But at the same time, the purpose of timbre as foundation to change the sound is a consequence of the desire to create a contemplative and spiritual piece, static in some parameters and very rich in timbre; a piece where the trace of time is confusing and the aural perception goes directly to the sound itself, where the styles are broken and where different cultures and traditions come together.

Mouyayoum

The Swedish composer Anders Hillborg composed *Mouyayoum* in 1983, as his first commission as composer, by Svenska Rikskonserten (The National Institute of Concerts). It is a piece written for sixteen-part mixed choir (SSSSAAAATTTTBBBB) that since the first performance in 1986 has been sang and recorded widely, becoming one of the most successful works of him. There is another shorter version, for male voices, written in 1999.

In the score's introduction, Hillborg explains this: "The piece may be considered as a study for the greatest possible precision of timbre, pulse and dynamics". To achieve it recognizable for the audience the material is "extremely limited". The rhythm consists always of cycles of sixteenth notes overlapped with long sustained notes in a constant timbre modification. The harmony is based on modal structure of hexachords and pentachords derived from perfect fifths that sometimes, are converted in clusters because of the voices range. In the first section the hexachords are changing by the addition of a new ascendant fifth and by the fade of the theoretically lowest fifth. This process causes that the change of the chord is not easily perceived for the neutrality of the intervallic relation between pitches until the harmony is clarified by a unison. The second section is made up by a short progression of pentachords that in the ending bars are converted into clusters.

The form, an arch-structure, is designed by the harmonic progression described before along with the enhancement of the overall choir range and the dynamics development.

Hillborg adds some extra effects in the piece that expand not only the timbral palette as well as the pitch material. Whistling is the first and creates a confusion between the overtones of voice and the whistle tones and simultaneously seems that some resonator or even some reverberation has been added. In the end of the piece Hillborg adds other effects as slow

glissandi, hand tremolo (quickly changing hand distance on mouth) and microtonality that are perceived as frequency modulation or tremolo.

Hillborg composed an alternative ending of the piece, not often performed and recorded that includes some little changes in pitch material, rhythm also in text but following the same idea of clustering and filtering.

In *Mouyayoum*, the timbre is directly associated with the overall texture, and in this aspect works by Ligeti as *Lux Aeterna* (1966) or *Clocks and Clouds* (1972-73) could be and a influence for Hillborg as well as works by Steve Reich (Stark, 2013, p.29). And probably, the interest of timbre has relation with their studies of electronic music started when he was student of Pär Lindgren at the Royal College of Music in Stockholm and quite explored between 70's and 80's.

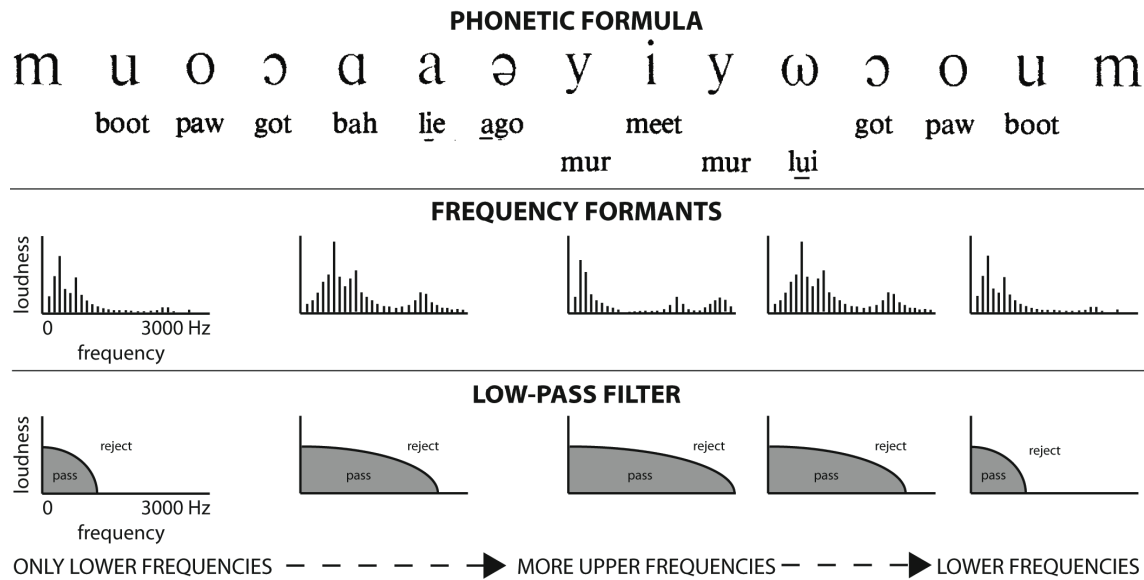
Phonetics as EQ filtering

Mouyayoum it could be the purest example of the transformation of timbre based on phonetics and, at the same time, this piece could be the most representative case of imitation of electronic filtering in the choir compositions.

The exploration of phonetics as a timbre modification started in a previous piece written three years before, *Poem 62* (currently uncatalogued), for four-part mixed choir. In this piece Hillborg takes a real text from E.E. Cummings but there is some introduction in a technique of vowel transformation: the use of slow transitions between different vowel sounds to create the impression of electronically filtering the choir (Stark, 2013, p.17-18). This filtering technique is almost the same that Stockhausen presents in *Stimmung* some years before but in this case its allusion is more easily recognizable (Stark, 2013, p.18).

The title is clearly, a suggestive reference of the purpose of phonetics as the main resource in the piece. "*Mouyayoum*" is a Latin alphabetic conversion of the phonetic sequence "μυῶναλιῶγιγρῶουμ" used by Hillborg in the score. As he remarks in the explanations "The text is a phonetic sequence which can be described as the opening and closing of the timbre". The transition between vowels, that should be performed as imperceptibly as possible (Hillborg, 1983), creates a process of revealing and concealing overtones and formants, that is, undoubtedly, the same effect of the EQ filtering emulated by the human voice. An

interesting graphic (Fig.5) of Stark (2013, p.28) shows how the formants of each phoneme creates this filtering of frequencies.



[Figure 6]. Graphic made by Stark in his dissertation about Hillborg and his music.¹³

This sequence or phoneme cycle, is always is conceived as a single sound and appears permanently during the whole piece, mostly presented in a very slow motion, by several voices at the same time without synchronisation. Complementarily, Hillborg adds another text cell, *wala*, that must be pronounced in English in a rhythmical pattern of sixteenth notes that creates a tremolo effect (Fig.6).



[Figure 7]. The *wala* cell is distorted and transformed to the *mouyayoum* sequence at the end of the figure.

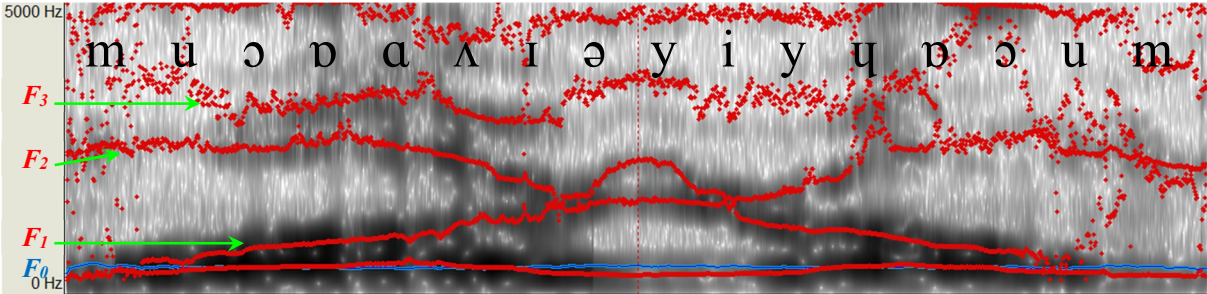
Hillborg creates two phonetic patterns that cover almost the vowel possibilities. The sequence and cells (during a while in the second section, the cell *wala* is transformed in *lala* and in the alternative ending is converted in *haha*) that are used in the piece are complementary between

¹³ Note: From “Anders Hillborg and his music,” by C.A. Stark. Copyright 2013.

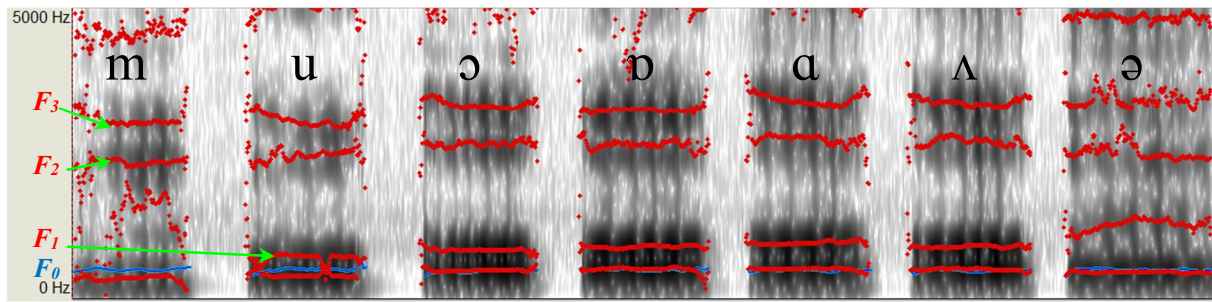
them and with a broad range of overtones. There are close and open vowels, rounded and unrounded, front and back, also, he adds a few consonants (see Table1). Analysing a spectrogram with the sequence (Fig.7, 8 and 9) is noticeable the process of transformation in the level of acoustics. Observing the general spectrogram of the sequence (Fig.7) the formants of each phoneme (F1, F2, F3) are changing gradually while the fundamental tone (F0) remains at the same frequency. Visibly, the phonemes chosen by Hillborg and its order is thought in order to create a specific shape of crossfading between the first and second formants. The acoustic effect is that the timbre is veiled in the beginning and the end with the phoneme [m] and in the middle with the phoneme [ə], where the F1 and F2 are almost merged. In contrast, between the veiled moments there are more bright timbre.

[Table 2]: Table with the phonemes used by Hillborg in *Mouyayoum*

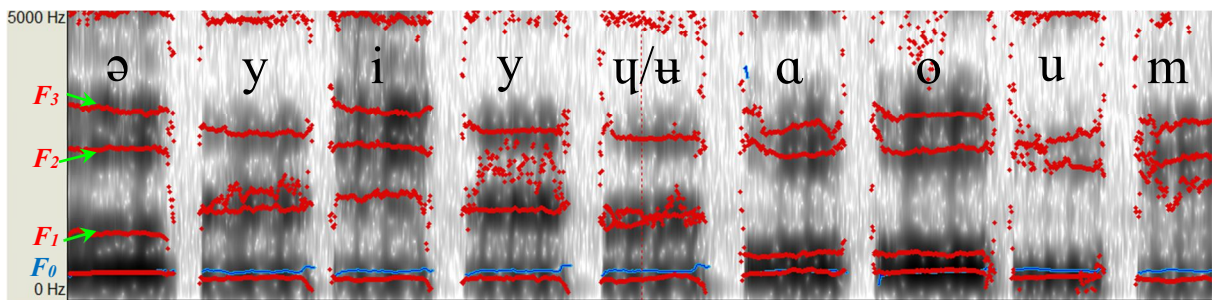
[u]	Close back rounded vowel	
[ɔ]	Open-mid back rounded vowel	
[ʌ]	Open-mid back unrounded vowel	
[ɒ]	Open back rounded vowel	
[ɑ]	Open back unrounded vowel	
[ə]	Mid central vowel	Is the most neutral vowel
[ɪ]	Near-close front unrounded vowel	As a short vowel between [ʌ] and [ə]
[y]	Close front rounded vowel	
[i]	Close front unrounded vowel	
[a]	Open front unrounded vowel	
[ɥ]	Labialized palatal approximant	This phoneme is corresponded to the vowel [ɥ] when is sang. In other cases, can be a consonant or a semivowel
[w]	Voiced labio-velar approximant	Semivowel close to vowel [u]
[m]	Bilabial nasal	Consonant used start and end in <i>niente</i>
[l]	Alveolar lateral approximant	Consonant used an articulation between [a]



[Figure 8]. This spectrogram, created with the software PAART, reveals the transformation and transition between the phonemes of the sequence *mouyayoum*. The blue line indicates the fundamental frequency (F_0) and the points and lines in red are the formants of each vowel.



[Figure 9]. In this spectrogram each phoneme appears separately.



[Figure 10].

With these two cells, *wala* and *mouyayoum*, there are complementary elements as in timbre as in rhythm. *Wala*, as short phonetic cell, creates a fast groove with a clear recognizable binary pulse and tempo perception through a non-changing timbre and on the contrary, *mouyayoum* seems a static phonetic cycle but with continuously slow transformation on the level of timbre but outside of metre.

Furthermore, in *Mouyayoum*, the timbre affects directly on the piece's structure, along with harmony and dynamics. Is noticeable that in both big sections the beginnings and the ends are made only by the long and main phonetic sequence likewise *wala* is growing up and vanishing inside of each section. Beyond, both at the beginning and at the end of the piece, *mouyayoum* is clustered in low tones, emerging an infinity of overtones, as contrast, in the middle of two sections, there is only a lonely tone in a voice of sopranos, F5, with the phoneme [ʌ] where the existence of overtones is almost imperceptible because of the high range. Finally, the pitch material used in these points, low cluster in the beginning, lonely tone in the middle and low cluster at the ends, translated as chaos-clarity-chaos (Stark, 2013, p.30), is the same idea with the overtones showed up by phonetics: overtone richness-lack-richness.

In conclusion, in this case study the phonetics is an obvious source to control the timbre, as imitation of electronic sound effects and as a refined tool to make a clear instruction of the sound shape. At the same time, the timbre is absolutely linked with other parameters of sound, rhythm and pitch even in the form of the piece. These connections provide coherence in the work, where all the parameters revolve around timbre.

Clocks and Clouds

In this case study the analysis is focused in a work that the voice, a 12-part female choir is combined with a small orchestra. *Clocks and Clouds* was written by György Ligeti in the years 1972-73 as a new piece for the Austrian festival musikprotokoll with some material prepared for the non-completed opera *Oedipus*¹⁴ and, even is not the most uncommon piece by Ligeti performed in concert, it is has not been widely recorded. There are only two versions, one of them is a vinyl from the première in the musikprotokoll festival in 1973, rare to find, and the other is recorded in 2003 as part of The Ligeti Project by Reinbert de Leeuw, Asko Ensemble, Schönberg Ensemble, Capella Amsterdam among others.

Ligeti reacted, in reference of *Clocks and Clouds*, as “one of my least complex composition” (Varnai, 1983, p.64), that probably could be, according to Jonathan W. Bernard (1999, p.14), “a characterization that may imply a lingering dissatisfaction”. Ligeti is not the only one who is not convinced with this work. Robin Holloway in an article in *The Musical Times* (2004, p.14) has an inspiring and astonishingly subjective point of view of *Clocks and Clouds*: “In itself it doesn't wholly convince: the combination of day-glo susurrations on the orchestra with pale pink yoghurt on the wordless female voice strikes, for once in this composer, and very surprising, a note of tackiness, almost kitsch”. Despite this work wouldn't been a main reference in the Ligeti's production, it is true that is a good example for this study about the use of phonetics in different contexts.

¹⁴ Interview by Herman Sabbe, 23 October 1978. Translated into French and authorized by the composer on 4 February 1979. First published in *Interface*, Vol. 8, 1979, p.11-34. Translated into English by Josh Ronsen, February-March 2003.

There would be other possibilities beyond *Clocks and Clouds*, as it is not the only work in which Ligeti uses phonetics in the voice. Probably, the most remarkable pieces are *Aventures* (1962), *Nouvelles Aventures* (1962-5) and from the *Nonsense madrigals*, “*The Alphabet*” (1988-93). Even though the interest in the way how Ligeti exploits the phonetics in those works is notable, I discarded to add these works as a case studies basically because the way that Ligeti adds the phonetics into the score is more as a non-meaning language creation than a timbral reason. However, there are some exceptions explained in the final part of this chapter. In this study the focus is on the timbre and the vocal ensemble and in *Clocks and Clouds* is more noticeable than the other words mentioned.

The title and the conceptual idea of *Clocks and Clouds* is a directly taken by the Karl Popper’s essay “Of Clouds and Clocks”. He explains the reason to choose Popper: “I liked Popper’s title and it awakened in me musical associations of a kind of form in which rhythmically and harmonically precise shapes gradually change into diffuse sound textures and vice-versa, whereby then, the musical happening consists primarily of processes of the dissolution of the ‘clocks’ to ‘clouds’ and the condensation and materialization of *clouds* to *clocks*” (Kerékfy, 2010, p.412). Ligeti transmute into music the idea of “two kinds of processes in nature, one that you can measure exactly and the other which allows only for statistical approximation”¹⁵ (Ligeti, 1983, p.64). And, mentioning Bernard (1999, p.14), “furthermore, in his essay Popper discusses the ways in which these two seemingly quite disparate systems [the cloud and the clock] are actually comparable—an idea reflected in turn later in Ligeti’s piece, when the differentiation noted above begins to break down”.

Another influence for Ligeti, the painting of Salvador Dalí *The Persistence of Memory* (1931), was revealed in a 1978 interview: “I should like to refer to the soft, limp watches of Dali’s painting, which had associative value in the composition of this piece...”. The melting watches, the fantastic illusion and surreal figures can be noticed in Ligeti’s piece in the apparent disorder and fuzziness especially in the terms of time and pitch material. Bianca Tiplea Temes (2017, p.36) explains this fact referring time: “With a poetic recycling of mechanisms and gear-shifts, the clock becomes, in his work, a pretext for playing with time against all laws of physics, often displaying in music its opposite hypostasis: the cloud. Via sonorous metaphors for deconstructed time and carefully planned chaos, these two elements

¹⁵ Ligeti, interview by Péter Várnai (1983). On *Ligeti in Conversation*. London, UK: Eulenberg. p.64.

become iconic entities in Ligeti's pieces". Referring to pitch, is remarkable the essay of Bernard, *Ligeti's Restoration of Interval and Its Significance for His Later Works* (1999) which provides a deeply analysis on harmony and micropolyphony in *Clocks and Clouds* (pages 14 to 19).

The way that Ligeti approaches to Popper's ideas is focused in pitch and rhythm and the timbre seems that is not considered. Likewise, the duality of clocks and clouds it has been fairly studied in the fields of rhythm and pitch but there are no approaches in timbre.

In *Clocks and Clouds* Ligeti uses the female choir as an enhancement of the orchestra, merging the voices with the woodwinds and strings as another instrumental group, doing exactly, all of them, the same role. The orchestral set is quite unusual, made up by 5 flutes, 3 oboes, 5 clarinets, 4 bassoons, 2 trumpets, glockenspiel, vibraphone, celesta, harp and strings without violins. Catch the eye the absence of violins and the unbalance of the woodwinds with the rest of the orchestra and the arrangement that Ligeti demands for its performance. Flutes and clarinets in the usually place of violins on the left, the choir in the centre quite elevated but "close to the orchestra to ensure the blending of the sound" (Ligeti, 1973, score notes). The set and the positioning of the choir and the orchestra is a clue to understand which sound Ligeti is looking for. The roles in the orchestra can be divided in two: broadly, the flutes, the clarinets and the voices along with the harmonics in low strings create fluid and compact textures and, in opposition, the percussion, the harps, the trumpets also the choir, produce the precise rhythmic designs.

Cloudy phonetics

The text in *Clocks and Clouds* is entirely made by short sets of phonemes, given in the international phonetic alphabet, from 13 vowels and 13 consonants. This sets of phonemes are created by pairs of a consonant plus a vowel or an alone vowel (see Table 3).

The purpose of the creation an imaginary language is only of musical function. This musical purpose could be in the terms of timbre, in order to imitate an electronic filtering as it can be showed in *Stimmung* or *Mouyayoum* for example, but here the timbre result is more a consequence that the purpose itself. Ligeti is not using phonetic notation to achieve an exact

sound shape connecting the voices' timbre with the instrument's timbre or connecting with the structure of the piece or to achieve a special and original voice colour. As well as he takes a series of pitches, including microtonal intonation, he uses the sets of phonemes to create processes of order and disorder along with pitch material and rhythm synchronization and desynchronization. Besides, the consonants selected, mostly voiced consonants, provides an articulation that get closer to the woodwind's attacks and helps to the auditory to recognize a new vowel and pitch but provokes a confusion between the sound source of flutes, clarinets, sometimes oboes and strings with the choir.

On overview of the structure of the piece from the point of view of the use of phonetics it can be useful to understand the processes of revealing and blurriness that Ligeti presents in the piece. Seeing the Table 3 it can perceive how Ligeti proposes his reconstruction of the Popper's idea in the phonetics perspective. I divided the piece following the phonetic structure, avoiding the orchestra and pitch, rhythmic or dynamic development. In any case, the general form has practically the same structure of sections than the phonetic structure.

[Table 3]: Overview of the phonetic structure in *Clocks and Clouds*.

BARS	PROCESS	TEXTURE	DESCRIPTION
1-50	<i>TACET</i>		
51-69	1 st process (See Table X)	Part A	This section is a growing up development of the phonetics sets, overlapped between them with a little decreasing in the last bars. The phonetics sets combine alone vowels with pairs of voiced consonants plus a vowel with a prevalence of nasal consonants: [l], [m], [n]. After the first bars, where the choir is in contrast with the strings, the flutes merge with the voices.
70-88		Part B	The second part follows the same idea presented before, always growing up the numbers of overlapped sets. Regarding to the relation with the orchestra, it is notable the blending with the oboes and string harmonics.
89-93	Transition (See Table X)		This is the most <i>cloudy</i> point of the piece, looking in to phonetics. In these bars the sets overlapped coming until twenty-six different phonetic figures in the same bar (93). Simultaneously, the texture, the rhythmical patterns and the intervals are changing gradually to the next section.
94-103	2 nd process (See Table X)	Rhythmic	These bars are a decreasing process of sets presented, the phonetic diversity and sets overlapped. Here, the

			relation with the instrument changes for the new texture, closer to percussion and staccato in woodwinds.		
104-105	<i>TACET</i>				
106-118	3 rd process		Fluid	Starting in synchrony, the voices, in this 3 rd process are in a disordered phonetic aggregate with quick and diverse changes that, consequently, creates a <i>cloudy</i> perception.	
119		<i>Clocky</i> point	(<i>Rhythmic</i>)	The bars 119 and 126 are a <i>clocky</i> points with a clear synchronization between several voices and with not many phonemes superposed at the same time. These are a contrast with the general amorphous texture.	
119-125				Fluid	Continuation of the 3 rd process without any remarkable difference.
126		<i>Clocky</i> point	(<i>Rhythmic</i>)		As a second time, another synchronized point. With a dynamic and instrumentation rise and tension increasing.
126-129				Fluid	Following the same structure explained before with a beginning of the fast decreasing. Here, there is a progressive reduction of the number of sets and the voices singing, thereby, the perceptual result is more clarity.
130-133			Vanishing		Again, this part starts with a synchronized point. In these bars, phonetics are the purest of the piece, along with pitch and rhythm. Here, Ligeti unifies the vocal part in only one vowel, [a], and one pitch. Practically, there are no movement in any instrument.
134-141	Transition	Overlapping of 4 th and 5 th	Fluid (Sop.) (or static)		
			Rhythmic (Alt.)	When finally, the 3 rd process is fading out, the next process appears, overlapped with the previous. The 4 th process begins with a synchronization of the voice and a few diversities in phonemes and with the use of similar vowels to the [a] sang by the sopranos: [a], [ə], [ɔ], some [o] and [u].	
142-156	4 th process		Rhythmic	Practically a phonetic static section. Ligeti uses the sets [da] and [ga] and in the end he fluctuates with other vowels in order to blur a little bit the process. In this process the perception of decompress between the sets entrance.	
157-190	<i>TACET</i>				
191-204	5 th process		Rhythmic	Beginning with a break with the previous instrumental section, this process is similar with the last with voices with the difference about the consonants chosen. Here, Ligeti selects more sonorous consonants, as fricatives and trills, [z], [ʒ], [r], to give a new articulation not listened before. Consequently, the attacks are softer comparing with the other rhythmic processes, but the sound of this consonants are perceived easier than the non-fricatives. The development from an order to chaos is easily perceptible.	
205-207	Transition			Again, this transition matches the diverse parameters	

			of sound. In the case of phonetics there is a progression by addition of new sounds creating a blurred but rich sonority. The rhythmic chaos is substitute for nebulous sustained notes.
208-227	6 th process	Fluid	This last process presents a phonetic diversity in a cascade apparition with a direction to uniformity at the end, especially in the vowels, with the mid central vowel, the neutral [ə] as the last.
228-231	<i>TACET</i>		

Zooming in, the Table 3a provides a reduction of the phonetic sets in the firsts 103 bars. In this first part of the piece, after the opening bars between 1 to 50, it can be perceived a development from clarity to chaos. The process of development by addition is the same in harmony and rhythm: the new set or phoneme appears until the disappearance of the previous. The new sets added normally have no phonetic similarity with the consecutives. For instance, in bar 60 Ligeti chooses [ly], [ø], and [mɔ], three vowels from different position in the chart and several differences between those formants. Furthermore, these three sets have a different attack, with one of them without consonant and the other with different manner and place of articulation.

Focusing on the development of the number of sets appeared together, there is a progressively increasing between bars 51 to 65, where there is a short decreasing to start again the growth of diversity until bar 93, with the maximum sets overlapped, twenty-six, that is the most chaotic point in the piece. After this culmination point there is a heavy decreasing until the bar 103.

Comparing, in a micro level, how Ligeti organize the phonetics with, for instance, the organisation of pitch material, it emerges a difference between these two parameters. The pitch material is incredibly ordered, whether it is for achieve a regulated or amorphous, but the phonetics seems quite intuitive, not random, but without a mathematic organization.

[Table 4a]: *Clocks and Clouds* phonetic reduction bars 1-103 (whole table in annex).

1-50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
tacet	no	no no	no	no la	la ne	ne ri	ri ly	ri ly	ri ly ø	ly ø mɔ	ø mɔ a	mɔ a	mɔ a				

											e	e ny o	e ny o a	ny o a rɛ ø ɪ ə	ny o a rɛ ø ɪ ə ɔ	a ə ɔ la	ɔ la ə vʊ
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To conclude this case study, in *Clocks and Clouds* Ligeti understands the phonetics as another parameter, along with pitch material or rhythm, to control the timbre in the voice in order to create the dialectics of clocks, some deterministic or ordered and clouds, chaotic or unpredictable. Or rather, he is exploring the transition between them because in fact, this dialectic is showed only in the extremes. This brings us to comprehend which is the sense of the sequence of phonetic sets: on the overall perspective it can be perceived a development between the clarity to the chaotic and vice versa. And zooming in, as well as the point is closer to the clarity, the order and similarity are more perceptible; on the contrary, when the chaotic moment is coming, it seems that exist a random selection of phonetic sets totally overlapped between them.

Therefore, the priority to reach a specific timbre is not the main point. Rather, the intention is to create a perception of balance (and unbalance) between order and disorder on the level of phonetics, a gradually fluctuation of unity and plurality.

[Table 4b]:

68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85
o la e vø e ve	la e ve	e ve vi vo	vi vo mi vø	vi mi vø	mi vø mu ri	mu ri nu li	nu li lo lo	lo lo a la mø	a mø ma a nø	mø a nø vø rø	mø a nø vø rø vy e a	nø vø vy e ny o	nø e ny o no mu	ny o no mu la ly lo ri	mu la ly lo ri ø ma	ly lo ri ø ma ru ne mo	ø ma ru ne mo mø me

[Table 4c]:

86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
mo mɔ mɛ y ne nɔ la	mɔ mɛ y ne nɔ la lɔ	ne nɔ la lɔ my vi mɛ	la lɔ my vi mɛ ri ve	mɛ ri ve vi lɔ mɔ mɔ le ri ly	vɛ vi mɔ le ri ly my ni ri ra vi	vɛ vi le ri ly my ni ri vi na lɛ ve va ta nɔ vɛ mɛ	vi le ri my ri vi na lɛ ve va vɛ da ra rɔ mɔ la ba ma da mo dɔ by bɔ dɪ dɛ bɪ	vi ri ri my ri ri vi na lɛ ve va vɛ da ra rɔ mɔ la ba ma da mo dɔ by bɔ dɪ dɛ bɪ bo bɛ vi da	dɔ by bɔ dɪ dɛ bɪ bo bɛ le	bɔ dɪ dɛ bɪ bo	bɔ dɪ dɛ bɪ bo	dɪ dɛ bɪ bo	dɪ dɛ bɪ bo	dɛ bɪ	dɛ bɪ	dɛ bɪ	dɛ bɪ

Plym-plym

This case study looks into a work very little performed, known and recorded composed by the Norwegian composer Kåre Kolberg. Kolberg is a composer particularly known in Norway as a pioneer of electroacoustic music in his country and for his responsibilities in music and composer's organisations such as Ny Musikk (the Norwegian section of ISCM) or Society of Norwegian Composers. Nevertheless, the work presented here, *Plym-plym, hommage á Edvard Grieg*, was composed in 1966, some years before Kolberg begun his explorations in electroacoustic music and his associative tasks.

Plym-plym was written for a four-part mixed choir of a minimum of four people for each voice, plus a mixed vocal quartet and a speaker with a loudspeaker. Kolberg took two poems from the collection *Gobelin Europa* by Stein Mehren. The first poem, "Man er tilstede" (One is present) is used whole, while the second, "Metodisk fremskritt" (Methodical progression) is used freely. The text, according to Kolberg words "is about – as far as I can tell – people at a restaurant, people sitting and having, apparently, deep conversations. In reality they are quite shallow. And to create this superficial chatter I have taken another of Stein Mehren's poems "Methodical progression" and infiltrating it into the first poem. But the first poem "One is present" is what gives the composition it's shape."¹⁶ In addition to this, Kolberg uses, as musical material, several kinds of text without verbal meaning.

The roles of each vocal section and the relationship between text are described by Kolberg in this direction: "The choir are supposed to make different sounds that we would associate with the situations described in the poem. Language sounds, spoken sounds and different kinds of noise. The quartet gives examples of music that we would associate with the same situations, and the speaker is supposed to give different examples of "loudspeaker voices". He is supposed to be intimate, discrete, make an intimate, discrete reportage, he is testing a microphone and he is portraying a commercial advertisement voice. Basically, making typical loudspeaker voices."

There are only three available recordings of *Plym-plym*, being the first and the second, probably part of the same project and the only ones that follow exactly the performance

¹⁶ Interview with Kolberg at NRK Radio with Sverre Lind 1967. Translated by Lars Isdahl (see Annex A). <https://www.nrk.no/skole/musikkparken/kare-kolberg---pling-plong-med-humor-1.13172596> (Accessed November 19, 2019)

requirements. This first recording dates of the year 1966 and it was performed by The Academic Choral Society of Oslo with Arnulv Hegstad as conductor. Exist a second recording in a video format¹⁷ of an interesting performance with same conductor released in 1969 for the public television. The third and last recording is a version performed by the Norwegian contemporary specialist's Nordic Voices as part of their CD *Djånke Don*, recorded in 2008. In this version the total of voices, including the choir, the soloist quartet and the speaker, are arranged to be performed in six individual voices.

There is not much literature about *Plym-plym* as well as the non-electronic music by Kolberg, but this piece is not an anomaly in his works. Kolberg's style is characterized for the break of genres and rules boundaries and it could be described as a collage between modern music, electroacoustic and popular music. The electroacoustic composer Jøren Rudi (2013, p.4) explains: “[...] perhaps the most important general characteristic of Kolberg's music is that he juxtaposes material from different musical genres, and in a number of works he also does this in combination with other types of media.”

The reason that the piece was written as an tribute to Edvard Grieg is unknown but it is a clue –considering the Grieg's popularity in Norway– that leads us to the Kolberg's main purpose of Kolberg in terms of new music and its capacity to connect new genres and techniques with the general audience. According to Rudi (2013, p.1 and 3) “Kolberg represented a radical departure from rigid genre hierarchies, combining modernist artistic approaches with the affordances of increasing available technologies” and he adds “Even though Kolberg was fully on the modernists' side when it came to going against tradition, folklorism and Neo-Classicism, he wanted to both communicate with his audience and resist the arrogance of some of the modernists”.

Plym-plym is a singular piece that cannot be described as a typical choral work in consideration of how Kolberg transforms the poetic text, a little bit politic satirical, or how he combines the choir with the soloists and the speaker, all of them merged as equals, or for the dramatic power given by the constant character indications as well as indications of imitation of genres such opera, pop or cabaret. This piece approaches the music to the theatre or recited

¹⁷ Videoclip of NRK Television (Norwegian Broadcasting Corporation): <https://tv.nrk.no/se?v=FTEM00007168> (Accessed October 14, 2019)

poetry, making of the all vocal possibilities, a powerful way to express irony, humour or chaos.

Phonetics as expressivity enhancing

The approaching of phonetics is quite different comparing with the other case studies seen before. In this case study the composer combines meaning text with phonetic non-meaning text but is not only this since Kolberg mixes different kind to tract the voice. From singing, in several styles and characters, to speaking, again with explicitly demanding of several characters and tones of voices, to *Sprechstimme*, also any kind of sound produced by the voice.

Regarding to the meaning text, Kolberg presents the poems spoken or singing, in an understandable way and unrecognizable, mixing the voices, disordering the text, indicating differences on the velocity or tempo (Fig.10) also breaking the words into repeated syllables and confusing the words with their morphemes (Fig.11).

C: *(opplysende:)*
T1 DETTE ER HISTORIEN OM ALLE SLAGS GENERALER SOM FIKK SEG
T2 *(optimistisk:)* HISTORIEN OM ALLE SLAGS GENERALER I
T3 *(undrende)* ALLE SLAGS GENERALER JOB -
T4 *(patetisk:)* HISTORIEN BERETTER OM GENERALER

[Figure 11]: Extract of the score of *Plym-plym* where the spoken text is altered through disordering and change the velocity (indicated with the extension of notation, according with Kolberg notes in the score).

C: *(Langsomt)*
C: *Dystert:*
B1 *m p* M A N E R T I L S T E D E U T E N Å V Æ R E D E T
B2 *p* *Lik perpetuelt ekko, Hendøfende repetitioner:*
MÅNENENEN ERERER TETETILSTEDEDE UTETETEN Å VÆRERERE DEDEDE
B3 *p* *Jevnt, uten gruppering i ord:*
M A N E R T I L S T E D E U T E N Å V Æ R E D E T
B4 *p* *Konsonantene holdes, gjentas ikke*
M A N N E R R T I L L S S S T E D E U T S S S E N Å V Æ R R R E D E T

[Figure 12]: Another extract with an explicit way to perform. B1 slowly and gloomy, B2 equally perpetual echo, B3 evenly without grouping into words and B4 holding the consonants (without repeated them).

In order to distinguish the meaning and non-meaning text Kolberg writes the poetic text in capital letters while the non-meaning text is notated using phonetic notation or minuscule letters. In the score notes Kolberg specifies some phonetic notation, which differs a little bit with the current standard of the International Phonetic Alphabet (see Table 5).

[Table 5]: The table shows the score notes about phonetic notation in *Plym-plym*.

Kolberg symbols	Kolberg description	English translation	IPA
r	østnorsk rule-r	east Norwegian rule r	r
ʃ	som engelsk “ship”	as English “ship”	ʃ
ʒ	som engelsk “ginger”	as English “ginger”	ʒ
R	skarrende r (drøvel-rulling)	guttural r (throttle-rolling)	ʀ
ʔ	glottisslag	glottal stop	ʔ
r _o	ustemt r	voiceless r	ɾ
õ	nasal o	nasal o	õ
ɬ	l-vibrant, tunga tremulerer mellom høyre og venstre munnvik	L-vibrant, tongue tremolo between right and left mouth folds	-
ɸ	bilbial vibrant, som “stop”-trilrop til hest	bilabial vibrant, like a "stop" trip call for horses	ɸ
<i>pizz.</i> ɸ	som ovenfor, men settes an med finger (“spille på slurva”)	as above, but fingered ("playing on the trash")	ɸ

In addition, Kolberg enhance these phonetic symbols with letters that can be understood as other phonetic symbols, sometimes with some kind of confusion between phonetic symbols and common letters (Fig.12) but with a lot of possibilities and solutions to create a vast collection of sound resources. There are some techniques in the score where phonemes are combined with other indications: firstly, referring to the attack, he usually combines some phonemes in order to precise the articulation (Fig.12 and 15), in glottal stops or in other consonants. Secondly, in several consonant sounds he demands a specific mouth position through vowel notation even he indicates phonetic movements with closed mouth (Fig.13 and 14). In the case that the sound lasts more than an instant, the result of this combination is a slight timbre modification, generally tremolo, in the main sound. Thirdly, sometimes he indicates voiceless sounds, as whisperings (Fig.16). And finally, sometimes he indicates a progressive change from a vowel to the next (Fig.17). This last effect is not easily perceived because there aren't many long notes to hear this change.

S1-2 *p* accel. *mf* **)
 qa qa
 A1-2 *mp*
 dzi
 T1-2 *p* *p*
 da da
 B1-2 *fp*
 Bö

[Figure 13]: In this selection of the score it can be seen the non-standard notation of phonetics. In soprano part, “qa” means [ka], in altos “dzi” means [dzi] and in basses the “B” it should be [b].

S
 A
 T
 B
 C:
f
kf
 (jo-jo-jo...)
f
kf
 (jo-jo-jo...)
 (nesten hviskende, dyptleie)
pp
pppp
 con bocca chiusa
 (jo-jo-jo...)

[Figure 14]: This part of the score, the ending in the choir staffs, Kolberg indicates an inner pronounce (jo-jo-jo...) at the same time that the singers are pronouncing “kf”, in current IPA [kʃ] or in closed mouth deep tone almost whispering.

S1 *mp* *pizz.* *)
 bla
 S2 *mp*
 dr gR
 S3 *mf* *pizz.*
 blip
 S4 *f*
 R dldl -- bodo --

[Figure 15]: The diversity on the sounds and the way to notate them is clear.

[Figure 16]: This part shows the double indication for example in the glottal stop [ʔ] with a specific mouth position of [a], [o] or [e]. Also, it is noticeable the combinations of phonetic symbols with onomatopoeias.

[Figure 17]: Here Kolberg demands short vowel sounds with a glottal stop attack from the voiceless (*ustemt*) to voiced (*stemt*).

[Figure 18]: The third bar of this section of the soloist quartet is the only one with a slightly perceptible transformation of the vowels, from “o” to “i” and return to “o”.

All these possibilities are written along with some extra voice techniques such as falsetto, nasal voice, brightness among others and indication of behaviour or character that changes the timbre of the voice in a subjective but effective way.

In this research it can be seen a tight connection between electroacoustic or electronic music with phonetics as music material. The case of *Plym-plym* is curious because by the time that Kolberg composed this work, he hadn't begun to work with electronic music yet, his most known field nowadays. However, there could be some indirect connexion in how Kolberg uses the voice with electroacoustic possibilities at that time: the electronic filtering, echoes, cut and paste effects, loops, etc. Probably, the influence of the summer courses in Darmstadt (Rudi, 2013) and his interest to any kind of music brought to this approaching of characteristic electronic techniques.

Finally, in *Plym-plym* the purpose of the use of phonetics can be understood as another tool, along with voice arrangement, chosen texts, genres mixing, etc., to emphasize the expressivity of the piece. Obviously, the timbre results are noteworthy and wanted by Kolberg, but those are not the purpose itself. For him “the most important is the relationship between text and music and the fact that the poem has dictated which timbre I should use and the very shape of the composition.”¹⁸

In this case, the sound effects have relation to the surrealist feeling of the work, to the confusion and surprisingly effects, as well as with the paradoxical relation between text and the way to perform it converted into music.

¹⁸ Interview with Kolberg at NRK Radio by Sverre Lind 1967. Translated by Lars Isdahl (see Annex A). <https://www.nrk.no/skole/musikkparken/kare-kolberg---pling-plong-med-humor-1.13172596> (Accessed November 19, 2019)

Deutsche Tänze

Deutsche Tänze is a piece composed by Cornelius Schwehr in 1989 commissioned by the vocal ensemble Schola Heidelberg and written for five female voices. There is a main recording by the same commissioners in the album *Nuits - weiß wie Lilien*¹⁹, a summary of the 20th century choral music.

Swehr took one of his favourites²⁰ texts by Bertolt Brecht, an excerpt of *Flüchtlingsgespräche* (Discussions by fugitives), written in his exile between 1940 and 1944. A text that “describes a dialectic situation and asks about truth and the possibilities to express it.”²¹ The main character of this story is man who, by accident, gets into a ferry where everyone is sentenced to death. When the ferry reaches the other side a group of soldiers shot everyone, less, fortunately, the man who shouldn't be there. The soldiers realize this situation and ask him why he was silent during the shooting and he answer that he learned it was better to be quiet than say something wrong that could bring to be shot, as his relatives happened. Eventually, being furious, he says something wrong and is killed.

The text is, clearly, a denunciation of the prohibition and consequences of free speech in oppressed political systems, in this case, in reaction to the Nazi Germany, and Schwehr, in *Deutsche Tänze* expand this claim from a literary text to a musical-sonic level.

There is an exhaustive analysis on this piece by Tina Krekels²² where shows *Deutsche Tänze* as an example of critical composition and the correlation between aesthetics, socio-political critique, text and sound. In that analysis Krekels (2012, p.23) explains that the piece “becomes not only a statement about history but also takes on a political attitude that is antimilitaristic and antifascist. This is one point of critique to keep in mind when listening.”

The title, *Deutsche Tänze* (German Dances), has no direct relationship with the text but rather establishes a bridge with the traditional structure of dances and an association with past classical music. For Schwehr, the connection with the past, either aesthetics, tonality or structures is something inherent in his music since traditional material is evaluated and

¹⁹ Schola Heidelberg, Nußbaum, W. (Conductor) (2001). *Nuits-weiß wie Lilien* [CD]. Åkersberga, Sweden: BIS.

²⁰ Schwehr, interview by author, November 14, 2019 (See Annex A).

²¹ *ib.*

²² Krekels, T. (2012). *Sprachmusik (Speech music) as Critical Composition: A case study of Cornelius Schwehr's Deutsche Tänze (1989)*.

alienated. Therefore, in *Deutsche Tänze* there is a *suite* skeleton behind the form as well as classical modal and rhythmical structure winks, mostly not perceivable but they could create an overall coherence on the work.

The piece has seven sections where the text is showed as a speech, without repetitions, omissions or order changes. However, until the lasts sections it is almost impossible to perceive or follow the Brecht's text. These seven sections have tempo indications and rhythmical structures that could remember to the dances, but they serve more as starting point for the composer than to relate traditional material with the piece for the listener.

Schwehr has a solid background on music for voice where the mixture of text, sound and music are explored and exploited. Some of his works follow the technique called *Sprachmusik* (speech music), with similarities with voice artists as Joan la Barbara, Cathy Berberian and the French poetic movement of *Lettrism* also with Kurt Schwitters' *Ursonate*, even though this work has no meaning text and the *Sprechgesang* in Schoenberg's *Pierrot Lunaire*. In any case, the remarkable point here is the use of the speech voice –not sung– understood as a sonic source beyond the use of the voice as a source to declare statements, feelings, etc.

Realizing that the voice is a fundamental source to communicate through language, Schwehr, based on Bruno Liebruck's ideas, establishes: “the word is the unity comprising sound and meaning”²³. The theoretical basis on speech-sound constituted an essential part of Schwehr thinking and he explains it in that way:

In every word—this unity of sound and meaning—two aspects are merged that have nothing to do with each other: one is unique and cannot be repeated and the other is general. The first aspect is the sound: the sound, that occurs during speech. Sound is altered even if the same person says the same word several times, and this is unique every time. The other aspect is meaning—that which the sound refers to—and what the sound, by itself, is not. There are also other types of sounds than those that take place in speech and language. These are, for example, the sounds of nature: e.g. rain, and the noise of the trees in the wind. These sounds are extra-linguistic. Or, they might be the sounds of expression: for instance, when I tell a joke, and a person laughs. This is an immediate expression: the actual laughing itself

²³ Schwehr, C. (2018). *Music and Language*. Transcription of a lecture. Translation by Alistair Zaldua.

doesn't mean anything, it only indicates something. And when someone laughs, that is something fundamentally different from the actual word "laugh", which is a word that this peculiar situation can only refer to, and not embody.²⁴

Deutsche Tänze is *Sprachmusik* but goes a little bit further since the use of the speech voice is combined, even though very little, with the sung voice. Also, the combination of five female voices gives a unity in register and timbre that distances with the common speech sound although on the other hand. And this use of *voices* instead of *singers* leads us to understand a break and change of the paradigm on the vocal ensemble that goes beyond of the traditional ensemble singing and its sonority. Hence, the aim is the use of the natural voice and not the *imposed* or operatic voice with different possibilities (whisperings, rattles or creaky voice, tongue clicks, whistling).

The sound of words

Asked about the phonetic source in *Deutsche Tänze* Schwehr responds unambiguously: "All you can hear is part of the text"²⁵. The processes of manipulate text are various; from break, dissect, cut the words, to use sounds not directly related with the words but yes in language or communication as whistles, breathings or tongue and gurgle (throat) clicks. In addition, Schwehr requires several kinds of voice: vocal cords cracking, sung voice but mainly whispered voice. All of this on the purpose to achieve a "musical richness and variety"²⁶.

As I said before, the text is not always understandable and Schwehr creates a discovering process of it starting with sounds outside of morphemes and words (even though they come from the text) (Fig.19) and ending with a fast and clean recite accompanied for dry and short hits (Fig.20). Between these two extreme points the process of revealing of the text of Brecht is continuous.

²⁴ ib.

²⁵ Schwehr, interview by author, November 14, 2019 (See Annex A).

²⁶ ib.

whispered voice and mainly fragmented. And the third, the rhythmical and metric indications that bring to the dances. I would add, in the third level the modal reminiscences as well as the use of sung voice or pitched sounds.

Focusing in the second compositional level it can't be affirmed that the use of phonetics in *Deutsche Tänze* has a sonic purpose according to the timbre of each phoneme. Rather the process is the inverse; is the word that dictates the sound, and the morphemes and phonemes that are derived from it preserve the original sound, although dissected and zoomed in. Therefore, the sonic or timbre result is a consequence and not a purpose as another works analysed in this study.

Let us take two examples of the score. The first (Fig.21) is the beginning of the fourth section, where the use of the text of Brecht is non-existent directly but the phonetic text written by Schwehr in the score comes from Brecht. The sounds chosen by the composer create a specific sound background: the unvoiced consonants [f], [s], [ʃ] (sch), [ç], [x] in the second voice and whispered morphemes with short vowels [hi], [he], [ha], [ho] in the fourth voices simulate the sound of language without language or with dissected and disordered language.

The image shows a musical score for five staves, labeled I through V. At the top, there is a section marker 'IV' and a tempo marking 'Alleg. mod.'. Staff I is a treble clef with notes and rests. Staff II is a treble clef with phonetic notation: (s) p, (f) p, (s) (sch) (ç), (x) (f) (s) (sch) (ç), (s) (f) (s), (sch) (ç) (x) (f). Staff III is a treble clef with phonetic notation: (s) p, (m) p. Staff IV is a treble clef with phonetic notation: p (hi) (he) (ha) (ho), (hi) (he) (ha) (ho), (hi) (he) (ha) (ho), (hi) (he) (ha) (ho), (hi) (he) (ha) (ho). Staff V is a bass clef with notes and rests, including a dynamic marking 'pp'. The score is written in a style that combines traditional musical notation with phonetic symbols to represent specific sounds.

[Figure 21]: The clean beginning of the fourth section combines two layers of sound types.

In the second example (Fig.22), from the fifth section Schwehr combines the Brecht's text (highlighted in yellow) with phonetic or morphemic text. The result does not clash, and the two approaches of sound converge in the same level of sonic perception. But there is a remarkable difference in the perception of text; gradually the Brecht's text goes on the

want to point out the creaky voice or voice fry technique. Schwehr demands this sound only a few times, but the sonic effect is easily audible. The first time that the creaky voice appears (Fig.24) (indicated from a less dense to denser), is combined with a progressive change between the vowels [u] and [a] and a dynamic *crescendo*. This effect contrasts with most of the other sounds, shorts and unvoiced, because of its duration that helps to pay attention to the shape of sound and its transformation. The timbre of this effect is non-unvoiced (although neither would be voiceless) and it can be related with the only full sung tone in the piece. This full and pure sung tone appears in the end of the first section with a progressively change of the phonemes [m], [a], [e], [i], and creates a similar effect with the creaky voice effect, at least for the change of the timbre regarding the formants of each phoneme.

[Figure 24]: The effect of creaky voice in the fifth voice (highlighted in blue) appears simultaneously with an unvoiced vowel of the first voice.

Before closing this analysis, it is appropriate to look into the notation methodology. Although Schwehr writes the whole piece over a pentagram staff the pitch indications are scarce and usually there is only a register requirement divided in low, medium and high, very high, etc. tones. This happens in the whispered parts, on the score notated with the notehead symbol “×”; the whistles, on the score showed with “^” as notehead; the glottal stops or throat clicks (*glucksen*), with the symbol “□”; the tongue clicks, with the symbol “⊕”; and the unvoiced part are notated with the symbol “◆”.

Besides, the creaky voice technique is notated with merlon style line (Fig.24) and the breathing out and in are notated as bow indications in the strings.

The phonetic notation is explained in the score notes and combines the standard of the IPA with a transliteration of the German language.

To sum up in *Deutsche Tänze* Schwehr creates a progression from phonic to meaningful even the meaningful is always there, hidden or blurred. As counterpoint of the other case studies there is not any connection of electronic music, even the process of dissecting and disordering, broadly used here, is common in speech or sung voice electroacoustic works. But, probably, the most distinctive and interesting point of this work lies in the combination, relation and conjunction of meaning text and the sound produced by it. Likewise, for the techniques used in speech and sing, far away from the case studies viewed so far.

Other works

Shortly I will mention some works that have some interesting points regarding the impact of phonetics in the voice timbre and that could be serve as other case studies.

The first, *Four*² (1990) by John Cage is a piece for mixed choir *a capella*. The piece is structured by sustained long notes with a letter of the word “Oregon”, the only text of the piece. The acoustic perception of the timbre of each phoneme is very similar to the piece for two voices mentioned in the introduction, *Litany for the Whale* composed by the same composer. The slowness of the piece and the simplicity of its material, with only the few changes of tones and phonemes causes a listening focused on the overtones of the voices and can even be confusing the phonemes for a non-phonetic sound.

There are several recordings of this piece, some of them as a live recording. Maybe, one of the most interesting is performed by the Latvia Radio Choir and Kaspar Putniņš in the album *Mythes Étoiles*²⁷.

The second work is *Sinfonia* (1968-69), by Luciano Berio. In this case the piece is written for large orchestra and a vocal ensemble of eight amplified voices. Berio uses the voices with almost all of their possibilities including the sung voice with phonetic notation. Just the firsts bars of the piece can already be used an example. The richness of instrumentation of this work is formidable and the voice is treated sometimes as part of the orchestra as well as in a foreground level.

²⁷ Latvian Radio Choir & Putniņš, K. (Conductor) (2013). *Mythes Étoiles*. Oslo, Norway: Aurora.

As one of the main pieces of Berio, *Sinfonia* is recorded many times, but for a good listening of the voices I would recommend the version of the Royal Concertgebouw Orchestra and Electric Phoenix with Riccardo Chailly as conductor of 1990.

Another work is *Gaw ek-dad kard*, by Mārtiņš Viļums. This piece was written in 2010 as part of a project led by the Norwegian composer Lasse Thoresen. This project was “an aesthetic research project oriented towards innovations in vocal practice and composition, through experiments with combining vocal techniques from different cultures.”²⁸ (Thoresen, 2012 p.1). From the numerous techniques that Viļums adds in his piece those regarding timbre are specially interesting and accurate. He requires a big variety of different voice techniques that effects direct the voice timbre. From lips, tongue and mouth positions to general indications about the darkness and brightness of the voice, along different types of tremolos, creaky voice, *frullatos*, etc. As far as the text is concerned, Viļums uses a Pahlavi text and then he obtains phonetic material that is manipulated in several forms. Two singular techniques applied on phonetics are the requirement of perform two or more phonemes at the same time and changing phonemes while maintaining another phonetic position.

This piece is only recorded by the Latvian Radio Choir in the same album mentioned before.

And finally, the last work is *Six Fantasies on a Poem by Thomas Campion*, composed by Paul Lansky in 1990 mentioned in the introduction of this study. This piece it can be described as an electronic work with a voice as a source material. This voice is very altered, but it always remains the human voice. The piece it could be a speech-sung music for a female voice ensemble since modification creates an impression of a choir or a vocal group. There is no direct voice timbre manipulation from the perspective of phonetics, but the electronic effects added on the voice are noteworthy in terms of phonetic transformation of the text and really interesting for the listener.

²⁸ Thoresen, L. (2014). The Conrescence Project 2008-2010: Ideas, processes, experiences, and musical works. *Tempo* 68(267), 7-21.

4. Application in my own artistic work

In this chapter I will show my own compositional process, approaching phonetics and timbre through some artistic creations. As an artistic part of the research, this chapter is unquestionably subjective, but it will be an example of the findings reproduced in new creations: some sketches, drafts or excerpts and two works, *ea* and *Criticism on the banalization of language*.

Sketches

Before the first composition, as well as during the process of writing this study, I had been creating some sketches and drafts to search ways to approach phonetics and find compositional solutions. Some of them are almost impossible to perform, or excessively difficult to achieve a good performance, but as sketches or drafts they have helped in the two main pieces that I present in this study.

All these musical excerpts were composed asking myself about notation, voice limitations, effectivity or timbre possibilities and, sometimes, ignoring limitations in complexity and practicalities. The absence of any conceptual background beyond phonetic potentials and structure issues gave me some freedom to focus only on the technique aspects around phonetics, timbre and voice.

I started establishing the goals of the sketches and drafts:

- To answer the following questions:
 - Can we change the timbre of the ensemble singing through the vowels?
 - Where are the limits in human hearing concerning phonetic variations?
 - Which is the feasible way to achieve a good blending from the phonetic perspective?
 - Which are the differences in the type of voices comparing phonemes?
- To have an example of the use of phonetics in a “pure” way (non-artistic) showing the possibilities as well as the impossibilities of the use phonemes as musical material.

In order to provide some control on the selection of vowels I made two decisions:

- To take the IPA vowels chart as a standard.

- To merge the vowels in different groups according to the similarities of the mouth position and the formants or overtones that are increased. We have two kinds of “models”:
 - **Models A:** transitions of vowels between the front position to back position (in the chart, vertical lines) and transition from closed to open position (horizontal lines) and *vice versa* in both cases. Each model uses rounded or non-rounded vowels. There is a total of **14 models**.
 - **Models B:** groups of vowels made by similarities in their acoustic result. There are **9 models** combining front and back positions, close and open positions and rounded and non-rounded vowels.

The choice of which kind of ensemble or choir to use has been made depending on how adequate it is. Normally the voices are divided in two types of each gender but in this case, I divided them in three. In this way we have the maximum possible register, different types of weights (brightness, heaviness, darkness, etc.), types of resonance consistent with chest singing, middle singing and head register.

- Soprano: female high voice, light and bright.
- Mezzo-soprano: female medium voice, a little bit darker than soprano.
- Alto: female low voice.
- Tenor: male high voice, bright.
- Baritone: male medium voice, powerful.
- Bass: male low voice, darker than baritone, heavy.

For the choir sketches I chose the same disposition as the ensemble and the eight-part division. Having eight voices allows a powerful and massive choir sound.

Although it would be interesting to compare the female voices with a countertenor, I discarded this type of voice because the usual predominance of his timbre against the female voices could provoke an imbalance between them.

Next, a list of fourteen sketches are exposed and explained²⁹:

²⁹ The scores are attached in Annex B.

1. *Sketch for vocal ensemble of six mixed voices with sustained chords.*

Models used: A. I also selected combinations of two phonemes as a *tremolo* effect. Starting from one voice (tenor) to *tutti*, and always with the same sustained chord, I explored six different models. The changes of phonemes must be sung as progressively as possible. Then these transitions are replaced by a new sustained chord with a combination of two phonemes to achieve the *tremolo* effect.

The pitches should be relatively comfortable for the singers and the chords are quite consonant and open.

2. *Sketch for vocal ensemble of six mixed voices with close chords and glissandi.*

In this sketch I connected *glissandi* with phoneme transitions in order to create a mirror between pitch and timbre.

3. *Sketch for vocal ensemble combining six mixed voices.*

Here I divided the ensemble in five groups of three voices, each one with the purpose to hear differences between female and male voices, high and low voices and central and extreme voices. In each of the seven chords I selected two phonemes without following any model but choosing distant phonemes.

4. *Sketch for vocal ensemble of six mixed voices.*

A simple sketch using the extreme pitches of each voice combined with all the B models.

5. *Sketch for vocal ensemble of six mixed voices.*

Another version of the same idea of the previous sketch.

6. *Sketch for vocal ensemble of six mixed voices.*

A creation of changing chords and registers in each voice following the B models. The timbre change should be heard, according to pitches and phonemes.

7. *Sketch for vocal ensemble of six mixed voices.*

In this sketch I tried to answer if there are some acoustic differences comparing a unique tone to an out of tuning.

8. *Sketch for vocal ensemble of six mixed voices.*

Controlled *trinos* combining pitches and phonemes of both models. Distinction between chords and clusters.

9. *Sketch for vocal ensemble or choir of six mixed voices with consonants.*

For the first time I selected an occlusive nasal sound to separate each vowel phoneme. This sketch is created by a chord progression from a closed position, almost a cluster, to a consonant, open and wide chord.

The order of vowel phonemes is a zigzag of the mouth position alternating rounded and non-rounded vowels.

10. *Sketch for female or male voices.*

Sketch with the purpose to compare male and female voices, as well as comparing soft clusters in different registers. Will it be possible to hear the same vowels in each group?

11. *Sketch for vocal ensemble or choir of six mixed voices.*

Starting from a basic imitation chorus style, the voices wander round all A models.

12. *Sketch for mixed choir of six voices.*

In this sketch I explored the differences in the time of changing vowels. What is the perception of the progressive changes comparing with fast or tremolo changes?

13. *Sketch for mixed choir of eight voices “inspired by John Cage”.*

One remarkable work by Cage presented briefly in this study is *Four*², for choir. In this work the choir sings sustained chords with text of the letters O-R-E-G-O-N. The timbrical result can be interesting for this study and I did the same focusing directly in the possible timbre variations through the vowel phonemes.

The goal of this sketch is to have a complete overview of sounds in all possible positions of the mouth.

14. *Sketch for mixed choir of eight voices.*

A hypothetical sketch, almost impossible to perform, of ascending microtonal scales. Each voice has one B model and each measure has a different consonant combined with the vowel.

The purpose of this sketch is to consider the choir as a group of instruments of the same family using different techniques. For example, a string orchestra where firsts violins play *molto sul ponticello*, second violins *sul ponticello*, viola *ordinario*, cello *sul tasto* and double basses *molto sul tasto*. With the strings it is evident what the sound or timbre will be. Are these situations comparable?

ear

ear is a work for mixed choir and organ composed in the beginning of my investigation. It was conceived as an investigation about the impact of phonetics upon choirs and its perception both by singers and audience.

This piece was written for a high-level amateur choir used to sing new music, in a concert for choir and organ with the concert topic of “The window”. These specifications brought me to create a work where first, a high-level amateur choir could perform in a suitable way; second, the organ had an important role keeping the choral sound in the foreground, and third, the symbolic connection of the concert topic and music was convincing.

The title of this piece shows the intention of perception to the audience. “*ear*” is the union of the words “ear” and “air”, which mean to listen and to ventilate our hearing (nearly obvious connection with “The window”). The intention was to create a choral piece with a new or not typical perception for the audience, going further of common singing, therefore achieving a sound that could be confusing as to its source, with the utopic purpose of converting the ear of the listener into the phonograph of Kittler³⁰, mentioned at the beginning of this thesis.

³⁰ “*The phonograph does not hear as do ears that have been trained immediately to filter voices, words, and sounds out of noise; it registers acoustic events as such. Articulateness becomes a second-order exception in a spectrum of noise.*” Notes by Friedrich Kittler (1999[1986]) quoted by Cox (2011, p.154).

Nonetheless, if this is not possible, at least with the purpose of inciting this question to the audience: “Is that sound coming from a voice?”.

This question brings the discussion about my concept of choir for this piece. First, the voice disposition is not constant. The piece is written for a chamber choir, around twenty-four singers that are divided in four, six, seven or eight voices depending on the moment. Second, the choir is linked with the organ as far as its stops: one whole instrument with a variety of timbre and a wide range of possibilities. And third, the processes of adding or removing voices is not in a counterpoint relation; it could be as a sum of superposed and juxtaposed sound layers with the purpose of creating a whole and specific timbre.

Notwithstanding, in *eaír*, the use of the voice is quite conventional in the sense that the work of the vocal cords is without uncommon interferences, aiming to achieve a *conservative* and *pure* choral sound. Yet, there is a crucial point: the absence of meaning text or language causes that the information provided by the choir is only acoustic.

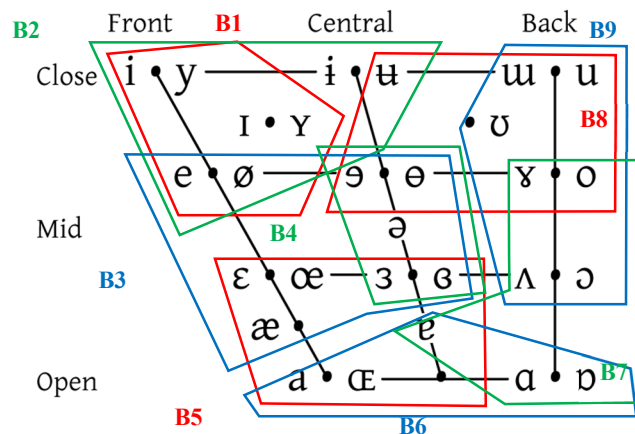
Before going further with phonetics, timbre and non-meaning text, let me explain how I fitted the organ in a piece where the voice is the centre point, the source and the purpose. As I said before, the organ has an important role, although mostly in the background. There is an uncontrollable basic parameter with the organ which is the centre point of this piece: the timbre. The non-existence of two equal organs in the world does not allow to control with accuracy the timbre compared with the voice. Consequently, the organ cannot be understood in the same level of the voices but provides help to them, in tuning and sustaining, and at the same time enhance the dynamics and the range. Also, the organ can be used, and is used, to establish contrast with the voice and organize some different sections of the piece appearing in the foreground and breaking the main discourse and bringing the choir to the next section.

Phonetics in eaír

The absence of meaning text does not mean a freedom of vocalisation, on the contrary, the *text* is a way to indicate the timbre in a concrete way. This *timbre text* is made up of thirty-four phonetic models or series, mostly using vowels but also some voiced consonants, and is written entirely following the International Phonetic Alphabet (IPA). Specifically, in vowels, the standard chart of IPA (Fig.25) is taken as a basic resource to create all the models.

[Table 6]: List of phonetic models A.

A1. ↓ Front / non rounded:	[i - e - ε - a] [a - ε - e - i]
A3. ↓ Front / rounded	[y - ø - œ - œ̃] [œ̃ - œ - ø - y]
A5. ↓ Central / non rounded	[i - ə - (ə) - ɜ - (ɞ)] [(ɞ) - ɜ - (ə) - ə - i]
A7. ↓ Central / rounded	[ɯ - ɵ - (ə) - ɛ - (ɞ)] [(ɞ) - ɛ - (ə) - ɵ - ɯ]
A9. ↓ Back / non rounded	[ɯ - ɤ - ʌ - ɑ] [ɑ - ʌ - ɤ - ɯ]
A11. ↓ Back / rounded	[u - o - ɔ - ɒ] [ɒ - ɔ - o - u]
A2. ↔ Closed / non rounded	[i - i - ɯ] [ɯ - i - i]
A4. ↔ Closed / rounded	[y - ɯ - u] [u - ɯ - y]
A6. ↔ Closed-mid / non rounded	[e - ə - ɤ] [ɤ - ə - e]
A8. ↔ Closed-mid / rounded	[ø - ɵ - o] [o - ɵ - ø]
A10. ↔ Open-mid / non rounded	[ε - ɜ - ʌ] [ʌ - ɜ - ε]
A12. ↔ Open-mid / rounded	[œ - ɛ - ɔ] [ɔ - ɛ - œ]
A14. ↔ Open / non rounded	[a - ɑ] [ɑ - a]
A16. ↔ Open / rounded	[œ - ɒ] [ɒ - œ]



[Figure 27]: Models B in the vowel chart.

[Table 7]: List of phonetic models B.

B1: Closed mid front	[i / y / ɪ / ʏ / e / ø]
B2: Closed front central	[i / y / ɪ / ʏ / e / ø / i / ɯ]
B3: Mid front central	[e / ø / ə / ɜ / ə / ε / œ / ɜ / ɛ / æ]
B4: Mid central	[ə / ɜ / ə / ɜ / ɛ]
B5: Open front central	[ε / œ / ɜ / ɛ / æ / ɐ / a / œ]
B6: Open	[ɐ / a / œ / ɑ / ɒ]
B7: Mid open back	[ɤ / o / ʌ / ɔ / ɐ / ɑ / ɒ]
B8: Closed mid central back	[ɯ / ʊ / u / ʉ / ə / ɤ / ɵ / o]
B9: Closed mid back	[ɯ / u / ʊ / ʉ / o / ʌ / ɔ]

As it can be noticed, the *timbre text* has vowels as its main type of sound. Apart from these models showed, there are some models without any sequence of phonemes or changes –static models– with five isolated vowels: [o], [e], [ə], [a] and [y] appeared in some sections, contrasting with the movement of the sequence models. Moreover, there are five consonant models, all of them voiced consonants: [b], [v], [v / z / ʒ], [ŋ] (combined with vowels) and [B / R].

An important point that I was aware of is that depending on the way the models are presented, the acoustic result varies. Hence, it is not the same effect to have a phonetic unity (the same phoneme in all the voices) or a plurality of different phonemes; the second option, in terms of timbre, is richer than the first, but also more blurred and with a less compact choral sound. Similar is the change between phonemes in a sequence: sometimes there is a direct change from a phoneme to the next and sometimes there is progressive change that creates a gradual timbre modification like EQ filtering in electronic sound manipulation (Fig.28).

Furthermore, some models have particular effects added on the phonemes as superposition of two sounds at the same time ([B+R]), tremolos or fast changes between two phonemes ([y~u], [b~u], [ə~ʌ], [v~z~ʒ] among others) and free changes between several phonemes. Beyond that, some general techniques are added as different levels of vibrato, hand tremolo and control of brightness (more nasal and harmonically rich) or darkness (more covered, less nasal) of the voice timbre apart from the timbre that each phoneme has (Fig.28).

All these effects, alongside the progressive changes between phonemes, are used in order to enhance the timbre possibilities of the phonemes and to take away the perception of phonemes as letters that could be part of morphemes, words and consequently, language.

Each one of thirty-four models appears once and is always juxtaposed with the following one, sometimes with a blurred transition and sometimes with a sudden break. The order is quite intuitive but is made considering the work form, the register limitations of some vowels (basically in soprano voice) and the comfortability to sing depending on the dynamics (usually, for an amateur singer it is easier to sing loud with an [a] than with an [u], for example), register and combination of the phonemes with other effects or voice techniques.

31

S 1

S 2

A 1

A 2

T 1

T 2

Br

B

Org.

Flute 2'

ppp

Male voices: divisi a 4

p, *pp* *cresc.*, *mf* *pp*

-----æ-----y-----æ-----y-----æ æ-----æ-----ε-----e-----ø

-----æ-----y-----æ-----y-----æ æ-----æ-----ε-----e-----ø

e-----ø-----ø-----ø-----ø

e-----ø-----ø-----ø-----ø

[œ~æ]

[œ~æ]

8 8 8

[Figure 28]: This excerpt of eair, with the models A3 and B3 as *timbre text*, shows the transition between phonemes and the unity or homophony between Altos and Tenors, the tremolos created by two phonemes in Baritones and Bases, effects as hand tremolo in Altos and Tenors, the change of brightness and darkness in Baritones and Bases (to “normal” voice) and the background role of the organ.

Criticism on the banalization of language

The second work presented was written for voices and electronics and, opposed to *ear*, contains “meaningful” text. In this case, there is a strong politico-social concept behind the piece which has a direct influence on the sound. A particular sonic result and its perception is not the purpose itself, but a consequence of the performance. Even the sonic result is not controlled by the composer, since each performance can be unique. Rather the purpose is to change the listener’s focus of perception from syntactic information to timbre, similarly to the process described by Jones³¹ and exposed in the introduction.

Criticism on the banalization of language highlights and criticises a common practice in the populist, fascist, racist or *machist* politics in a moment when these ideologies are booming almost everywhere in the world. From an artistic perspective, specifically a sonic perspective, an abstract analogy of the process of banalization of political language is made.

It is obvious that the impact of the oratory or political discourse can be enormous and very powerful, so awareness of the language used is essential for any politician. Usually the language employed by populist leaders or ideological influencers has a destructive, deceptive and manipulative purpose. This language is frequently made up of basic vocabulary as well as of several words with a deep political and social meaning, which, originally, are used to refer to the main issues and realities of the society.

The text of the piece is constituted by words chosen by their meaning and for their deliberately immoral use by some politicians. *Democracy*, *terrorism* or *truth* are some of these words. This bad use transgresses, detracts and cancels the original sense of the word. Besides, it mixes and confuses words with a righteous and constructive meaning and whitewashes those words related to wickedness, as well as the deeds that come from it.

These words must be recited or sung in the mother language of each performer. Yet, progressively the words melt away, transform and finally disappear: the word changes to a naked sound without meaning. Consequently, wanting to create a simile with the process of

³¹ “[...]”slow motion” speech provides listeners with a slowed rate of phonetic and syntactic information and thus gives them the time necessary to “hear out” harmonics in the vowels and, in general, to focus on timbral information in the signal”. Jones (1987) thoughts about *Six Fantasies on a Poem by Tomas Campion* by Paul Lansky.

the banalization of language a paradox is established: while from the politico-social viewpoint the meanings are violated, from the sonic-artistic viewpoint the sounds are transformed. In other words, what in political discourse is an aberration, disgrace and a shame for mankind, in the piece (or in the sound) it becomes a source of musical resources that emerge, evolve and become richer.

The piece is written for voices in the strictest sense of the word *voice*. The performers can be anyone with basic voice control and notions of music reading. The number of performers can vary depending on the occasion and the stage possibilities, but the recommended minimum is two voices, and the maximum, twenty. Additionally, an amplification with some electronic modifications on sound in live performance is required. In order to keep the sound of the voice as pure as possible but at the same time to be able to enhance and emphasize the voice and the techniques applied on it, the electronic effects used are reverberations, echoes and soft EQ filters.

There must be no conductor. In order to keep a unity in time in the performance there is a screen with a timer and section information. It is not necessary to have an exact synchronization between the performers unless it is expressly required. However, the interaction between the performers must be absolute in order to unify dynamics, speed and the general mood. The piece must be rehearsed enough for the performers to get to know each other, as well as everyone's interpretation; the goal is to connect with each other and reach an agreement in any doubt or unexpected situation.

In the last sections, those with phonetic notation, a union of utterance is required; until then, each one shall use his own diction according to their mother language.

The score is made up by a set of instructions with some musical notation added. It is divided in sections and bars, which are showed in a square box.

The phonetic notation follows the standard of the International Phonetic Alphabet (IPA) and it is showed between brackets.

From phonic to sonic

The voice techniques used in the piece can be divided in changes in the text and in the sound. While in *ear* the indications and requirements were specific, in this piece the indications are an open guide with flexibility.

There are several processes to transform the words in only sonic information. Each performer is free to transform the word on their own. All these techniques can be mixed and superposed.

- Eliminating or reordering letters. This process is quite random and uncontrollable but can create a word's progressive loss of meaning keeping the word behind the sound.
e.g. in Catalan: *Democràcia* → *dmcrs* → *eoia* → *dumecriasà* → *demcrs* etc.
- Changing letters. The process is similar to the previous one but a little bit more extreme and with a faster loss of meaning.
e.g.: *Democràcia* → *lenoglàmia* → *domicrèsuo* etc.
- Blurring. Less articulation and more softness in the mouth movements. The vowels are still there almost until the end and the consonants become voiced consonants.
e.g.: *democràcia* → *demogràzia* → *damagraza* → *damgaza* → *damza* → *daza* → *daz* → *da* → *d*.
- Sharpening. More strength in articulation. There is a preponderance of hard consonants, mainly voiceless but also some voiced ones.
e.g.: *democràcia* → *denocràtsia* → *tecnocràtzia* → *técocrràtxia* → *tecrreatx* → *treccratx* → *trrcrrtx*.
- Time manipulation (lengthening and contracting). There are two ways to perform the lengthening technique: with sustained and long tones (*ddddeeeemmmooo-ccrrrrrààààasssssiiiaa*) or with long silence rests between the words. This process could be called *slow motion process* and enables the audience to focus on the sonic information over the syntactic one.

The techniques to transform the sound and timbre are diverse:

- Pitch manipulation. Sometimes notated in a general register (high and low) and sometimes in specific pitches with a standard staff.
- Dynamic changes notated in the standard manner.
- Requirements of whispered voice and creaky voice.

- Physical obstruction (closed mouth, hands in mouth, asphyxiation, etc.). With two purposes: applying a mute to the voice or creating *tremolos* through repeated movements.
- Changes of darkness and brightness in timbre.
- Manipulation with the electronic amplification:
Stereo changes, reverberations, echoes.

This piece has several influences from other works either because of the notation and the score format (*Stimmung* by Stockhausen) or because of the conceptual relation between language and sound (*Deutsche Tänze* by Schwehr), as well as from the idea to evolve from the phonic to the sonic. In the last case there is a narrow connexion with a piece by Unsuk Chin, *Akrostichon-Wortspiel* for soprano and orchestra, and an article about the piece.

In *Akrostichon-Wortspiel*, not analysed in this study because of its instrumentation of solo voice and orchestra, Chin manipulates the text somehow like I did in my piece. In the score notes she writes: “Sometimes the consonants and vowels have been randomly joined together, at other times the words have been read backwards so that only the symbolic meaning remains” (Chin, 1996)³². Albeit in my case the symbolic meaning disappears and does not remain. And regarding to Chin’s manipulation upon text, Bower (2016, p.6) introduces, indirectly, an interesting statement about the sonic and the phonic: “These alterations put literary text, set text, and musical text in contention with one another. Accentuating the sonic over the phonic, Chin’s settings obfuscate their lineage [etc.]”³³.

On balance, it all comes down to where the composer, the performer and the listener put their attention, whether it is the word or the sound. In *Criticism on the banalization of language* the borders of this attention are fluid but finally, the essential point is not “what one hears but [...] how one hears it” (Bolhman, 2005, p.212).

³² Chin, U. (1996). *Akrostichon-Wortspiel*. London,UK: Boosey & Hawkes (Score notes).

³³ Bower, J.E. (2016). Noise, Complexity, and the Agency of Imprecision. *L'autre musique Revue*, 4.

5. Evaluation and conclusions

Phonetics, as a musical source, is a tool that permits a wide range of possibilities regarding timbre and language-sound dichotomy. Depending on the perspective and the artistic purpose of the composer, the use of phonemes can differ greatly.

Even though the use of phonetics is not something very frequent in music for choir or vocal ensemble, as we have seen, since the 1960s there are a variety of examples and different uses of that. There is not a paradigm, a leading method or approach, or a school who traces an influence regarding the use of phonetics in voice composition. After all, we are discussing about a specific technique albeit with a remarkable impact.

While Stockhausen and Hillborg utilize the phonemes as an enhancing of the voice and for a precise control of timbre, Kolberg understands phonemes as an extra tool to enrich the musical material, not in a naïve sense but in a less structured than the first two. On his behalf, Ligeti uses the phonemes as he uses pitches and rhythm patterns: there is no specific timbre purposes beyond cycles of unity and plurality. Furthermore, the connexion between language and sound is broadly explored by Schwehr or Cage, among others. However, the main difference could be the listener's perception that each composer wants: some aim at an experimentation with phonemes in order to highlight overtones –Stockhausen in *Stimmung*–, some intend an imitation of another source –Hillborg in *Mouyayoum* imitating electronic EQ filtering– and some explore the boundaries of language and sound –Schwehr in *Deutsche Tänze*.

In my works, rather than taking other composers and their pieces as a direct influence, I have wanted to take advantage of phonetics as a tool from several viewpoints. There are many similarities in other works and other compositional approaches, but it could be difficult to find works where phonetics techniques and their impact are the main goal since in other pieces the use of phonetics is the procedure towards the goal. Moreover, in the two pieces presented, the strategy to work with phonetics, the compositional process as well as the result are quite different.

In *ear*, the purpose was to use phonetics in order to achieve a high level of timbre control upon the choir. Hence, there is a considerable structuration of the phonemes used and the refined notation in almost any parameter of the piece. Regarding the perceptual intention, I wanted to create a sound that could confuse the listener about the source, the voice in this case, confusing them with sounds that could not come from a human voice.

In a different manner, in *Criticism on the banalization of language* the control of most parameters is soft, and the use of phonetics is indirect until the last sections of the piece. The piece focuses on the language and its loss of meaning rather than in the voice timbre.

In the beginning of this study I presented some questions that I will now try to respond. Some of them need new studies to have a solid answer. First, I exposed six specific queries:

1. *The intelligibility of the difference (and interconnection) between overtones and formants as timbre (sonic perception), as chord (harmonically, pitched) or as phonemes, mostly vowels phonemes (related to morphemes, language).*

As we seen and according to Wolfgang Saus, it is possible to perceive a vowel sound differently if there is some ear training or an enhancing of the overtones. With a singer who has a good technique of overtone singing it is possible to differentiate the fundamental tone of the overtones. It is difficult to affirm that the perception of the harmonic series of a tone can be perceived with the same facility in the formants of each vowels. Or, if it is possible, to hear the formant pitches outside of the general sound. To respond this, it would be necessary to carry out a good study and survey about hearing perception.

Regarding the phonemes, it is interesting to compare those works which use them together with language or alone. It can be asserted that in *Mouyayoum* there is no connection with language and the perception of the listener never relates the phonemes with morphemes and words. In opposition, in *Deutsche Tänze* the use of phonemes can be really confusing about whether the sound is the main text or not, principally because all the phonemes come (indirectly) from the text. In the middle, *Stimmung* combines isolated phonemes with some words which can occasionally cause some confusion.

2. *The fact of focusing on the origin of the sound as a starting point for creating compositional material.*

One of the pieces that most accomplishes this statement is *Stimmung*, since Stockhausen started his composition process investigating his voice and the timbre it produced. Another is *ear*. An analogy it can be established with several pieces for instruments where the search of timbre possibilities is the goal. For instance, *Guero* for solo cello by Helmut Lachenmann or *Partiels* for ensemble by Gérard Grisey.

It is an evidence that material can be created by focusing only on the sound source, as is proven by the existing artistic creations.

3. *The effect of choral blending with regards to phonetic parameters.*
4. *A deeper look into language utterance: understanding how the timbre of phonemes in singing voice can affect and influence interpretation and perception.*
5. *Combinations of phonemes (different formants): what is the perceptual result?*

For these three queries, it would be necessary a comparison and analysis on recordings for choir and vocal ensemble to prove each fact. Theoretically, for the first question it can be affirmed that a unison of phonemes with the consequently unity in formant pitches causes a good blending.

6. *The combination of the following two factors: first, the resultant frequency of a phoneme (the overtones of the fundamental pitch and the formants frequency) and second, the influence of vocal technique on the same phoneme (from a veiled to a bright sound).*

This combination is used in my pieces, as well as in *Gaw ek-dad kard* by Martin Vilums. Indirectly, Kolberg in *Plym-plym* combines phonemes with character requirements that implies usually changes of timbre. Therefore, the combination of the two factors exposed is possible, used and, taking in consideration recordings of *Plym-plym* and *Gaw ek-dad kard*, perceptible.

After these questions I exposed the main research question and two derived sub-questions:

- *How can the use of phonetics as a musical material impact upon composition for vocal ensemble?*

The use of phonetics, specifically the use of phonemes or the use of phonetics for musical purposes, has a direct and efficient impact upon composition for several reasons. First, as a tool to notate almost exactly the position of the mouth and the articulation of the sound, it allows a precise control of timbre. Second, the use of phonetics focuses on both the compositional process and listeners' perception of the sound shape. Hence, for the composer the large amount of material derived from phonemes causes further refinement, at least, on the

level of timbre. And for the listener, focusing their perception on the sound shape causes a different experience that is certainly different compared with a non-phonetically approached piece: more attention on the sound and loss of connection voice-language.

- *Which complete vocal sounds are derived from phonemes, and what is the impact on timbre, blend, etc.?*

Virtually all sounds with the possibility to be notated as a phoneme can be used as music material. Moreover, the use of phonemes is an excuse to start to use any sound produced by the voice or the body. As we have seen, the combination of phonetics with any voice extended technique enhance extensively the musical material related with the voice. The impact on timbre is an enrichment of vocals. In blending, the impact is relative since depending on the use of this material the achievement is one or another. Yet, it is certain that the range of choral blending and non-blending is wider and easily controllable.

- *In which ways can we use these resources or materials as composers?*

Apart from the already mentioned use as timbre control, these resources can be used in different directions to structure the work: establishing connexions between form and timbre, pitch and timbre, etc. Another way is to use this sonic material together with language, in order to blur the limits of it as well as to work with the significance of music language, common language and any interconnexion between them.

As I already mentioned, there are several questions that remain unanswered. Basically, those questions that need good recordings and exhaustive analyses on the level of acoustics. This study has been focused mainly on the artistic perspective and to prove the effectivity of the findings presented is mandatory to reinforce the perceptual and acoustic perspective.

As a recommendation, in future studies a further research into aspects of perception about derived material from phonetics and spectrographic analyses on the sound focused on timbre differences would be useful. Besides, the sketches written and presented in this research had been conceived to be concretely analysed beyond the artistic and compositional parameters and that part remains to be studied. Likewise, it would be interesting to compare the listener's perception of the different approaches to using phonetics, especially comparing the two main pieces composed for this study.

Finally, closing this research and after composing *ear* and *Criticism on the banalization of language* I can assert that: firstly, the use of phonetics from a compositional perspective helps the composer to go forward on the control of the voice and its timbre. Specifically, to explore little-used choral and ensemble singing timbre possibilities. Secondly, phonetics is an accurate and effective tool to notate the parameter of timbre and helps the performer to achieve the composer's intentions and can bring the listener to non-common hearing experiences. And thirdly, using phonemes combined with other voice techniques enables us to go further and enhance conventional choral and ensemble singing.

APPENDIX A

Interview with Cornelius Schwehr by Pol Requesens Roca through e-mail correspondence.

Date: 14th November 2019.

–I would like to know what reason brought you to compose this piece (commission, personal interest...) and why did you choose this text.

–It was a commission of the "Schola Heidelberg", and the text is one of my favourites. It describes a dialectic situation and asks about truth and the possibilities to express it...

–Is there any influence in this piece? (some artist or artistic work, some sociocultural situation...)

–The influences are divers. On one side a classical structural thinking and one the other my admiration of the good German, French and Italian folk-music and songs.

–About the “instrumental” set. Why did you choose an ensemble of five female voices?

–This was the commission.

–Some questions are related to specific musical parameters which I’m curious about their origin: if it’s conceptual/symbolic/with relation to the text or if it’s only sonorous, or both:

What was your idea about the process of text alteration (break/cut/dissect)?

–The piece is a sort of "suite" (several dances) and the processing of the text follows the idea of achieving musical richness and variety (little, much, understandable, only sound.....)

–The meaning text is cut and superposed with non-meaning sounds. Do the phonetic sounds have relation with the meaning text?

–All you can hear is part of the text.

–Most of the sounds are whispered, is this because of the sense of the text about the “problematic of talk” in an authoritarian environment? Or is because for an aesthetic/sonorous reason?

–Whispered are only words and syllables and they are following the text from the beginning to his end (without any repetitions or omissions).

–There are four types of sounds beyond of the usual phonology in Europe that catch my attention. The glottic stops, the whistles, the voice creaking and the tongue click. Do they have connection with the text?

–Not directly but they have a close connection to my tonal and musical ideas.

–And, aesthetically, what were the timbre intention in the piece? Specially regarding to the use of phonetics.

–This is too complex to answer in some sentences. I've written some texts, articles and lectures about - you can find them on my homepage (sorry, they are in German). One is translated in English - I will send it separately (this is the answer to the last question too).

–Finally, this work has the narrowest relation between language and sound of the selected case studies in my research. So, I'm curious about your thoughts about the “word” and “sound” and the “meaning”. (Some words about it or an essay, or article or anything else it could be great!)

Transcription of the interview with Kåre Kolberg by Sverre Lind in the Norwegian Broadcasting Corporation Radio (NRK Radio). Translated by Lars Isdahl.

Date: 30th March 1967

–The composition we are about to hear first is Plym-Plym, by Kåre Kolberg. The name itself give certain associations, but to what, Kolberg?

–I have used a poem by Stein Mehren from the collection Gobelin Europa. It is about – as far as I can tell – people at a restaurant, people sitting and having, apparently, deep conversations. In reality they are quite shallow. And to create this superficial chatter I have taken another of Stein Mehren’s poems “Methodical progression” and infiltrating it into the first poem. But the first poem “One is present” is what gives the composition it’s shape.

–So, it is a serious composition. And could one say that it is radical?

–I know that it has been perceived as such by some. I did not. I started working on it a while back, it was in 1963. I started taking notes, and then I went looking for a text that would fit the ideas that I had been working on. The poems by Stein Mehren did not catch my attention the first time I read his collection, it was only when I started looking for texts that would fit that I started working on these.

–It is a choir composition. Is the choir being used in any particular way?

–No. The ensemble consists of three elements; there is a choir and a soloist quartet and a speaker who throughout the piece talks through a loudspeaker. The choir are supposed to make different sounds that we would associate with the situations described in the poem. Language sounds, spoken sounds and different kinds of noise. The quartet gives examples of music that we would associate with the same situations, and the speaker is supposed to give different examples of “loudspeaker voices”. He is supposed to be intimate, discrete, make an intimate, discrete reportage, he is testing a microphone and he is portraying a commercial advertisement voice. Basically, making typical loudspeaker voices.

–The sound (meaning timbre) is maybe very important in this composition, then?

–Yes, even if I work with timbre in this composition, it is not a regular timbre composition. The most important is the relationship between text and music and the fact that the poem has dictated which timbre I should use and the very shape of the composition.

–Yes, then let us listen to Plym-Plym by Kåre Kolberg, sung by Collegium Musicum Vocale conducted by Knut Nystedt.

APPENDIX B

Scores of the works composed as artistic section of the research.

*ea*ir (2019)

For mixed chamber choir and organ.

Duration: 12 minutes.

*Criticism on the banalization of language** (2019)

For voices and electronics.

Duration: 15 minutes.

*The score only includes the indications for the voices.

POL REQUESENS ROCA

edair

for mixed choir and organ

*ea*ir

for mixed choir and organ

Written for Neon - Koor voor nieuwste muziek in a mutual collaboration with the Conservatorium van Amsterdam.

About *ea*ir

This piece is part of the artistic section of my Master's Research Thesis "*Phonetics and voices timbre. The effect of the use of phonetics in compositions for vocal ensemble*" (Conservatorium van Amsterdam). As an investigation about the impact of phonetics upon vocal composition, I composed this work using phonetics, mainly vowels phonemes, in order to enhance the timbral palette of the choir sound and thinking how the interpretation (performer) and perception (audience) could be affected and influenced by the timbre of phonemes in singing voice. Even though *ea*ir is closely to the overtone singing technique, this piece doesn't focus exclusively on that; here, each phoneme has their own timbre, depending on the fundamental note and the formants of it and the piece explores the results of the use of this timbral resource. There is no language, neither words nor morphemes in *ea*ir, the *text* is a notation for a timbral purposes.

P.R.

Explanations

1. About the choir and arrangement on stage:

The choir is divided differently depending on the moment:

- Six-part choir: Soprano, Mezzosoprano, Alto, Tenor, Baritone and Bass
- Eight-part choir: Soprano 1-2, Alto 1-2, Tenor 1-2 and Bass 1-2

It is recommended to have a set of 24 to 32 singers divided in equal parts in each choir division. The arrangement is to stand in a single line, as spread out and surrounding as possible in relation to the audience with the voices in order from left to right (from conductor's view) of soprano, alto, tenor and bass.

2. About phonetics:

The text is entirely written with the International Phonetic Alphabet (IPA).

The text is designed following numerous phonetic sequences, basically phonemes of the IPA's vowel chart.

The pronunciation of this vowels should be the maximum neutral between the languages known by the singers and with the most possible similarity between them.

A dotted line between two phonemes indicates a progressive change from the first to the second.

Phonemes which appear in a square brackets between a tilde are to be pronounced one after the other as fast as possible: [y~u] or [b~u].

Phonemes which appear as a sum in square brackets are to be pronounced together: [B + r].

Two or more phonemes in square brackets are to be pronounced one after the other in a progressive and freeway, not excessively fast: [u-ə-i-ʉ-ʌ].

Free phoneme (chosen by the singers) is indicated with this symbol: #: ([#:~#:]).

3. About voice:

The choir's sound is continually transformed through the following parameters:

- Vibration

- As a rule, there will be no vibration unless it is noted on the score.
- *no vibr.*: absence of vibration.
- *slow and soft vibr.*: very slight and slow vibrato.
- *poco vibr.*: slight vibrato.
- *max. vibr.*: extreme vibration.
- *vibr. increasing*: vibrato crescendo in velocity and range.

- Timbre of the voice

- When indicated with a hexagon on the score, voice colour is to be changed.
- **N**: normal voice.
- **D**: dark voice, not nasal and covered.
- **B**: bright voice, more nasal and harmonically rich.

4. Miscellaneous notes:

Note heads with a descending or ascending triangular shape ($\triangle \nabla \blacktriangle \blacktriangledown$) are to be sung as low or high as possible.

Continuous lines between notes are glissandos, that should be performed in the most lineal and strict way possible.

The open hand symbol (✋) means tremolo by quickly changing hand distance on mouth. This effect lasts until the next rest.

As a rule, there aren't indications of breathings. Each singer will breath freely without synchronisation with the other singers.

The registration of the organ is a guide for the player who will be arrange it for the instrument.

Duration: approx. 12 minutes.

eaír

Fresh ♩ = 60

Soprano 1 *ppp* *poco cresc.*

Soprano 2 *ppp* *poco cresc.*

Alto 1 *ppp* *poco cresc.*

Alto 2 *ppp* *poco cresc.*

Tenor 1 *ppp poco cresc.*

Tenor 2 *ppp poco cresc.*

Bass 1

Bass 2

Organ *pp always as a support for the choir* OFF → ON
Gedackt 8'

Bourdon 16', Subbass 32'
motor OFF → ON → OFF

6 *p* *mp*

S1 [u-ш-u-о-э-о-г-о]

S2 u - - - - - г - - - - - u - - - - - э - - - - -

A1 u - - - - ш - - - - u - - - - о - - - - э - - - - о - - - - г - - - - о

A2 *p* *mp* [b~u] u - - - - u - - - - о - - - - э - - - - ш - - - - о

T1 *p* *ppp* [b~u]

T2 *p* *ppp* [b~u]

B1

B2

Org. 6

11 *ppp*

S1 *f* *dim.* **B** → **N**

S2 *p* *ppp* *f* *dim.* **B** → **N**

A1 *ppp* *ppp* *f* *dim.* **B** → **N**

A2 *ppp* *ppp* *f* *dim.* **B** → **N**

T1 *ppp* *f* *dim.* **B** → **N**

T2 *pp* *f* *dim.* **B** → **N**

B1 *pp* *f* *ppp* **B** → **N**

B2

Org. *mp*

Flute 8', 4', Nasard 2 2/3'

16

S 1 *p* **N** → **B** → **D**

S 2 *p* **N** → **B** → **D**

A 1 *ppp* *p* **N** → **D**

A 2 *ppp* *p* **N** → **D**

T 1 *ppp* Male voices: divisi a 3

T 2 *ppp* Male voices: divisi a 3

Br *p* **N** → **D**

B Male voices: divisi a 3

Org. 16

Gedackt 8'

+ Bourdon 16'

26

S1 *mf* *p* **B** **N**
 - ø - u y - - - - ø - - - - æ - - - - œ

S2 *mf* *p* **B** **N**
 - ø y - - - - ø - - - - æ - - - - œ

A1 *mf* *mf* **D** **B** **N**
 ø u ø u u - - - - y - - - - ø æ - - - - œ - - - - y - - - - œ - - - - y - - -

A2 *mf* *mf* **D** **B** **N**
 - ø - u - ø u - - - - y - - - - ø æ - - - - œ - - - - y - - - - œ - - - - y - - -

T *mf* *mf* *p* **B** **N**
 - u y - - - - ø ø - - - - œ - - - - œ - - - - œ - - - - œ

Br *mf* *mf* **N** **B**
 u - 3 ø - - - y - - u ø - - 3 - - y - - - u - - y - - ø [y~ø]

B *mf* *mf* **N** **B**
 u - - - ø - - - ø - - y - - u - - - y - - - ø [y~ø] [y~ø]

Org.

B

31

S1

S2

A1

A2

T1

T2

Br

B

Org.

Flute 2' *ppp*

Male voices: divisi a 4

p, *pp* *cresc.* *mf* *pp*

p, *pp* *cresc.* *mf* *pp*

pp *cresc.*

pp *cresc.*

p

p

[œ~œ]

[œ~œ]

œ y œ y œ œ æ ε e ø

œ y œ y œ œ æ ε e ø

e ø θ θ

e ø θ θ

36

S 1 *p cresc.* *f* *p*

S 2 *p cresc.* *f* *p*

A 1 *p cresc.*

A 2 *p cresc.*

T 1 *mf* *pp* *p cresc.* *f* *pp* *p cresc.*

T 2 *mf* *pp* *p cresc.* *f* *pp* *p cresc.*

B 1 *p cresc.* *f* *pp*

B 2 *p cresc.* *f* *pp*

Org.

36

53

S1

S2

A1

A2

T1

T2

B1

B2

Org.

53

- Octave 4'

[Two keyboards]

RH: Flute 4', Nasard 2 2/3', Tierce 1 1/3'

LF: Bourdon 8' and 16'

- Octave 8' and Posaune 16'

Detailed description of the musical score: The score is for page 11, starting at measure 53. It consists of ten vocal staves (S1, S2, A1, A2, T1, T2, B1, B2) and an Organ part. Each vocal staff begins with a treble clef and a key signature of one sharp (F#). The vocal parts are arranged in a choir setting. Above each vocal staff, there are dynamics markings: *p* (piano) and *f* (forte). The lyrics for all vocal parts are: "i i u i i i". The Organ part is located at the bottom of the page, starting at measure 53. It includes registration instructions: "RH: Flute 4', Nasard 2 2/3', Tierce 1 1/3'" and "LF: Bourdon 8' and 16'". There are also notes about keyboard settings: "- Octave 4'" and "- Octave 8' and Posaune 16'". The Organ part features a melodic line in the right hand and a bass line in the left hand, with a 7-measure rest in the right hand at the end of the first system.

59

S 1
S 2
A 1
A 2
T 1
T 2
B 1
B 2

Org.

p free glissando
p free glissando
p free glissando
p free glissando
p rubato inside the bar
(cluster)

Detailed description of the musical score: The score is for a vocal ensemble and organ. It begins at measure 59. The vocal parts (Soprano 1, Soprano 2, Alto 1, Alto 2, Tenor 1, Tenor 2, Bass 1, Bass 2) all have the syllable '--u' under the first note. From measure 59 onwards, each vocal part performs a glissando, indicated by a wavy line and the instruction '*p* free glissando'. The organ part (Org.) has a complex melodic line in the right hand, featuring a 7:4 chord in the first measure and 7:7 chords in subsequent measures. The left hand of the organ part features a cluster of notes, indicated by a wavy line and the instruction '(cluster)'. The organ part is marked '*p* rubato inside the bar'.

62

S1 *p free glissando*

S2 *p free glissando*

A1 *p free glissando*

A2 *p free glissando*

T1

T2

B1

B2

Org.

(cluster expansion)

LF: - 16'

65

S1 *pp* *f* *pp* [v~z~3]

S2 *pp* *f* *pp* [v~z~3]

A1 *pp* *f* *pp* [v~z~3] [v~z~3]

A2 *pp* *f* *pp* [v~z~3] [v~z~3]

T1 *pp* *f* *pp* [v~z~3] [v~z~3]

T2 *pp* *f* *pp* [v~z~3]

B1 *pp* *f* [v~z~3]

B2 *pp* *f* [v~z~3]

Org. 65

D

68

S1 *mp* *poco cresc.*
[v~z~3] 9-3 (3)-----6

S2 *mp* *poco cresc.*
[v~z~3] 9-3

A1 *mp* *poco cresc.*
[v~z~3] ə (ə)-ə 3

A2 *mp* *poco cresc.*
[v~z~3] ə 9

T1

T2 [v~z~3]

B1 *pp*
[v~z~3]

B2 [v~z~3]

Org. 68
7 Gedackt 8' *pp*
3 3 3

Detailed description: This page of a musical score, labeled 'D', contains measures 68 through 71. It features eight staves: Soprano 1 (S1), Soprano 2 (S2), Alto 1 (A1), Alto 2 (A2), Tenor 1 (T1), Tenor 2 (T2), Bass 1 (B1), and Bass 2 (B2), followed by an Organ (Org.) section with three staves. The vocal parts (S1, S2, A1, A2, T2, B1, B2) all begin with a vocalization marked [v~z~3]. The organ part starts with a 7th chord and a melodic line, then moves to a 'Gedackt 8'' register with a *pp* dynamic and triplet patterns. Dynamics include *mp* and *poco cresc.* for the vocalists, and *pp* for the organ. The organ part includes triplet markings (3) and a fermata over the first measure.

72

S1

S2

A1

A2

T1

T2

B1

B2

Org.

theta

3

theta

theta

3

theta

theta

3

3

3

5

78 *f* *mf* → **D**

S1

(e)-----ə

f *mf* → **D**

S2

(e)-----ə

f *mf* → **D**

A1

(e)-----ə

f *mf* → **D**

A2

(e)-----ə

f *mf* → **D**

T1

(e)-----ə

f *mf* →

T2

(e)-----

f *mf* →

B1

(e)-----

B *f* *mf*

B2

Org.

Gedackt 8' (join to keyboard)

80 *poco vibr.* -----

S 1 *pp poco cresc.* *p* ----- *ppp*

S 2 *pp* *poco vibr. - poco cresc.* *p* ----- *ppp*

A 1 *pp* *poco vibr. - poco cresc.* *p* ----- *ppp*

A 2 *pp* *poco vibr. - poco cresc.* *p* ----- *ppp*

T 1 *pp* *poco cresc.* *poco vibr. -* *p* ----- *ppp*

T 2 *pp* *poco cresc.* *p* ----- *ppp* *poco vibr. -*

B 1 *pp* *poco cresc.* *p* ----- *ppp*

B 2 *pp* *poco cresc.* *p* ----- *ppp*

(e)-----ə

80

Org.

99

S 1 Female voices: divisi a 4 *mf*

S 2 Female voices: divisi a 4 *mf*

MS Female voices: divisi a 4 *f*

A Female voices: divisi a 4 *f*

T 1 Male voices: divisi a 4 *p sub.* *f* *mp sub.* *ff* *u* *a*

T 2 Male voices: divisi a 4 *p sub.* *f* *mp sub.* *ff* *u* *a*

B 1 Male voices: divisi a 4 *p sub.* *f* *mp sub.* *ff* *u* *a*

B 2 Male voices: divisi a 4 *p sub.* *f* *mp sub.* *ff* *u* *a*

Org. 99

[Two keyboards] RH: Flute 2', Nasard 2 2/3', Flute 1' LH: Principal 8', Octave 4'

f *pp* LF: Octave 4, Flute 2'

Bourdon 16', Principal 16', Octave 8'

F

♩ = 80

104

S1

S2

A1

A2

T1

T2

B1

B2

Org.

[One keyboard] Principal 8'

110 *f* *ppp*

S1 *f* *ppp*

S2 *f* *ppp*

A1 *f* *ppp*

A2 *f* *ppp*

T1 *f* *pp*

T2 *f* *pp*

B1 *f* *pp*

B2 *f* *pp*

Org. *f* *pp*

+ Octave 4' and Flute 2'

Bourdon 8'

110

116 *mp* *slow and soft vibr.* ----- *dim.* *ppp* Female voices: divisi a 3

S 1 [D-Æ]

S 2 *mp* *slow and soft vibr.* ----- *dim.* *ppp* Female voices: divisi a 3

MS Female voices: divisi a 3 *p* æ-----

A 1 *mp* *slow and soft vibr.* ----- *dim.* *ppp* Female voices: divisi a 3

A 2 *mp* *slow and soft vibr.* ----- *dim.* *ppp* Female voices: divisi a 3

T Male voices: divisi a 3 *p* ----- *mf* molto dim. ε-----æ-----

Br Male voices: divisi a 3

B Male voices: divisi a 3 *p* ----- *mf* molto dim. æ-----æ-----ε-----æ-----

116 Org. Tremulant *p* Bourdon 16', Gedackt 8', Nasard 2 2/3', Septima 1 1/7' (or Tierce 1 3/5')

121

p ————— *mf* *molto dim.* *slow and soft vibr.* ————— *ppp* *p cresc.* → **B**

S
 e-----œ-----œ--a--æ--ε--3 a--œ--a-----

mf *molto dim.* *slow and soft vibr.* ————— *ppp* *p cresc.* → **B**

MS
 -a--3-----e-----œ-----œ--a ε--3--a--œ--a-----

p ————— *mf* *molto dim.* *slow and soft vibr.* ————— *ppp* *mf* → **B**

A
 #e-----œ-----œ--a--æ--ε--3--a a a -

slow and soft vibr. ————— *ppp* *p* ————— *mf* ————— *p cresc.* → **B**

T
 -a--3-----e-----œ-----œ æ--ε--3--a--œ--a-----

p ————— *mf* *molto dim.* *slow and soft vibr.* ————— *ppp* *p cresc.* → **B**

Br
 3-----e-----œ-----œ--a--æ--ε a--œ--a-----

slow and soft vibr. ————— *ppp* *p* ————— *mf* ————— *p cresc.* → **B**

B
 -a--3-----e a-----æ--ε--3--a--œ--a-----

121

Org.
 - Bourdon 16', and Septima 1 1/7' (or Tierce 1 3/5')

G

127 *f* *fp* *f* *ff* *ppp*

S
--o-----u [u~Λ] u- u- γ-----Λ--o

MS
--o-----u [u~Λ] u- u- γ-----Λ--o

A
--o-----u [u~Λ] u- u- γ-----Λ--o

T
--o-----u [u~Λ] u- u- γ-----Λ--o

Br
--o-----u [u~Λ] u- u- γ-----Λ--o

B
--o-----u [u~Λ] u- u- γ-----Λ--o

127

Org.

Principal 8', Gamba 8',
Cromorn 8', Octave 4', Fifteen 2',
Quint 1 1/2', Mixture IV, Trumpet 8'

ff

Octave 8', Trumpet 8', Principal 16',
Posaune 16', Subbass 32'

132

Female voices: divisi a 4

S 1

S 2

A 1

A 2

T 1

Male voices: divisi a 4

p \leftarrow *f*

T 2

Male voices: divisi a 4

p \leftarrow *f*

B 1

Male voices: divisi a 4

p \leftarrow *f*

B 2

Male voices: divisi a 4

p \leftarrow *f*

Org.

136

p < *f*

S 1

[B+R]

S 2

[B+R]

A 1

p < *f*

[B+R]

A 2

p < *f*

[B+R]

T 1

T 2

B 1

B 2

136

Org.

140

S1 *ff* *p sub.*
u---u---y u (u)--

S2 *ff* *p sub.*
u---u---y u (u)--

A1 *ff* *p sub.*
u---u---y u (u)--

A2 *ff* *p sub.*
u---u---y u (u)--

T1 *ff* *p sub.*
u---u---y u (u)--

T2 *ff* *p sub.*
u---u---y u (u)--

B1 *ff* *p sub.*
u---u---y u (u)

B2 *ff* *p sub.*
u---u---y u (u)

140

Org.

145 *molto cresc.* **B** **N**

S1
 -- u --- y u --- y --- u --- y --- u --- y --- u --- y --- u --- y [u~y] y - u ---

S2
 -- u --- y u --- y --- u --- y --- u --- y --- u --- y --- u --- y [u~y] y - u ---

A1
 -- u --- y u --- y --- u --- y --- u --- y --- u y u y [u~y] y - u ---

A2
 -- u --- y y --- u --- y --- u --- y --- u --- y u y u [u~y] y - u ---

T1
 -- u --- y u - y - u - y - u - y - u - y u y u [u~y] y - u ---

T2
 -- u --- y y - u - y - u - y - u - y - u y u y [u~y] y - u ---

B1
 -- u --- y u y u y u y u y u y [u~y] y - u ---

B2
 -- u --- y u --- y --- [u~y] y - u ---

145

Org.

H

150 *ff* *mf* *fff*

S1
-- a u-----a a a

S2
-- a u-----a a a

A1
-- a u-----a a a

A2
-- a u-----a a a

T1
-- a u-----a a a

T2
-- a u-----a a a

B1
-- a u-----a a a

B2
-- a u-----a a a

150 *mf* *ff* *Previous registration*

Org.
Octave 4', Flute 2', Cymbal III

161 *f* *fff*

S1 *f* *fff* [D] → [B] FREE PITCH [::→::]

S2 *f* *fff* [D] → [B] FREE PITCH [::→::]

A1 *fff* *f* *fff* [D] → [B] FREE PITCH [::→::]

A2 *fff* *f* *fff* [D] → [B] FREE PITCH [::→::]

T1 *f* *fff* [D] → [B] FREE PITCH [::→::]

T2 *f* *fff* [D] → [B] FREE PITCH [::~::]

B1 *f* *fff* [D] → [B] FREE PITCH [::→::]

B2 *f* *fff* [D] → [B] FREE PITCH [::→::]

161 *tr* Double trill

Org. + Flute 2' + Mixture V'

The organ part features a double trill starting at measure 161. The registration changes to '+ Flute 2'' and '+ Mixture V'' are indicated in boxes. The bottom staff shows a complex chromatic and diatonic line.

171

B (always)
mp

S1
e ø y i e ø y i e ø y i e ø y i y i e ø y i

B (always)
mp

S2
e ø y i e ø y i e ø y i e ø y i y i e ø y i

B (always)
mp

A1
e ø e ø e ø e ø e ø y i e ø y i e ø y i e ø y i e ø y i e ø y i

B (always)
mp

A2
e ø e ø e ø e ø e ø y i e ø y i e ø y i e ø y i e ø y i e ø y i

→ **B** (always)
mp *mp*

T1
ø e ø e ø e ø e ø e ø y i e ø y i e ø y i e ø y i e ø y i e ø y i

→ **B** (always)
mp *mp*

T2
ø e ø e ø e ø e ø e ø y i e ø y i e ø y i e ø y i e ø y i e ø y i

mp

B1
e ----- ø e ø e ø e ø e ø e ø y i e ø y i e ø y i e ø y i e ø y i e ø y i

mp

B2
e ----- ø e ø e ø e ø e ø e ø y i e ø y i e ø y i e ø y i e ø y i e ø y i

171

Org.
Gedackt 8'

J

180

S1 *mf* u [i-y-e-ø-i-u] *ff* **N**

S2 *mf* u [i-y-e-ø-i-u] *ff* **N** D5: whistler solo

A1 *p* *molto cresc.* u [i-y-e-ø-i-u] *ff* **N**

A2 *p* *molto cresc.* u [i-y-e-ø-i-u] *ff* **N**

T1 *p* *molto cresc.* u [i-y-e-ø-i-u] *ff*

T2 *p* *molto cresc.* u [i-y-e-ø-i-u] *ff*

B1 *molto cresc.* u [i-y-e-ø-i-u] *ff*

B2 *molto cresc.* u [i-y-e-ø-i-u] *ff*

Org.

180

accel. -----

185 *ff sempre*

S1
-- a ε----- a ε----- a ε----- a ε----- a ε----- a

S2
-- a ε----- a ε----- a ε----- a ε----- a ε----- a

A1
-- a e----- a e----- a ε----- a ε----- a ε----- a ε----- a

A2
- a e----- a e----- a ε----- a ε----- a ε----- a ε----- a

T1
ff sempre
i----- a i----- a e----- a ε----- a ε----- a ε----- a ε----- a

T2
ff sempre
i----- a i----- a e----- a ε----- a ε----- a ε----- a ε----- a

B1
ff sempre
i----- a i----- a e----- a e----- a e----- a ε----- a ε----- a

B2
ff sempre
i----- a i----- a e----- a e----- a e----- a ε----- a ε----- a

185

Org.
ff
Heavy registration with reed stops dominance

K

♩ = 80

190 *ff* *poco dim.*

S1 *ff* *poco dim.*

S2 *ff* *poco dim.*

A1 *ff* *poco dim.*

A2 *ff* *poco dim.*

T *Male voices: divisi a 3* *ff* *poco dim.*

Br *Male voices: divisi a 3* *ff* *poco dim.*

B *Male voices: divisi a 3* *ff* *poco dim.*

190

Org.

195 *f*

S1 *f* *fff*
a---*a*---*a* *a*---*a*---*a* *a*---*a*---*a* *a*

S2 *f* *fff*
a---*a*---*a* *a*---*a*---*a* *a*---*a*---*a* *a*

A1 *f* *fff*
 [B] [Z] *a*

A2 *f* *fff*
 [B] [Z] *a*

T *f* *fff*
 [B] [Z] *a*

Br *f* *fff*
 [B] [Z] *a*

B *f* *fff*
 [B] [Z] *a*

Org. *f* 8' combination *fff*
 Previous registration

Pol Requesens Roca

CRITICISM ON THE BANALIZATION OF LANGUAGE

for voices and electronics

Criticism on the banalization of language

for voices and electronics

Duration: 15 minutes.

Commentary

This piece highlights and criticise a common practice in the populist, fascists, racists or *machists* politics in a moment when these ideologies are booming almost everywhere in the world. From an artistic perspective, specifically a sonic perspective, an abstract analogy of the process of banalization of political language is made.

It is obvious that the impact of the political oratory or discourse can be enormous and very powerful, so consciousness of the used language is essential for any politician. Usually the language practiced by populist leaders or ideological influencers has a destructive, deceptive and manipulative purpose. This language is frequently made up of basic vocabulary as well as for several words with a deep political and social meaning, which, originally, are used to refer the main issues and realities of the society.

The text of the piece is constituted by words chosen by their meaning and for its deliberately bad use for some politicians. This bad use transgresses, detracts and cancels the original sense of the word. Besides, it mixes and confuses words with a righteous and constructive meaning and launder those words which have a relation with the wickedness or facts from that come from it.

These words are recited or sung in the mother language of each performer. Yet, progressively the words melt away, transform and finally disappear: the word changes to the naked sound, without meaning. Consequently, wanting to create a simile with the process of the banalization of language a paradox is established. That which in political discourse is an aberration, disgrace and a shame for the humanity, in the piece (or in the sound) it becomes a source of musical resources that evolve and enrich.

About the performers

This piece is written for voices, between 2 and 20 performers, or more if the space allows it. It is not necessary to be a professional singer, some basic notions about the control of the voice and an educated ear it is enough.

The voices are divided in female and male and in odd voices and even voices.

Each performer must have his own microphone.

About the performance

There must be no conductor. In order to keep a unity in time in the performance there is a screen with a timer and section information. It is not necessary an exact synchronization between the performance less it is expressly required. However, the interaction between the performer must be absolutely in order to unify dynamics, speeds and the general mood. The piece must be rehearsed enough to know the performers and their interpretation as well as to connect between them and to reach an agreement of any doubt or unexpected situation.

In the last sections, those with phonetic notation, a union of utterance is required, until then, each one shall use his own diction according his mother language.

About the score and notation

The score is made up by a set of instructions with some musical notation added. It is divided in sections (numbers) and bars (number with its corresponding letter), which are showed in a square box. Above this box a time indication is written and, on the right, between parenthesis, the duration of the bar is indicated.

The phonetic notation follows the standard of the International Phonetic Alphabet (IPA) and it is showed between brackets.

The voice tone or pitch is showed in a slight grey box.

The dynamic notation is the usual on musical scores.

Speech voice: natural speech voice without any kind of voice manipulation unless is required.

Sprechstimme: Speech-sung voice with slightly tone control.

Sung voice: natural singing voice.

Nv: means a normal general voice timbre.

Dv: means a dark general voice timbre, very covered voice.

Bv: means a bright general voice timbre, more nasal and harmonically rich.

Soft voice: normal voice.

Cracked voice: speak or sing with the tensed neck muscles in order to achieve a break sound of the voice.

A triangle line indicates a progressive change of the general voice timbre. Both for general voice timbre and changes between soft and cracked voice.

Finger/mouth tremolo: finger tremolo between the lips.

Hand/mouth tremolo: hand tremolo on the mouth.

Two hands/mouth tremolo: put the hands on the mouth in a cupped position and with one hand make a tremolo.

Breath obstruction: speak or sing until the air of lungs is over, as literally as possible.

H Very high tone (according to the register of each voice).

MH Moderately high tone (according to the register of each voice).

M Middle tone (according to the register of each voice).

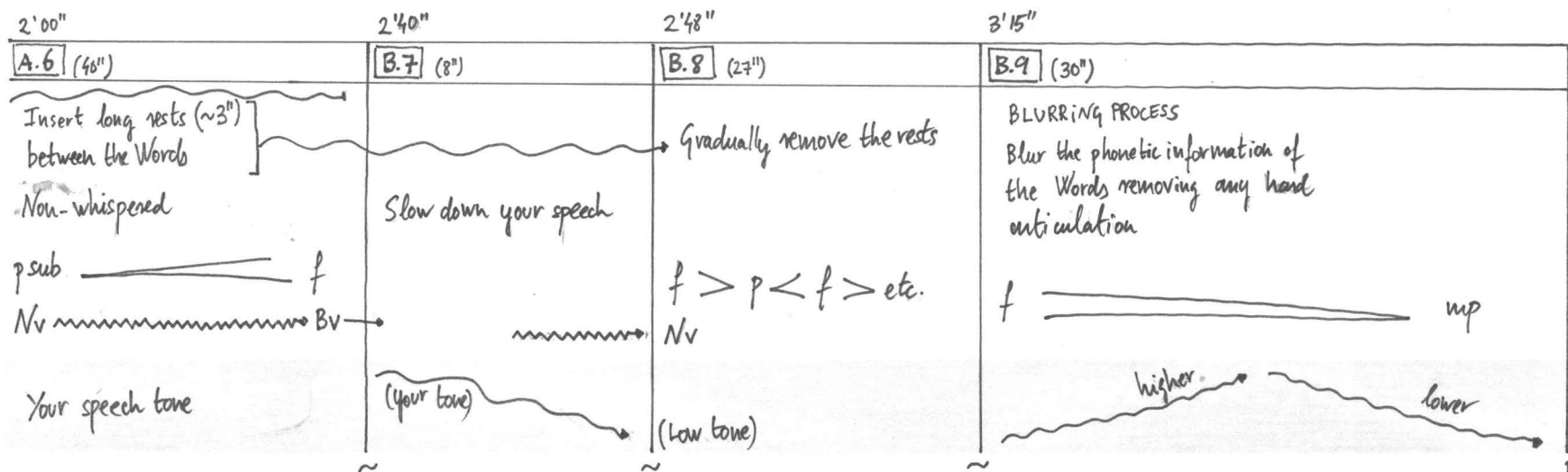
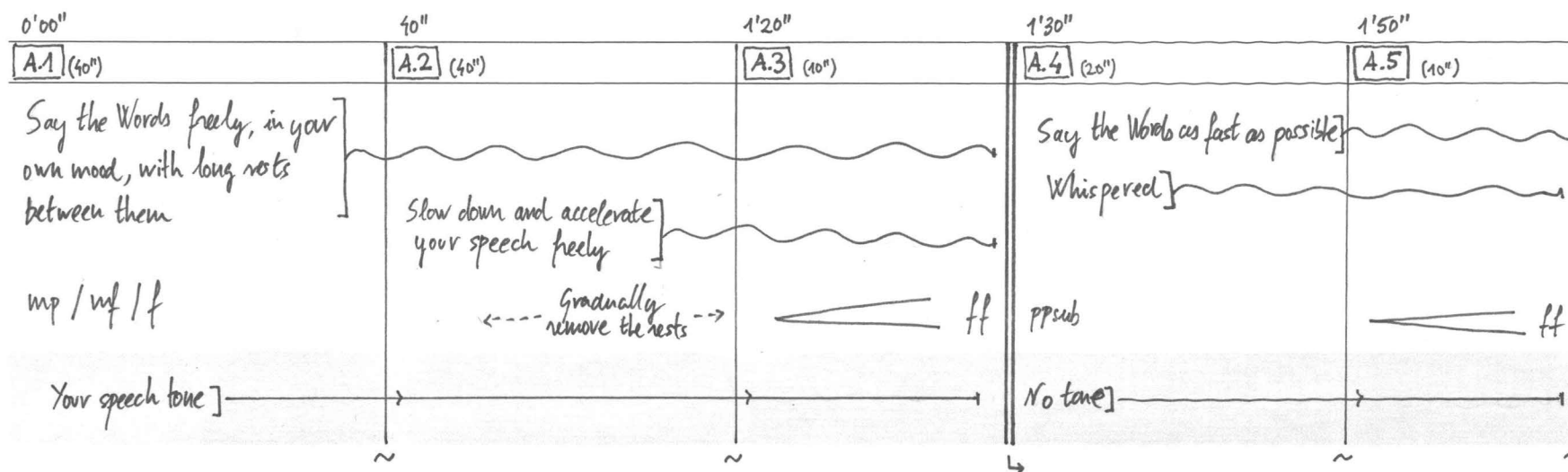
ML Moderately low tone (according to the register of each voice).

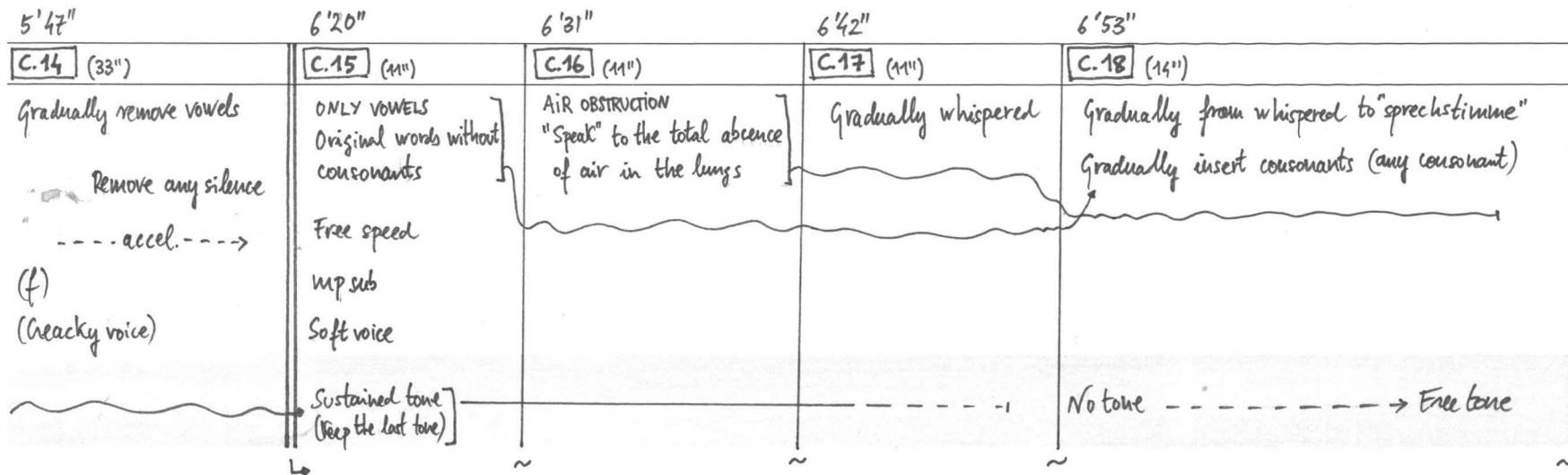
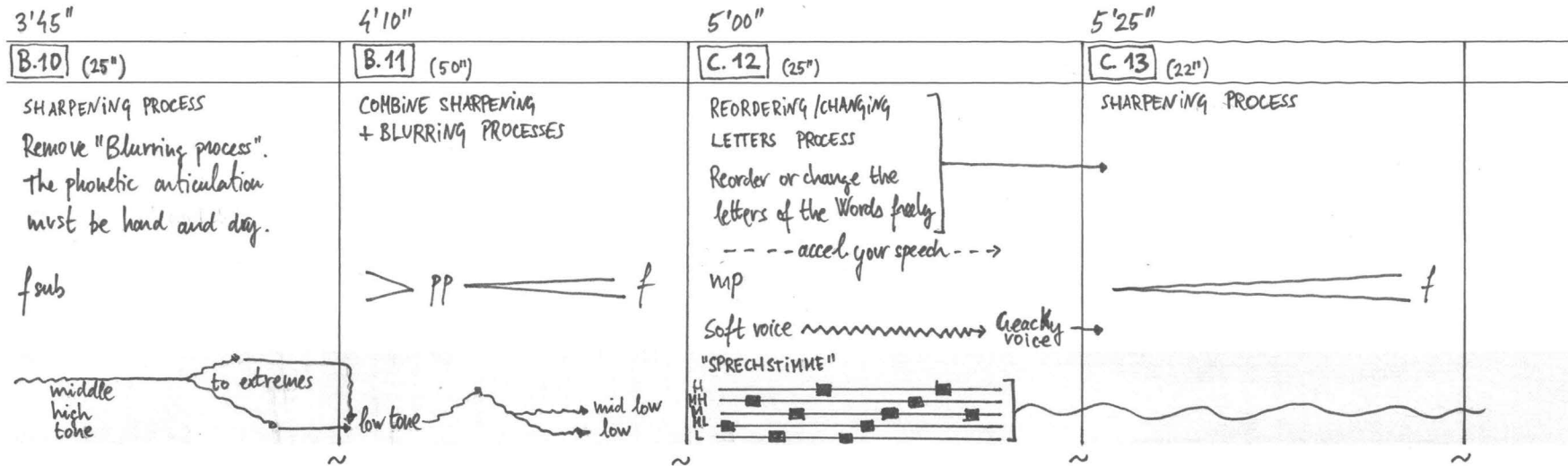
L Very low tone (according to the register of each voice).


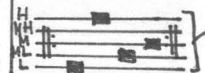
~ Vague bar change, with a transition between the previous bar and the new (always when the bar line is thin).

↳ Exact and synchronized change of bar (always together with a double hard-line bar).

CRITICISM ON THE BANALIZATION OF LANGUAGE





7'07"	7'20"	7'36"	7'45"	8'15"
C.19 (13")	C.20 (16")	C.21 (9")	C.22 (30")	D.23 (25")
Remove air obstruction Enlarge all the phonemes (around 1" for each one)	Remove vowels Gradually contract the phonemes (accd)	Say the phonemes as fast as possible	I include vowels. The order of the letters of the Words is changed.	Enlarge the manipulated Words as much as possible Now the Words must be absolutely incomprehensible
		$\leftarrow ft \rightarrow$	(H) ~~~~~> Bv [TONE SEQUENCE]: 	FEMALE VOICES: Keep with the previous MALE VOICES: say/sing slowly each phoneme must last equal
(Free tone)				ppsubs (Bv) SUNG! Pitch: as low as possible

8'40"	9'00"	9'14"	9'33"	9'54"	10'01"
D.24 (26")	D.25 (14")	D.26 (19")	D.27 (21")	D.28 (7")	D.29 (13")
Gradually remove vowels Gradually convert any type of consonant in voiced consonant (pp) (Bv) ~~~~~> Bv	Make each phoneme last about 3". (only voiced consonants)		Change very slowly from consonants to vowels (still from the Words)	(Only vowels)	Keep the last vowel of D.28 Take it to the closest position (the phoneme will be changed) ↳ ([a] → [i]/[i:] or [a:] → [u:])
poco gliss. (almost imperceptible)	poco cresc. ~~~~~>	Add a little and fast vibrato ~~~~~>	Keep your tone. Stop vibrato and gliss.	(Nv) ~~~~~> Bv Even numb. FEMALEV. → Keep the tone Odd numb. FEMALEV. → up gliss Even numb. MALEV. → up gliss Odd numb. MALEV. → down gliss	f Keep your tone

10'14"	10'23"	10'30"	10'36"	10'45"
D.30 (9")	D.31 (7")	D.32 (6")	D.33 (9")	D.34 (7")
Low-tone voices disappear in ascending order. The three highest remain. poco dim. Bv ~~~~~> Nv	Odd number voices sing taking the vowel and the tone of the highest voice (Even numb. TACET) The highest voice goes to the winte > mp	Even numb. male voices (EMV) sing alternating [y] and [ø] with a gradual change between them and without stable pulse. poco cresc. (Nv) ~~~~~> Bv	EFV sing a neutral vowel [ə] with the mouth almost closed. (closed teeth and slightly open lips) OFV, OMV, EMV continue with the previous mf cresc.	EFV Keep D.33 EMV add a hand/mouth tremolo OFV and OMV go to the phoneme [e].

10'52"	10'57"	11'04"	11'15"	11'19"	11'23"	11'27"
D.35 (5")	D.36 (7")	E.37 (11")	E.38 (4")	E.39 (4")	E.40 (4")	E.41 (13")
EFV and EMV: stop tremolos EFV and EMV: gradually change from your phoneme to [e] OFV and OMV keep D.34		Articulate the phonetic sequence : [e - ø - ə - u - ɔ] :	OFV: : ə - u - ɔ : OMV: : ə - u - ɔ : EMV: : ə - u - ɔ :	OFV: ~~~~~> soft voice OMV: ~~~~~> soft voice EMV: ~~~~~> soft voice	OFV: ~~~~~> soft voice OMV: ~~~~~> soft voice EMV: ~~~~~> soft voice	EFV: ~~~~~> soft voice

11'40"	11'51"	12'03"	12'11"	12'14"
E.42 (4")	E.43 (12")	E.44 (8")	E.45 (3")	E.46 (4")
All voices: [D]	HFV, LFV and HMV: [D] ----> [O] ----> [U]	All voices: [y] + [u~a]		HFV: > pp ([: breath deeply → [r] < f > :])
pp (sub) Dv (sub) FV (F4) MV (F3)	LMV: [y]	mouth movement	LMV: > pp ([: breath deeply → [r] < f > :])	breath time
	LMV Bb2	HFV: Bb4 LFV: F4 HMV: Bb3 (LMV: Bb)		ps

12'18"	12'21"	12'40"	12'47"
E.47 (3")	E.48 (14")	E.49 (7")	E.50 (10")
LFV: > pp ([: breath deeply → [r] < f > :])	HMV: > pp ([: breath deeply → [r] < f > :])	ODD VOICES: [m] mp sub Dv	PP voiceless (whispered)
		EVEN VOICES: [r] with two hands / mouth tremolo f	really slow slices. to D (10") (adv.)
LMV c3	LMV 94	HO FV: G LO FV: E HO MV: A LO MV: D	EFV: D EMV: D and D
			(no tone)

	12'57"	13'03"	13'06"	13'09"	13'12"	13'15"
	E.51 (6")	E.52 (3")	E.53 (3")	E.54 (3")	E.55 (3")	E.56 (3")
(ODD VOICES) [m] (mp) Nv		! = 100 [mi-a]	cres.	mp #0 D#3	cres.	mf cresc. #0 D#3
(EVEN VOICES) [m] mp Nv		[m]	! = 100 [m-y-xx]	mp	cres. #0 D#3	mf cresc.
				! = 100 [mib-o-a]	cres. #0 D#3 4	mf cresc.
					! = 100 [m-i-e-ø]	mf cresc. #0 D#3
						! = 100 [mø-ø]

	13'18"	13'21"	13'24"	13'31"	13'35"	13'40"
	E.57 (3")	E.58 (3")	E.59 (7")	E.60 (4")	F.61 (5")	F.62 (11")
	rit f cresc.	ff slow acc. pliss.	ff	All voices: [f]-[r]		
	f cresc. slow acc. pliss	ff	pliss	Voiceless (ff)		
	f cresc. #0 D#3 4	ff	pliss rit	Voiceless (No tone)	pp	ppp
	! = 100 f cresc. [mi-e-ø-o-u]	ff slow acc. pliss	pliss ! = 100 [my-ø-u]			
	rit f cresc.	ff	pliss rit			
	f cresc. slow acc. pliss	ff	pliss ! = 100 [mu-o-ø]			
	f cresc.	ff slow acc. pliss	rit			
	f cresc. #0 D#3	ff ! = 100 [mu-o-ø]	pliss			

All voices:
D3/D4

FEMALE VOICES

MALE VOICES

Lowest tone possible

acc. pliss.

	13'51"	13'57"	14'00"	14'03"	14'06"	14'09"
	F.63 (6")	F.64 (3")	F.65 (3")	F.66 (3")	F.67 (3")	F.68 (3")
HFV	[r] [i:p < f > p:]	[i:mf < ## > mf:]				[i:i-ae:] (as fast as possible) Bv <i>fff</i> D#5
LFV	(PPP)	<i>p</i>	<i>fff</i>		<i>Bv</i> B#	
HMV	[v] <i>mf</i>	[v+r] <i>f</i>	<i>fff</i>			
LMV	[v] <i>mf</i>	[v+r] <i>f</i>	<i>fff</i> A2	[i:[u->#->y->i->y->#-]] <i>Bv</i> #0 #2		

	14'12"	14'16"	14'21"	14'25"	14'29"	14'34"	14'41"
	F.69 (4")	F.70 (5")	F.71 (4")	F.72 (4")	F.73 (5")	F.74 (3")	F.75 (4")
		All voices	Add a hand/mouth tremolo			Stop tremolo	
		[?] → [u]	[u] → [o] → [a]			[a]	[a] → [ə]
	[i:[i-o:] (as fast as possible)] <i>Bv</i>	<i>mp</i> <i>Dv</i>	<i>mf</i> 	<i>f</i> <i>Nv</i>		<i>HFV:</i> <i>other:</i> <i>p</i>	(HFV: tacet)

14'45"

F.76 (8")

[ə]
(p)
♩ = 60

Musical notation for F.76, showing a treble clef with notes on G4, A4, B4, and C5, and a bass clef with notes on G3, A3, B3, and C4. There are sharps on F4 and C4 in both staves.

([ə])

14'53"

F.77 (3")

[u]
(p)

HFV: soft whistle
pp

Musical notation for F.77, showing a treble clef with notes on G4, A4, B4, and C5, and a bass clef with notes on G3, A3, B3, and C4. There are sharps on F4 and C4 in both staves.

14'56"

F.78 (9")

Change vowels slowly and freely
[?] → [?] etc.

HFV: (whistle)

15'04"

F.79 (11")

----- to almost speech voice

(HFV: tacet)
your tone ————— slow diss to limit

15'15"

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