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The *Isorhythm*ic technique and the cycling principles in composition

Their use and application to contemporary and jazz composing in order to create a "disruption of regularity"

(Artistic Research Report 2013)

CODARTS

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Main Subject Teacher: Paul M. van Brugge

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1. INTRODUCTION (Motor and Motivation)

1.1 Interests

During my whole musical life and since its very beginning my taste and preferences has been oriented to some periods and styles in the History of music and to some characteristics of perception of musical phenomena.

1.2 Historical aspects

As most of the musicians, but also as most of the listeners or music lovers, I have obviously loved (and I still love) the music of the period that I would call "broadened classicism" and that corresponds to the birth and development of the tonal system, from the early XVII until the late XIX century. But, during my musical education and the widening of my historical knowledge, I begun to have a particular preference for what was before and after that period, that is the early music with all the development of polyphonic styles, from Gregorian chant to Palestrina, and the XX century music.

At that moment, I could not understand the deep reason of this preference but now I know that it was not only because of the different sonorities that you can experiment outside of the strict tonal system, but also because of the different possibilities that a composer has to organize pieces avoiding its rules.

Let me do an example. African and Indian music do not use the tonal system even if they use systems of scales that are similar or comparable to our scales. But those scales are conceived more as modes, like in our early music indeed, and do not serve for a construction comparable to our tonal system. With these premises, both musical traditions have developed a very complex rhythmic system (in case of Indian music also a very complex modal/melodic system) and musical structures very often based on what I would call "multi-layer" technique. In these styles indeed you can often listen different layers usually contrasting in some way to each other. In the case of African music this contrast is mostly based on rhythmic displacements between the different layers. Thus, what you perceive is an irregular occurring in time of events belonging to different layers.

1.3 Perceptual aspects

This leads us to the second field of my interest, the one of perception. In fact, I have always been fascinated by the perception of different layers in music. Of course we can say that all kind of music is a matter of perceiving more than one layer at the same time, but what really interests me is whenever those layers are not perfectly or strictly coincident. Whenever it happens we can perceive:

1. A clear separation among the layers

2. Something that can be also regular in one single layer but gives a feeling of irregularity if we combine the displaced layers. This irregularity can be also cyclic.
3. An acoustic illusion, the perception of a "meta-layer" that does not exist at all in itself but is the result of the combination of the actual layers.

Therefore I decided to orient my research in the specific field of rhythm, because is the field that, obviously, controls the different possibilities of displacement and shifting in time. This decision has also something to do with my experiences, practice and studies as a professional jazz musician. Jazz is a rhythm-based music and part of its roots is in African music, already mentioned.

1.4 Choice

So my first idea was to check along the history of music periods, styles, composers, and compositional techniques that had dealt with the principles of multi-layer, overlapping, superposing, displacement, shifting, and using the rhythm as basic layer of reference.
After a short reflection I began realizing that, by this point of view, the topic risked to be too wide. It was necessary to do some choices and decide who or which style or technique include or exclude. In this sense what is in this research is a direct consequence of that choice. The reasons of the choice are different and not always rational. Sometime it has been a matter of taste, sometime of curiosity, other time a personal feeling of proximity with the compositional thought of a certain composer. But, anyway, the common thread is there and is what I tried to clarify above.
Thus, I concluded to direct my research toward four main styles:

1. *Isorhythm*ic technique used by the composers of *Ars Nova*, Philippe de Vitry, Guillame de Machaut, Guillame Dufay
2. Oliver Messiaen
3. Gyorgy Ligeti
4. Techniques of displacement of different layers used in jazz, mostly focusing on George Russell, Steve Coleman, Vijay Iyer, Steve Lehman

Before going further, just a few words about the first studied style. This represents for me an important starting point. Indeed there are in it a certain number of my interests mixed together as the passion for early music, the interest for multiple layers, and a technique of shifting, so to say, systematically used as basis for an entire composition. Furthermore, this technique of shifting (*isorhythm*ic) involves both rhythm and melody (pitch collection), and we have to wait for Berg or Webern and, above all, Messiaen, for having the use of a very similar technique in composition.

Of course, this has to be also a practice-based research and, therefore, my final goal is neither musicological, nor only analytical or theoretical. Indeed I have focused and studied the aspects of each technique or style that I considered interesting for helping me in developing my personal style of composition and therefore, this research does not want to be an exhaustive research also on regard to the analysis of different styles and composers.

2. THEORETICAL BASIS OF MY RESEARCH

2.1 Introduction

As soon as I started to reflect on the principles of shifting, layers, displacement, Rhythm, Meter, and so forth, I felt the necessity of making clear, firstly for myself, the theoretical basis of such a research. It was important to have a clear definition of the meaning of Rhythm, Meter, Polyrhythm, Polymeter etc. since also in official theory there can be some confusing concepts or definitions about this topics.

I have to say that, in the very beginning, I did not have these concepts completely clear. Step by step, proceeding in the analysis, I have defined them better. So, this is a chapter that precede the others but that has actually been written in the final step of the research.

As I have already mentioned in my introduction (motor and motivation), my interest has always been in the direction of overlapping (or simultaneous use) of musical parameters shifted or displaced to each other.

I found out that we can consider the occurring of these overlapping on three different layers:

1. Meter
2. Rhythm
3. Melody/Harmony (in combination with Rhythm)

It is important to point out that, of all these 3 layers, rhythm plays an essential role in shifting or displacement.

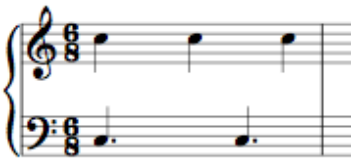
One other important thing to notice is that if we superpose different values, in order to have a shifting they must have *different length* or a *different number of elements*. The examples that I will show in the next paragraph will better clarify this point.

2.2 The Hemiola, a rhythmic and metric principle.

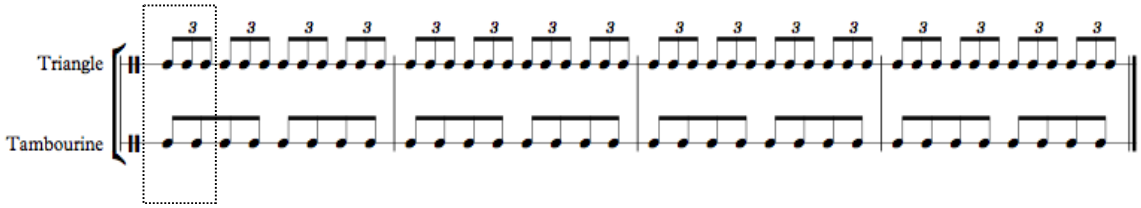
So, starting with the layers of meter and rhythm, one of the clearest example of what I am talking about is the so called **Hemiola**, a Greek word that also has a Latin synonymous: "Sesquialtera".

Referring to the various and not perfectly coincident definitions of these words in the Dictionaries of Music (Oxford, Harvard, Grove's), we can say that a **Hemiola** is the simultaneous (or successive) use of a 3:2 ratio.

Here follows some examples in which we can clearly find the principle of **Hemiola**:



Ex 2.1 **Hemiola** on 6/8, original Vertical **Hemiola**



Ex 2.2 **Hemiola** on 4/4 with triplets

For better analyzing these examples we have to consider 4 different layers:

1- **The pulse** (in written notation is determined by the denominator of the fraction that indicates the meter and that implies also the units of measurement for the speed). This means that the pulse has value of 1/4 in 4/4, 3/8 in 6/8 and so forth.

2- **The meter** (the organization of the pulse in groups that corresponds to a measure and their accents). This is what we commonly call a meter that is 4/4, 6/8, 5/4, etc. In this case the important number is the numerator of the fraction.

3- **The different subdivisions of the value of pulse** implied by the meter itself (e.g. in 4/4 it is every value that is shorter than the value of the pulse like, eights, triplets, sixteenth notes etc.)

4- **The multiples of the value of pulse** that is every value longer than the value of pulse. In 4/4 they are dotted quarter notes, half notes, dotted half, whole, etc.

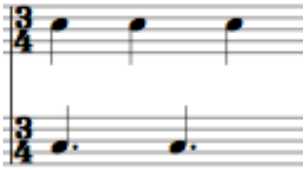
In the 3rd and 4th layer, each subdivided or multiple value creates a secondary layer. For example, in 4/4, a passage in eights or where the eights prevale can be considered at one layer (that one of eights) of subdivision of the pulse, whereas a passage in sixteenth is still at the layer of the subdivisions but different from the layer of eights.

Let us analyze the first two examples, apparently very different. If we compare the whole bar of 6/8 with one movement of the bar in 4/4 with triplets, we clearly see that they look the same, or, at least, they have the same acoustic result (3 values in the same space of 2).

Analyzing the different layers and comparing them between the two examples, we can notice that in Ex 2.1 we have two possible values for the pulse (look, we have already an ambiguity!): 3/8 or 1/8; in 4/4 (Ex. 2.2) we could also consider 1/4 ("formal" written pulse in the denominator of the fraction) and 1/8 *(virtual* possible pulse implied and present at a different layer of subdivision). So, for the time being, we can say that, at this layer, the two examples are different if we consider as pulses 1/4 in 4/4 and 3/8 in 6/8. But if we consider 1/8 in 4/4 as the pulse, now at this layer the two examples are equivalent: there are three superposed values every two pulses, no matter what the subdivision of the pulse can be as well as the written value. This is also a clear example of *superposition of values with different length* (each one of the 3 overlapped values are indeed shorter than each one of the 2 on which they are superposed).

Proceeding toward the other layers is quite obvious that, at the layer of meter, the two examples are different. Meter is indeed an organization of the pulse that, with the time signature, defines which is the unity of measurement of the time, and consequently the speed, and how to organize the rhythmic values in relationship with them. It is pretty clear that the organization of a 6/8 is different from that one of a 4/4. However, this happens only if I compare the written/formal pulse indicated by the meter (1/4 to 3/8 or 1/8). But, as soon as I shift some layer, considering a

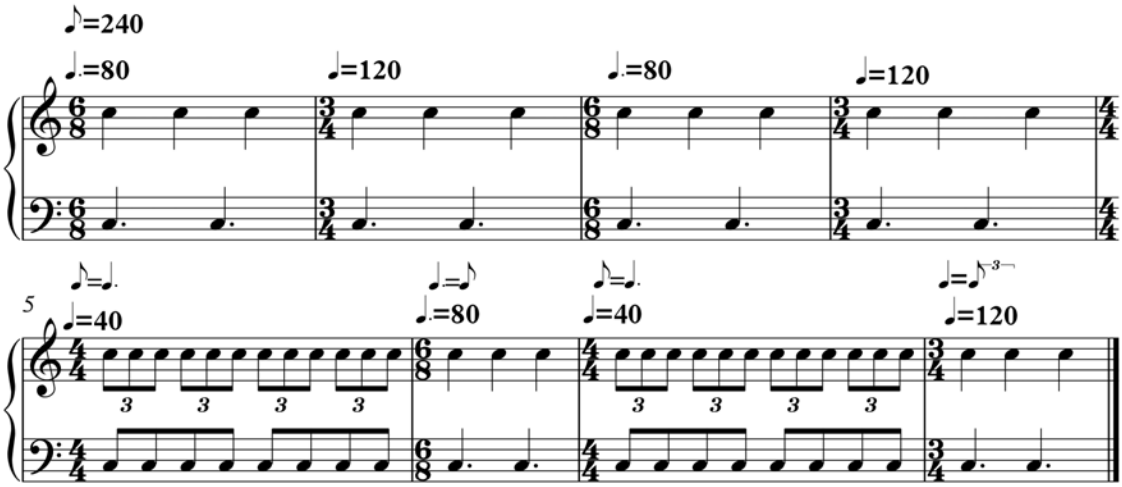
different pulse (1/8 to 3/8), things start changing. I will do some other examples. Hereunder we can see the same **hemiola** previously presented in 6/8, but now written in 3/4:



Ex 2.3 Vertical **Hemiola** on 3/4

Of course, the values are the same, the acoustic result is the same, but the formal value of the pulse and the metric organization are different.

In the following example I have put in the same line the 3 different **hemiolas** of the previous example, each one with its own metric organization.

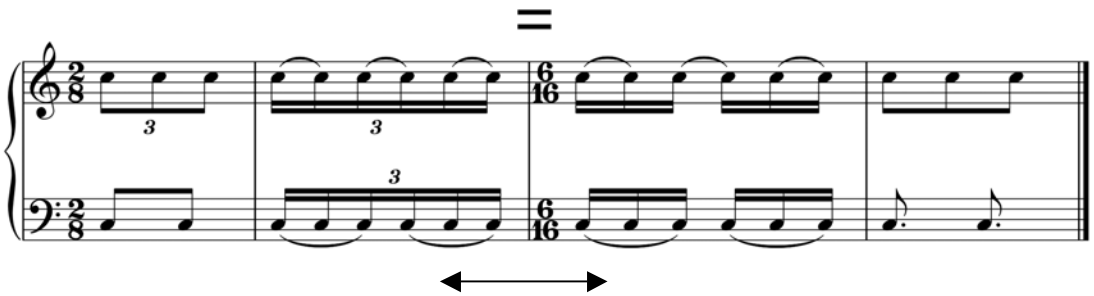


Ex 2.4 Succession of different **Hemiola**s- **<u>CD track n°1</u>**

As we can see, in order to have the same acoustic result, and because of the differences at the layer of meter, each **hemiola** has the same result only changing the relative speed of each formal pulse. The 6/8 and the 3/4 share the same pulse of 1/8 but to play the 4/4 we need to do a so-called **metric modulation** in which 1/8 = 3/8. Nonetheless, when you listen to them you cannot feel the difference that could be perceptible only with a metronome playing the different "formal" pulses.

Let us go further to the layers of subdivisions. So far we can conclude that, despite their similar acoustic result, there are still some differences between the previous examples. But if we go toward a different layer of subdivisions, step by step the differences disappear. Firstly we can subdivide the Ex 2.2 going to a layer of

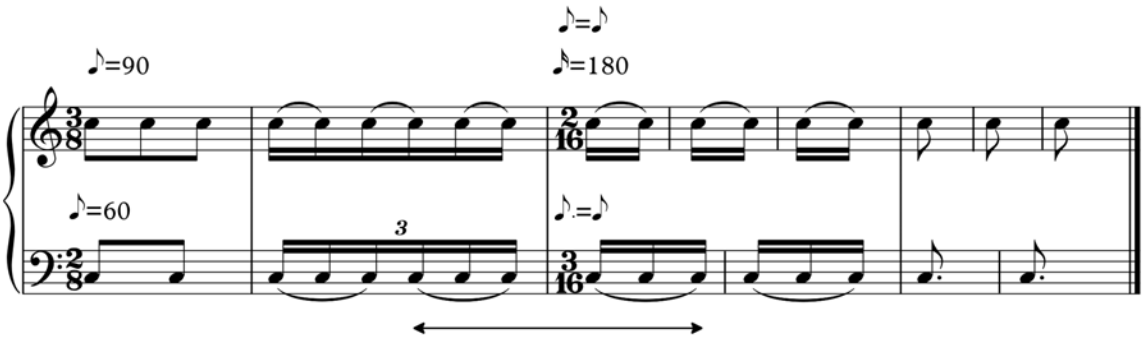
sixteenth. Of course, to correctly subdivide it, we need to use triplets of sixteenth, like in this example:



Ex 2.5 Transformation of the **Hemiola**

Firstly I have reduced the 4/4 meter to an equivalent meter of 2/8. In this way I have already switched to another layer in which the formal pulse is: 1/8. In the second bar we can see the switch to the layer of sixteenths. Since they are triplets-sixteenths the juxtaposed meter of 6/16 is perfectly equivalent and interchangeable. As I have anticipated, the differences disappear, as we can also see in the last bar, which is nothing but a **diminution** (*an equal subdivision of all values of a pattern or rhythmic phrase*), of the **Hemiola** where we have started (Ex. 2.1). The only differences remain in the way of writing and into the *conception*, without any difference into the *perception.*

Thus, the bases of my point of view about this part of the Musical theory are almost all here. What we can see in the first bar of Ex. II.5 is what is usually called a Polyrhythm or **Cross-rhythm.** It consists in the superposition of value with an irregular subdivision (respect to the formal meter) on other regular values. That is, in other words, an overlapping **of values with different length.** In the right part of the same example instead, we can have another point of view of the same occurring, that is an overlapping **of values made with a different number of (the same) elements**. This is possible only because we observe the same thing on different layers of meter and subdivision. Thus, we can rewrite the example in this way:



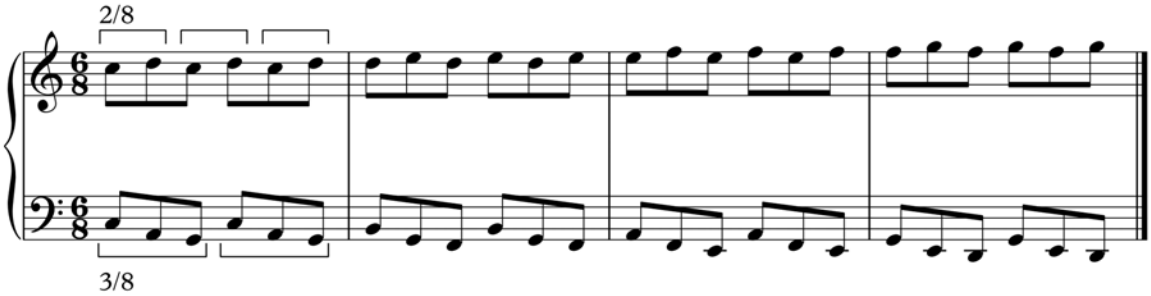
Ex 2.6 Different notation of the transformations of the **Hemiola**

In this way the example belongs to the field of **Polymeter.** Indeed, in the left part (layer of eights) we can see a superposition of two different meters (3/8 on 2/8) with different frequency of the same pulse (1/8). Since the different frequencies are in a ratio of 3:2, they permit to have the same bar. So, this is what some theorists call: **Polymeter preserving the measure,** that is a *Polymeter with same length of the measure and different value of the pulse* or a *Polymeter in which each meter uses rhythmic elements with different length (different subdivisions).* I am aware that this definition can be still confusing. It is a matter of fact that the measure is preserved. What is less clear is what happens to the pulse. To be clearer we have to precisely define our point of view. If we see the example as in the left side of Ex. 2.5 (an irregular triplet superposed to two regular eights) apparently (and also actually, in a way) the two values share the same pulse (1/4 or 2/8). But if we look at this example as if one meter organized in three pulses was superposed to one with two, we have to conclude that they do not have the same pulse with the same frequency.

In the right side instead, we can see a superposition of two different meters with the same frequency of the pulse. In this way the values can still be seen as values with different length but, because of the different layer and the different metric organization, they appear as build by a different number of the same elements. This is what can be called a **Polymeter preserving the pulse (or preserving the tactus)** that is a *Polymeter with different length of the measure and same value of the pulse* or a *Polymeter in which each meter uses a different number of elements of the same length.*

What is noteworthy here is the facts that the two kind of Polymeter coexist in the same **Hemiola**-combination depending only on the layer we observe it. As a general principle we can say that *the deeper we go to the layers of subdivisions, the more we find Polymeter preserving the pulse and vice versa*. Another general principle to point out is that, *despite of the different subdivisions or meters overlapped, there will be always a common pulse (with the same frequency) and thus, every kind of Polyrhythm or Polymeter is, at least virtually, a Polymeter preserving the pulse*.

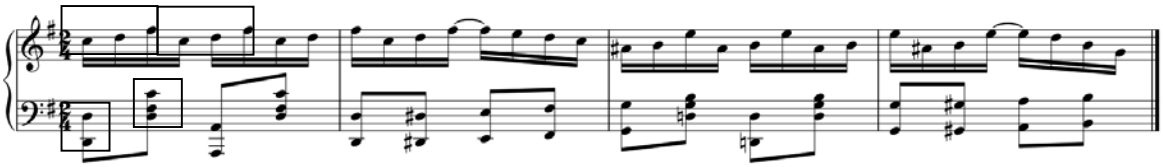
Let us now have a look to another possible occurring of the same **Hemiola**-combination:



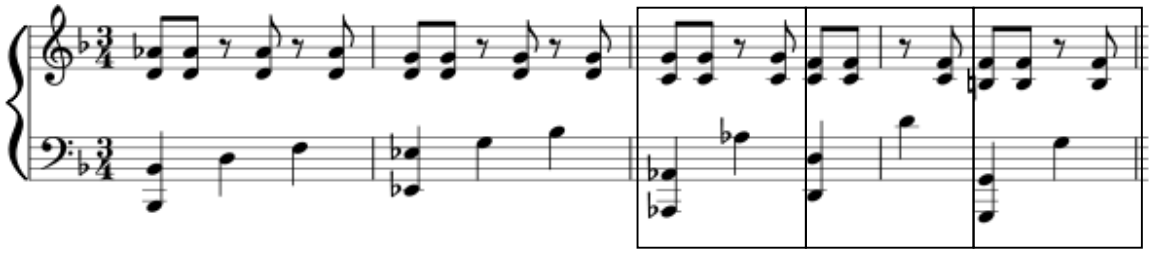
Ex 2.7 Implied **Hemiola**

Apparently we do not have here an explicit Polymeter. The meter is 6/8 and the rhythmic values are all at the layer of eights. But, depending on the organization of the melody in both hands, we can observe an **implied** Polymeter **(or a Vertical Polymetric Principle).** It is for sure a *Polymeter preserving the pulse* and the analogy with the previous **Hemiola** examples is clear. We will meet again this kind of implied Polymeters that involves the organization of the melody. I call these melodic patterns, which imply meters because of the number of their elements and their repetitions, **melodic/metric patterns**.

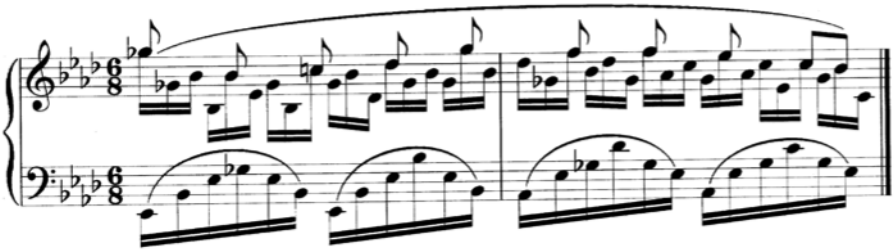
Now I will give some other examples belonging to different periods and styles of the different use and occurring of the same **Hemiola**-principle.



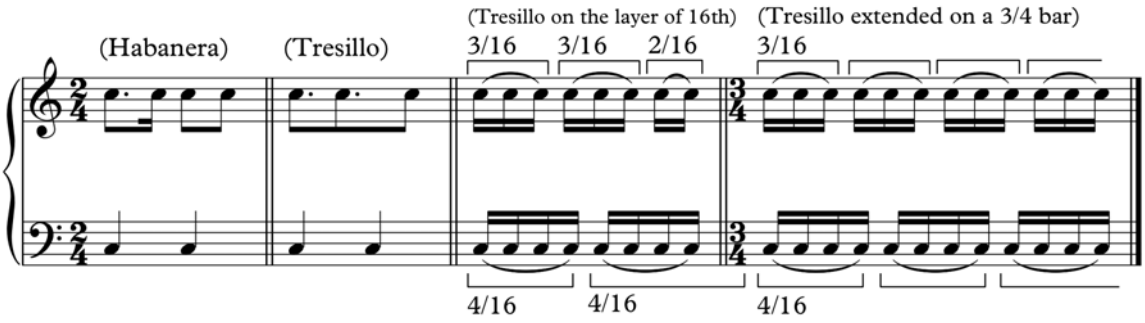
Ex 2.8 Secondary Ragtime – Implied Polymeter preserving the pulse using melodic/metric patterns (the ratio on the layer of 16th is 3:2 or 3:4)



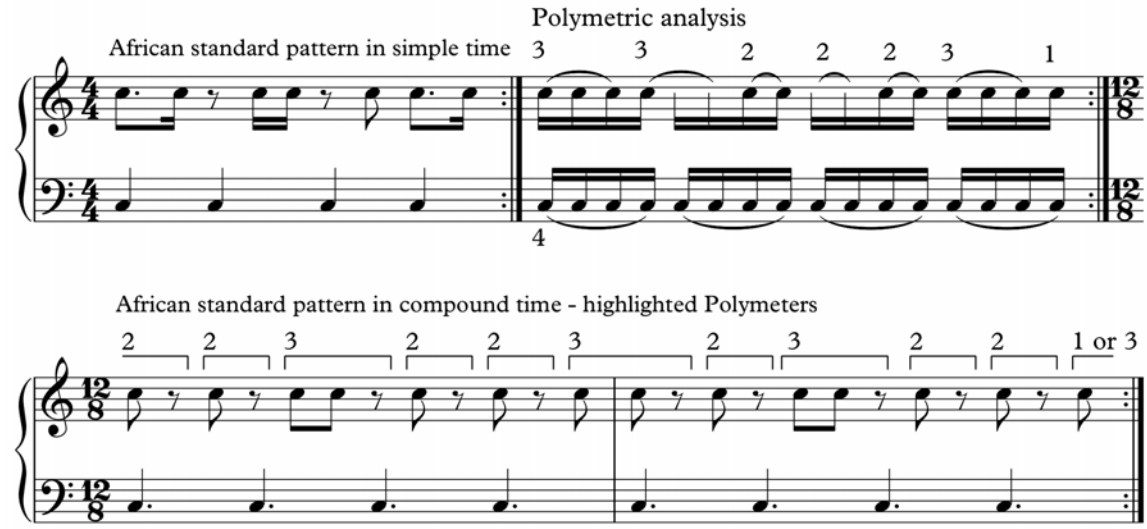
Ex 2.9 Mozart, piano sonata K332 – Implied Polymeter preserving the pulse using melodic/metric patterns (the ratio on the layer of quarter notes is 2:3)



Ex 2.10 Chopin, ballade n°4, mm 175/76 – Implied Polymeter preserving the pulse (the ratios on different layers are 3:2, 3:8, 4:3)



Ex 2.11 Habanera pattern and its origin: Tresillo pattern and its extension – Implied Polymeter preserving the measure at the layer of 8ths, Polymeter preserving the pulse at the layer of 16th (ratio 3:4). (The Habanera pattern is usually related to the Tresillo pattern as its origin by several treatises such as Davide Penalosa, Peter Greenwood *The clave matrix : Afro-Cuban rhythm : its principles and African origins,* Redway, CA : Bembe Books, ©2009.- Roberts, John Storm 1979. *The Latin tinge: the impact of Latin American music on the United States*, Oxford; as well as stated by one of the greatest Jazz musicians and composers: Morton, "Jelly Roll" 1938: Library of Congress Recording, *The Complete Recordings By Alan Lomax*.)



Ex 2.12 African standard pattern in simple and compound time – Implied Polymeter preserving the measure at the layer of pulses (1/4 and 3/8), Polymeter preserving the pulse at the layer of 16th or 8ths (ratio 3:4 and 2:3)

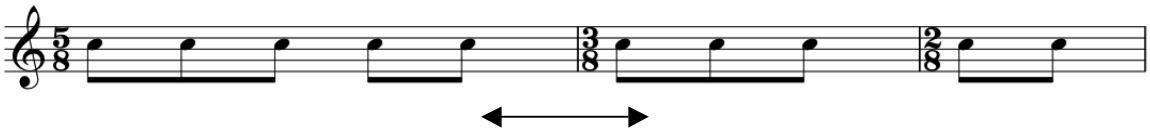
In all of the previous examples I have tried to demonstrate that each rhythmic or metric combination can be considered as a *Polymeter preserving the pulse*. Nonetheless, in the aforementioned examples there are at least two other occurring worth to be briefly treated.

If we look at the Ex 2.9 (excerpt from the Mozart sonata) we cannot say that we have an actual superposition of different meters. It is true that the 2/4 implied meter is played over a 3/4 meter but, since no voice is playing the accents of a 3/4, the actual (and perceptible) effect is the temporary switching form a ternary meter (3/4) to a binary one (2/4). The two meters have the same pulse both formal and real (1/4 with the same frequency), so there is no metric modulation and the principle is very similar to the already mentioned **Vertical Polymetric Principle** characteristic of the **Hemiola**. Thus, we can say that, for analogy, this is an example of **Horizontal Polymetric Principle** that is the juxtaposition *of successive different meters*. Indeed we can also call it **Horizontal Hemiola.**

This Horizontal **Hemiola** has all the characteristics I have already pointed out for the vertical one. In the same way we can have Polymeter preserving the measure and Polymeter preserving the pulse, implied Polymeter and different layers to consider. We can also say that a **metric modulation** *is the needed calculation to be done when two successive meters belong to a Polymeter preserving the measure*. Since they do not have a common pulse we need the metric modulation to translate one pulse to another. When we have two successive meters belonging to a Polymeter preserving the pulse, we do not need any modulation.

Following this idea we can see instances of *Horizontal Polymetric Principle* in Ex. 2.11 and 2.12, which not by chance are strictly connected for cultural and historical reasons. Of course, they also are examples of *Vertical Polymetric Principle* but, if we look at what in this examples is played by the right hand of the piano we can clearly see a series of different juxtaposed meters, mostly succession of binary and ternary meters (see Ex. 2.11, 3-3-2, or Ex. 2.12 , 3-3-2-2-2-3-1). This is for me an example of *Horizontal Polymetric Principle* that we can classify as *Implied Polymeter preserving the measure or the pulse* depending on the considered layer.

However, talking about rhythm, I also have to mention that some theorists divide these structures in: **Additive** Rhythm and **Divisive** Rhythm**.** I do not want to go too deep in a dissertation about this definition but can be important to relate it to my theoretical approach. To be very simple, and according to some treatises (e.g. Ton de Leeuw, *Music of the twentieth century*, Amsterdam University Press, 2005) we can call **divisive** rhythms all the rhythmic structures (thus also the metric structures) that are repeated after a short periodicity, despite their apparent irregularity. In other words this music can be organized in larger and equivalent organizations of a pulse that are meters. I will clarify this point of view with an example:



Ex 2.13 Horizontal Polymetric Principle in a 5/8 meter, **divisive** rhythm.

If the meter presented in this example is the basic meter working throughout a whole piece, it is for sure a **divisive** rhythm, despite of the fact that it is composed by two different organizations of the pulse. On the contrary, an **additive** rhythm is a juxtaposition of (different) metric organization without any periodicity or with a periodicity so long as not to be more perceptible. A clear example of **additive** rhythm is the *Histoire du soldat* by Stravinsky, where rhythmic patterns are juxtaposed ore superposed without a perceptible periodicity valid throughout the whole piece. In other words we could not find a common *meta-meter* for all the changing of meter of

the piece. If we want another example of **divisive** rhythm, we can see again the Ex. 2.12, the *African standard pattern.* We can see this example as a juxtaposition (and superposition) of different meters but with a short periodicity. Indeed, the succession of different meters is repeated after 4 pulses (1/4). So, the inclusion in a regular organization is present and the rhythm is **divisive.** In relation with a disruption of regularity we can say that, obviously, **additive** rhythms are a step further than **divisive** rhythm.

From the point of view I have tried to argue in this chapter both the definitions and all the examples can be considered juxtaposition or superposition (implicit or explicit) of different meters with the same pulse, or a *Horizontal (or Vertical) Polymeter preserving the pulse*. The fact that the successive or simultaneous meters are regularly repeated and organized in a larger meter or not does not change the fact that they belong to a Horizontal (or Vertical) Polymetric Principle. However we can analyze a Horizontal (or Vertical) Polymeter and say when it has an **additive** or a **divisive** organization. Also here we can also notice that the **additive** or **divisive** classification is clearly related with my point of view on layers because it is about the meta-organization of meters.

To get to the conclusions of this brief theoretical dissertation, we can say that: *the use of different rhythmic values with a ratio in which none of the two values is equal to 1, both simultaneous and successive, can be interpreted as a superposition or juxtaposition of different meters.* With *a ratio in which none of the values is equal to one* I mean that if we superpose four 16th to one quarter note, the ratio can be 4:1 or 4:2 that is 2:1, or 4:4 that is 1. Instead, if we superpose 3 eights on 2 eights, the ratio is 3:2 and none of the values is equal to one, as well as happens in the ratios 3:4, 2:5, 6:5, 7:3 and so forth.

2.3 Perception

What I have said and tried to demonstrate in the previous paragraphs is that, mathematically speaking, every kind of Polymeter, or Polyrhythm, or Cross-Rhythm, or Additive or Divisive Rhythm, is reducible to a Polymeter preserving the pulse. However, this does not mean that they are actually perceptible only as Polymeters preserving the pulse. Now we need to separate the analytical level from that of perception, and I will do it with the aid of two of the previous examples.

Let us again analyze the Ex. 2.1 (Vertical **Hemiola**) and the Ex. 2.7 (Implied **Hemiola**). I have already demonstrated that they are both reducible to Polymeters preserving the pulse but, by a formal point of view, they are still different. In fact, in Ex. 2.7 the preserved pulse (1/8) is present and played, and thus perceptible as an "actual" pulse. In Ex. 2.1 the smallest common pulse (1/8 again) that is present at one layer of subdivisions, is neither played nor actually present and perceptible. So, what happens when we listen to the two examples? Listening to the Ex. 2.7 we perceive all the pulses and their different metric organization. This is exactly a Polymeter preserving the pulse, also at the level of perception. Listening to the Ex. 2.1 instead, we do not perceive the common pulse (1/8) and therefore we perceive two different pulses (1/4 for the right hand, 3/8 for the left hand) that do not have the same frequency and speed because are based on different multiples of the basic pulse (1/8). The effect is that of listening to two different parts with a different speed. This is a Polymeter preserving the measure, also at the level of perception. I would say that, in the latter case, the effect of separation between two parts is stronger.

Hereunder is a resume of the Hierarchy of the Polymetric principles and structures that I have designed along this chapter:

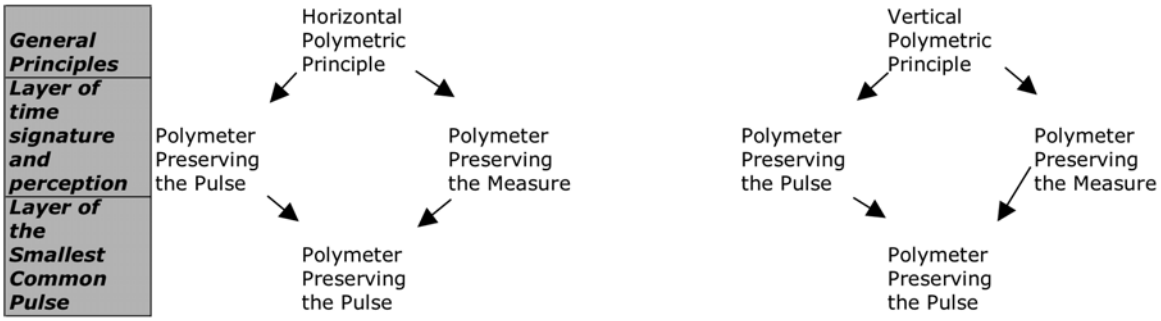


Table 2.1 – Hierarchic scheme of the layers and structures of Polymeters.

2.4 Cyclic Principles

Despite of all the different definitions that we can give to the use of different rhythmic values and their combinations, we cannot help but notice that, just looking only at the rhythmic/metric layer, when in the ratio of the two (or more) superposed or juxtaposed elements none of them is equal to 1, we have two results:

1- The two parameters are shifted or displaced to each other, i.e. they don't occur together always in the same points.
2- The aforementioned shifting, because of the ratio between the two elements, automatically creates a **cycle** that can be defined as *the number of repetitions needed for having the same occurring of two or more shifted elements*.

For this reason I called the techniques analyzed in this research also ***cyclic techniques.***
Thus I am going to study **cyclic techniques** originated by the shifting of musical parameters combined in **different** layers.

3. THE *ISORHYTHMI*C TECHNIQUE AND THE STYLE OF *ARS NOVA*

3.1 Introduction

3.1.1 Historical and Theoretical Perspective

Before approaching the analysis of the style called *Ars Nova*, we cannot help but highlighting some historical and theoretical aspects regarding this music.

The so-called *Ars Nova* style flourished in France, Italy and the Burgundian Low Countries in the late middle age, approximately in a period between 1330 and 1430.

The most famous and important exponents of this style are Philippe de Vitry (1291 – 1361), Guillame de Machaut (1300 – 1377), and Guillame Dufay (1397 – 1474). The style that these composers (and many others, most of which anonymous or unknown) developed was in between the so-called *Ars Antiqua* style (represented by Perotinus and Leoninus, both Chapel Masters of Notre Dame in Paris) and the Polyphonic style of the Franco-Flemish school of the XV century (represented by Johannes Ockeghem, Josquin des Prez and Orlande de Lassus).

Of course, we can look at each style as heir of the previous and inspirer of the next, but at the same time, I think it is important also to look at each style as mature and accomplished in itself, giving it the importance and dignity that it deserve.

Each style in music is naturally influenced by the studies of theorists and their theoretical developments, but there are some styles that are more influenced by theory. Just to give clear examples I can quote the Well Tempered Clavier by J.S. Bach and the music of the Vienna School in the first half of the XX century.

The *Ars Nova* style belongs to the category of styles strongly influenced by theory. In those years indeed the theoretical basis of two practical tools were clearly defined and developed:

1. The Rhythmic Modes
2. The *Mensural* Notation System

About the *Mensural* Notation I have to premise that, even if it is nothing but the way in which the theorists of middle age began to organize a metric structure, the symbols and words used in that period need a translation and an explanation in modern notation and concepts. Of course this is not the place for treating this topic. I just want to quote two fundamental bibliographic references. One is the ancient and original treatise *Ars Cantus Mensurabilis* by Franco de Cologne (ca. 1260) and the other one is a modern treatise about *mensural* notation *The Notation of Polyphonic Music* by Willi Apel, (1961).

3.1.2 Rhythmic Modes

The rhythmic modes were the first processing of the theorists. They started to use different symbols for notating the different durations of the notes. Besides this, they also started to define rhythmic patterns generated by the combination of those different values, patterns that they called "rhythmic modes" by analogy with the modal melodic and harmonic system derived by the ancient Greeks and Latin theorists. Since the introduction of symbols to notate the values was a *major* innovation compared to the notation used in the Gregorian chant, they felt the necessity of creating kind of "good recipes" for combining the rhythmic values, in according to aesthetical and philosophical principles, as well as it happens in each Manual of Composition (see Ex. 3.1).

Mode	Original Notation	Meaning	Modern Equivalent
Mode I		long-short	
Mode II		short-long	
Mode III		long-short-short	
Mode IV		short-short-long	
Mode V		long-long-long	
Mode VI		short-short-short	

Ex. 3.1 – Rhythmic Modes and their Modern equivalents

Likely, the new theoretical principles were defined in consequence of something that was happening in the musical practice. As an innovation in the tradition of *Gregorian Chant* (or Plain Chant), rhythm started to be used in the compositions, probably influenced by popular and dance music of Middle Age. But, as always happens, the new theoretical tools started in their turn to influence the composers and their compositional techniques.

3.1.3 The *Mensural* Notation System

After defining symbols for the durations the next step was that of organizing them in metric structures. This was the *Mensural* Notation System. Without deepening it here, it consisted in a metric organization of the different durations in relation with a pulse. The different meters were organized in layers that corresponded to our modern layers of different subdivisions or multiple of a determined pulse. Each layer, basically, could be based on two different subdivisions, binary and ternary, with all the possible combinations of layers and subdivisions. For example, we could have the first layer with a binary subdivision and the second layer (that one of subdivision itself) with a ternary subdivision and so forth.

Translating all this system in a modern terminology and system, it provided the use of four basic meters corresponding to our 6/8, 2/4, 9/8, 3/4. In this organization two layers were considered, one was the layer of the meter itself, and the other one was the layer of subdivision. There was, however, another layer consisting in the grouping of two or three bars of the aforementioned meters. This layer was called *Modus*, and could be ternary (*Perfectus*) or binary (*Imperfectus*) and the symbol of the value was called *Longa*. The layer of modern meter was called *Tempus* and could also be ternary (*Perfectum*) and binary (*Imperfectum*), and the symbol was called *Brevis*. The layer of subdivisions was called *Prolatio*, ternary (*Maior*), and binary (*Minor*), the value was called *Minima*. In the following scheme we can see the relationship between the different layers and the related values:

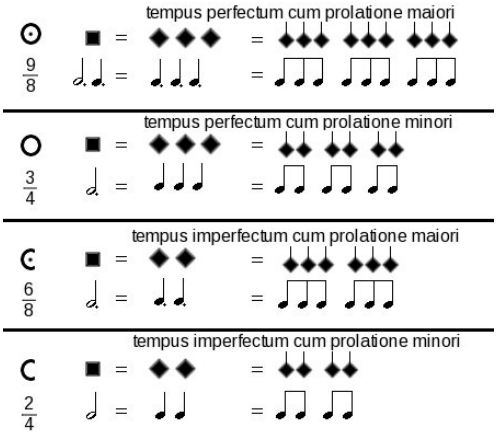
Layers	**Modus**		**Tempus**		**Prolatio**	
Ternary subdivisions	Perfectus		Perfectum		Major	
		1Longa =3 Breves		1 Brevis=3 Semibreves		1 Semibrevis=3 Minimae (i.e. 1dotted crotchet=3 quavers)
Binary subdivisions	Imperfectus		Imperfectum		Minor	
		1 Longa=2 Breves		1 Brevis=2 Semibreves		1 Semibrevis=2 Minimae (i.e. 1 crotchet=2 quavers)

Table 3.1 – Layers and values of the *Mensural* System

As I have previously said, these were the possible combinations:

1. *Modus Perfectus*, *Tempus Perfectum*, *Prolatio Major* (a grouping of 3 bars of our modern 9/8)
2. *Modus Perfectus*, *Tempus Imperfectum*, *Prolatio Major* (a grouping of 3 bars of our modern 6/8)
3. *Modus Perfectus*, *Tempus Imperfectum*, *Prolatio Minor* (a grouping of 3 bars of our modern 2/4)
4. *Modus Perfectus*, *Tempus Perfectum*, *Prolatio Minor* (a grouping of 3 bars of our modern 3/4)
5. *Modus Imperfectus*, *Tempus Perfectum*, *Prolatio Major* (a grouping of 2 bars of our modern 9/8)
6. *Modus Imperfectus*, *Tempus Imperfectum*, *Prolatio Major* (a grouping of 2 bars of our modern 6/8)
7. *Modus Imperfectus*, *Tempus Imperfectum*, *Prolatio Minor* (a grouping of 2 bars of our modern 2/4)
8. *Modus Imperfectus*, *Tempus Perfectum*, *Prolatio Minor* (a grouping of 2 bars of our modern 3/4)

As we can see, the meters corresponding to the modern ones were at the layer of ***Tempus*,** whereas the layer of ***Modus*** regarded larger groupings of the basic meters. Hereunder I put a scheme of the different meters (from the layer of ***Tempus***) with the symbols of durations and their corresponding modern values.



Ex 3.2 – Different meters and corresponding notation

It is doubtless that such an organization in layers and values mathematically related influenced the compositional techniques of the composers of *Ars Nova*. Their musical language seems to be also strongly influenced by popular music and its rhythmic vitality. Indeed they started to produce secular compositions like songs and dances, influenced by the Courtly Literature and French Medieval Poetry. But, parallel, they developed the highest form of musical composition at that time that was the sacred production of Motets. It is also noteworthy that the first Mass totally composed by only one composer, the Missa de Nostre Dame, is due to Guillame de Machaut.

3.1.4 Motets

Thus, following the premises and goals of my research, my analysis has been focused on the sacred production of Motets. In fact, these compositions were structured in a way that fully exploited the possibility of multi-layers and numerical combinations of the *Mensural* Notation System. The technique used for the composition of these Motets was called *Isorhythm* a Greek word meaning "same rhythm" and coined by the German musicologist Friedrich Ludwig in 1904.

Let us describe briefly this technique. The typical *isorhythm*ic motet of the early *Ars Nova* Style was usually a three-voice composition. The lowest voice, called *Tenor* and composed in very long rhythmic values (at the so-called layer of the ***Modus*** with the ***Longa*** as the used notation value), was based on an arrangement of a pitch collection derived by a **Plain Chant** with a rhythmic pattern composed for the occasion. The pitch collection (or melodic pattern) was called ***Color*** (that means repetition, plural ***Colore*s**); the rhythmic pattern (in the earliest composition based on rhythmic modes) was called ***Talea*** (that means cutting, plural ***Talea*e**). Usually, the ***Talea*** was composed in a way that the number of notes of it did not correspond to the number of pitches of a ***Color***. This provided a shifting, and consequently a cycle with a certain number of repetitions needed for having the same occurring of the two patterns. This was for sure the first time in which this kind of principles were used in the history of Western music.

We can try to imagine the reasons why this technique was used. Firstly there was the will of using and arranging a traditional sacred material in a way that it was present as fundament of a piece, but, at the same time, not clearly perceptible, in order to have more freedom of creating something new. Then, the shifting principle and the consequent cycles were a clever way to have repetition and variation of the same material, thus helping in creating a form with the right balance of predictability and unpredictability.

The upper voices, called in order from the lowest to the highest ***Motetus*** and ***Triplum***, were freely composed and with the rhythmic values organized respectively in the layers of ***Tempus*** (***Brevis***) and ***Prolatio*** (**Semi*brevis*** and ***Minima***). Thus, the effect was that of three layers related but with three different speeds due to the different used rhythmic subdivisions. The effect of three very independent layers was reinforced by the use in the ***Motetus*** and ***Triplum*** of two different texts, sometimes both in French, sometimes one in French and one in Latin, sometimes both in Latin. Especially the French texts were often of secular argument.

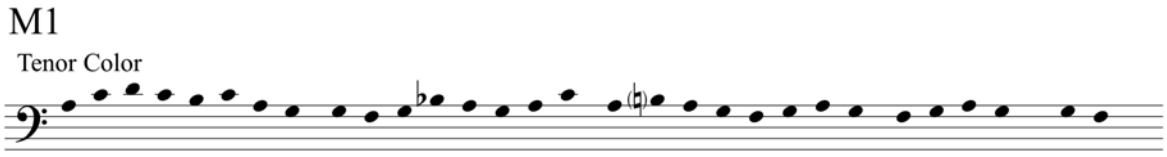
After the finishing of the cycle generated by the arrangement of a *Color* with the *Talea*, usually the full Motet was repeated with a diminution, also a technique made possible by the *Mensural* Notation System. For Instance, all the durations were diminished by a half or a third of their value.

3.2 Isorhythmic Analysis: a Motet of G. de Machaut, Amara Valde – Amour – Quant en moy

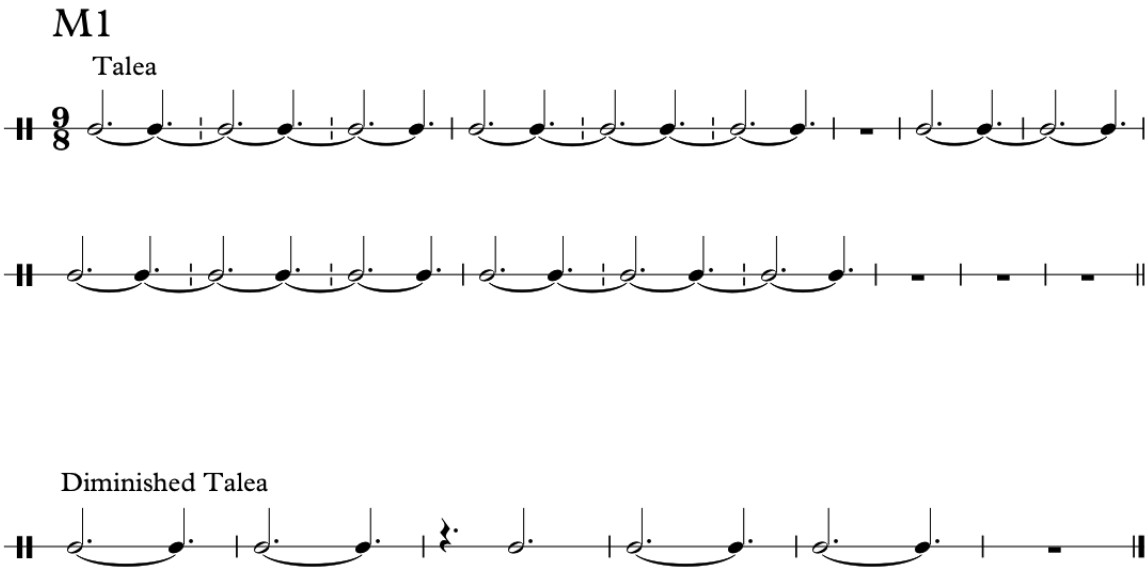
3.2.1 The Talea/*Color* arrangement

Here is an analysis of one motet of G. de Machaut. It is also known as M1, that means Motet n°1, referring to the order in which the Motets of Machaut were presented in the ancient codes. A complete transcription of this Motet, is attached to this report, on courtesy of Prof. Jacques Boogaart (J. Boogaart, "O series summe rata – De Moteten van Guillame de Machaut).

The analysis is mostly focused on the *isorhythm*ic and cyclic technique and consists in the highlighting of the numbers involved; hence it is a quantitative analysis. In the Ex. 3.3 and 3.4 we can see the *Talea* and the pitch collection of the *Color*.



Ex 3.3 – *Tenor Color* of Machaut's Motet n°1



Ex 3.4 – *Talea* and diminished *Talea* of Machaut's Motet n°1 transcribed in modern notation

The Motet is for three voices, the meter is 9/8 translated in modern notation; the total length is 144 bars of 9/8, with a pulse (as it is performed by modern performers) of ca. 140 bpm. Then, the numbers of the cycle:

- Number of pitches of the *Color* Cpi = 30
- Number of notes of the *Talea* Tn = 5
- Number of repetitions of the *Talea* Tr = 6

- Number of statements of the *Color* Cs = 1
- *Color*:*Talea* ratio Cpi:Tn = 30:5 = 6:1

As we can see, the number of repetitions of a *Talea* and the number of statements of a *Color* are a direct consequence of the ratio between the two numbers that is the key value for determining the cycle.

Each *Talea* has a length of 18 bars in the modern meter of 9/8 and it is repeated 6 times, each time with different pitches.

After the 6 repetitions with 1 statement of the *Color*, the diminution starts, repeating the *tenor* also in its cyclic structure but dividing each value of it for three. Thus, the *tenor* now is related to values of 3 instead of 9. So the number for understanding the diminution is:

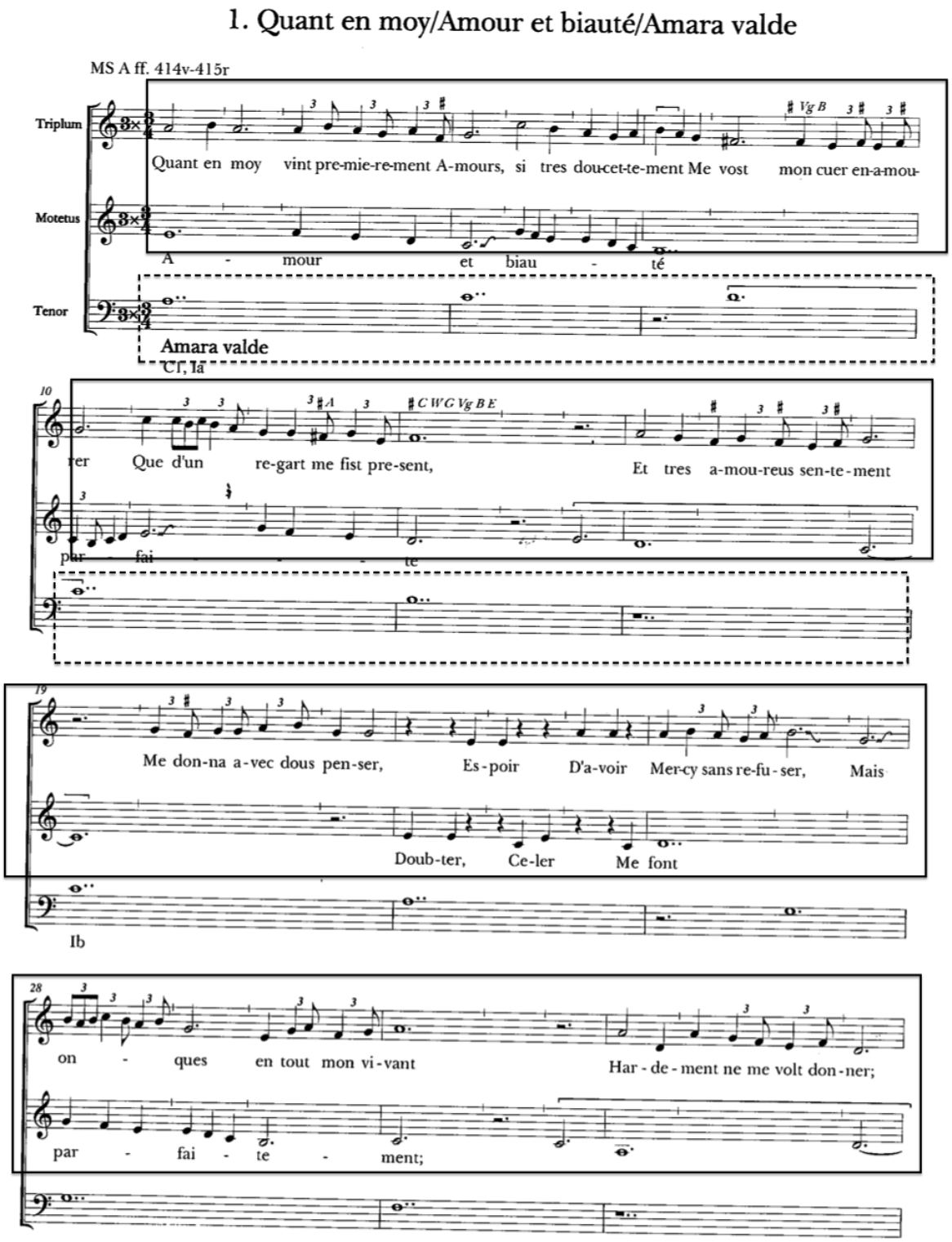
- *Longa*/*Brevis* ratio L:B = 3:1

3.2.2 Upper Voices

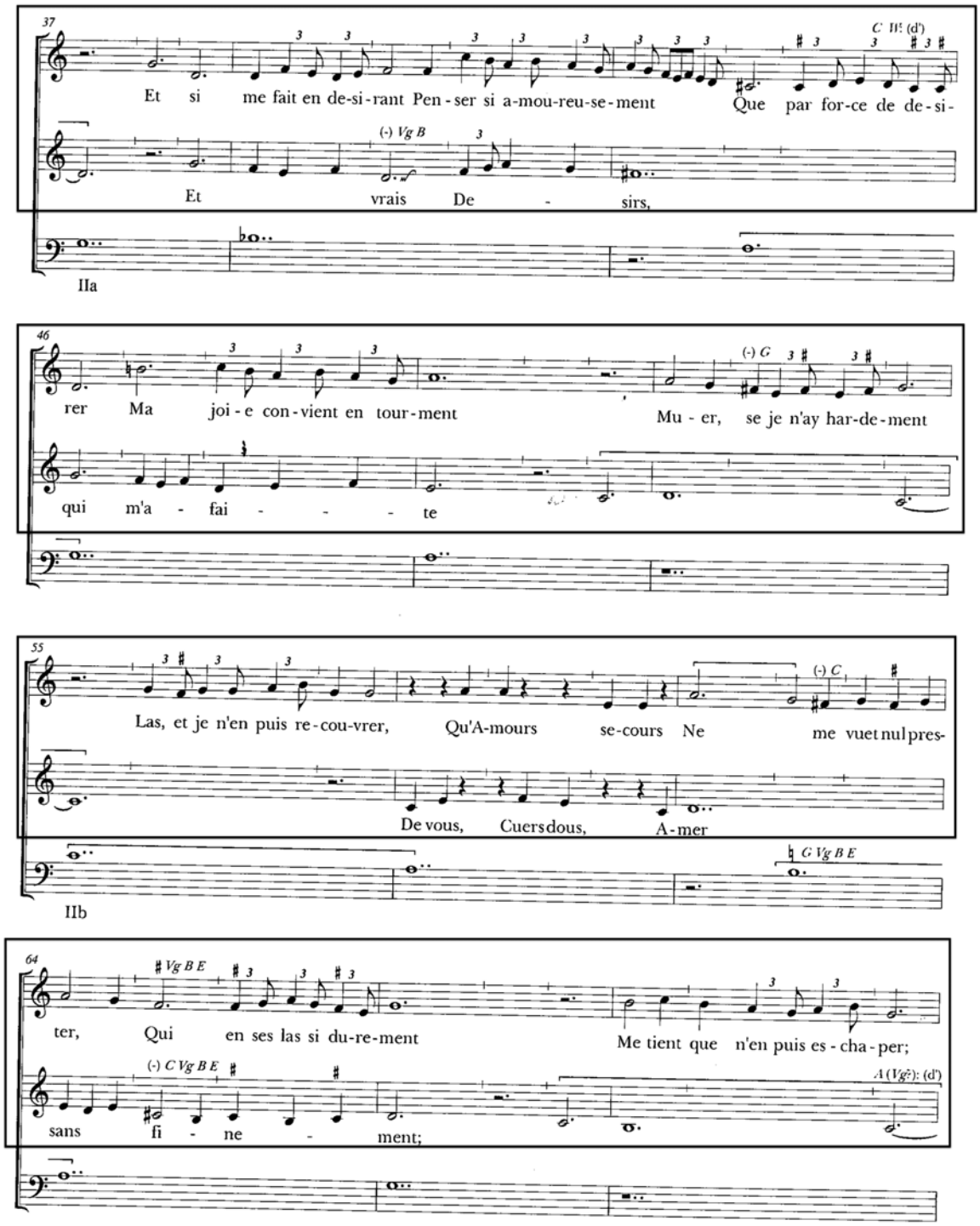
Now let us have a brief look at the upper voices. I said earlier that they are freely composed but this is only partially true. For sure there is no pitch collection of reference, as in the *Tenor* part, so, in this sense, the melodies are freely conducted, and related to the text to be sung. But, rhythmically speaking, we notice a tendency already present in this early Motet and that will be expanded in the late period of the style. Indeed there are parts of the two voices that have different rhythm at each repetition of the *Talea*, but other parts are the same and this means that the rhythm is predetermined, as it happens for the *Talea*/*Color* arrangement. We can imagine that these parts were composed after the creation of the *Tenor* part for giving to each *Talea* a clearer rhythmic identity, reinforcing the sense of repetition. In fact, the repetition of the *Tenor* part of the *Talea* is not so perceptible because of the so long values. Of course, it affects the form but the rhythmic repetition is not understandable. So, probably, the idea was of creating more recognizable patterns in each *Talea* and therefore easily perceptible at each repetition.

Some treatise calls this technique *panisorhythmic*, some other calls it *isoperiodic*, but the final meaning is the same.

The very interesting occurring of this Motet is the length of this second cycle created in the *Motetus* and *Triplum* voices by the repetition of equal rhythms. Obviously, this second cycle is strictly related to the *Tenor* cycle, also because is not created by the shifting of pitch and rhythm. What is noteworthy here is that the length of this second cycle is exactly the double of the *Tenor* cycles. So, we can say that these two cycles are, in a very simple way, shifted to each other (see the example below). This is a very peculiar occurring belonging to this Motet. In fact, along the analysis of 26 *Isorhythm*ic Motets from Machaut and other composers I have found this occurring only one other time. This fact represents for me the intuition by Machaut of the possibility of creating different cycles in different layers shifted to each other.



Ex 3.5 – G. de Machaut, Motet n°1, mm 1-36. The two superposed *Talea*e of different length are highlighted in a different way. The *Talea* in the upper voices is more visible in the motet (2nd voice) part.



Ex 3.6 – G. de Machaut, Motet n°1, mm 37-72. The *Talea* in the upper voices is highlighted to show the frequency of this cycle. The *Talea* in the *tenor* part has been already repeated 4 times against the 2 times of the *Talea* in *motetus* and *triplum*. (Transcription by J. Boogaart, "O series summe rata – De Moteten van Guillame de Machaut) **CD track n°2 (attached score 1)**

3.3 Other Motets: a quantitative analysis

3.3.1 Table

The following is a table in which I have represented the results of the same kind of quantitative analysis on other 25 *Isorhythm*ic Motets form different composers and periods, from the early to the late style.

Motet Number	*Voices*	*Modus*	*Tempus*	*Prolatio*	*Modern Meter(Tempus)*	*Length in modern measures*	*Number of pitches of the Color(Tenor)*	*Notes of the Talea*	*Color-Talea ratio*	*Repetitions of the Talea*	*Number of statements of the Color*	*Diminution Longs/Brevis ratio*
M1	3	Perfectus	Perfectum	Major	9/8	144	30	5	6:1	6	1	3:1
M2	3	Perfectus	Imperfectum	Major	6/8	135	28	7	4:1	4	1	?
M3	3	Imperfectus	Imperfectum	Major	6/8	115	25	7	4:1	4	1 (with incomplete talea)	2:1
M4	3	No	Imperfectum	Major	6/8	153	18	12	3:2	3	2	2:1
M5	4	Tenor Perfectus/t. imp - C.Tenor Imp/t. imp for half of the Talea and then reversing	Perfectum	Major	9/8	96	28	7	4:1	4	1	2:1
M6	3	Perfectus	Imperfectum	Major	6/8	99	29	T1=9, T2=9	3:2	T1=3	2	no dim
M7	3	Imperfectus	Imperfectum	Major	6/8	169	21	14	3:2	3	2	2:1
M10	3	Perfectus	Imperfectum	Major	6/8	106	30	5	6:1	6	1	2:1
M11	3	Perfectus	Perfectum	minor	3/4	100	Different form: 3 phrases of tenor (12 repeated with the same pitch)					
M16	3	Perfectus	Imperfectum	minor	2/4	148	Different form: 3T some with less pitches with literal repetition)					
M17	3	Perfectus	Imperfectum	Major	6/8	132	18	6	3:1	3	1	no dim
M20	3	No	Perfectum	Major	9/8	50	Different form: not ISO Tenor cycle=7+5+7+7+7+5+7+4 B similar to Passacaglia					
M21	4	Imperfectus (C.tenor P)	Imperfectum	Major	6/8	230	40	10	4:1	4	1	2:1
M22	4	Perfectus	Imperfectum	Major	6/8	155	24	16	3:2	3 + T4 incomplete	2	no dim
C110	3	Tenor Mp, Ti	Upper: 8Bi pM+9Bp prm+10 Bi pM+9 Bp prm				33	22	3:2	3	2	no dim
C105	4	Imp/Per	Imp/Per	minor	2/4 -3/4	135	106	53	2:1	2	1	no dim
IV2	4	Per/Imp	Imperfectum	Major	6/8	132	28	7	4:1	4	1	2:1
IV9	4	Perfectus	Imperfectum	Major	6/8	180	32	16	2:1	2	1	1st dim=3:2, 2nd dim= 2:1and half, 3rd dim=3:1
V6	3	Per/Imp	Per/Imp	Major	9/8 -6/8	132	28	7	4:1	4	1	
V7	4 + 2	Perfectus	Imperfectum	Major	6/8	158	30	10	3:1	3	1	?
V11	4 + 3	Imperfectus	Imperfectum	Major	6/8	145	30	6	5:1	5	1	2:1
V14	4	?	Imperfectum	Major	6/8	120	16	4	4:1	8	2	2:1
D1	4	Perfectus	Perfectum	minor	3/4	102	28	49	2:1	2	1	no dim
D3	4 + 2	Perfectus	Imperfectum	Major	6/8	95	32	16	2:1	2	1	From Mp to Tp (1 Lp=1 Bp)
D5	3	No	Imperfectum	Major	6/8	127	45	Irregular 9+4 and 2nd and 3rd 15	3:1	3	1	From Ti pM to Ti pm= 6:8 to 2:4
D11	4	Imperfectus	Perfectum	minor	3/4		14	14		1 x each proportio	1 x each proportio	

Table 3.2 – 26 *Isorhythm*ic Motets - Quantitative analysis (M=Machaut, C=Chantilly Code, Iv=Ivrea Code, V=Vitry, D=Dufay)

3.3.2 Statistics observations

Among 26 Motets we can observe

Meter:

- 11 have *Modus perfectus*, *Tempus imperfectum*, *Prolatio Major* (3 x 6/8)
- 4 have *Modus imperfectus*, *Tempus imperfectum*, *Prolatio Major* (2 x 6/8)
- 2 have *Modus perfectus*, *Tempus perfectum*, *Prolatio Minor* (3 x 3/4)
- 1 has *Modus perfectus*, *Tempus perfectum*, *Prolatio Major* (3 x 9/8)
- The others do not use the layer of *Modus*. Among them 2 have *Tempus imperfectum*, *Prolatio Major* (6/8) and 2 have *Tempus perfectum*, *Prolatio Major* (9/8)

Numeric ratio between *Talea* and *Color*:

- 16 with Cpi multiple of Tn
    - 6 with 4:1
    - 4 with 2:1
    - 2 with 6:1
    - 2 with 3:1
    - 1 with 5:1
    - 4 with Cpi and Tn with a GCD (with 3:2)
    - 1 with Cpi = Tn (4 Cs in different diminutions)
- The others are irregular or use different forms

Length of *Color* and *Talea*

- 24 have short *Color*es (between 15 and 45 pitches) and shorter *Talea*e (between 5 and 22 notes)
- 2 have very long *Color*es (100 and 106) with long *Talea*e (49 and 53)

Diminution

- 17 have a section with diminution
    - 9 with 2:1 ratio
    - 2 with 3:1 ratio
    - 6 with more than one ratio (Dufay)
- 9 do not have a section with diminution

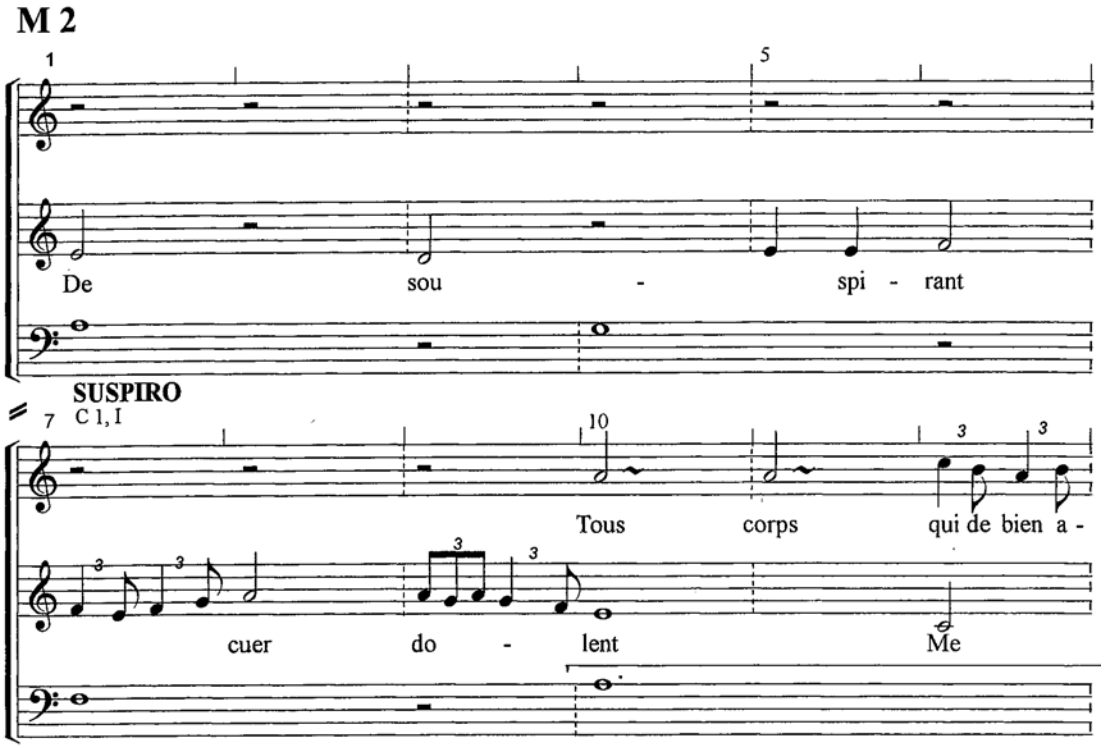
Overlapping of different cycles

- 2 have a cycle in upper voices that has a double length of the cycle of the *Tenor*
- 24 have no overlapped cycle

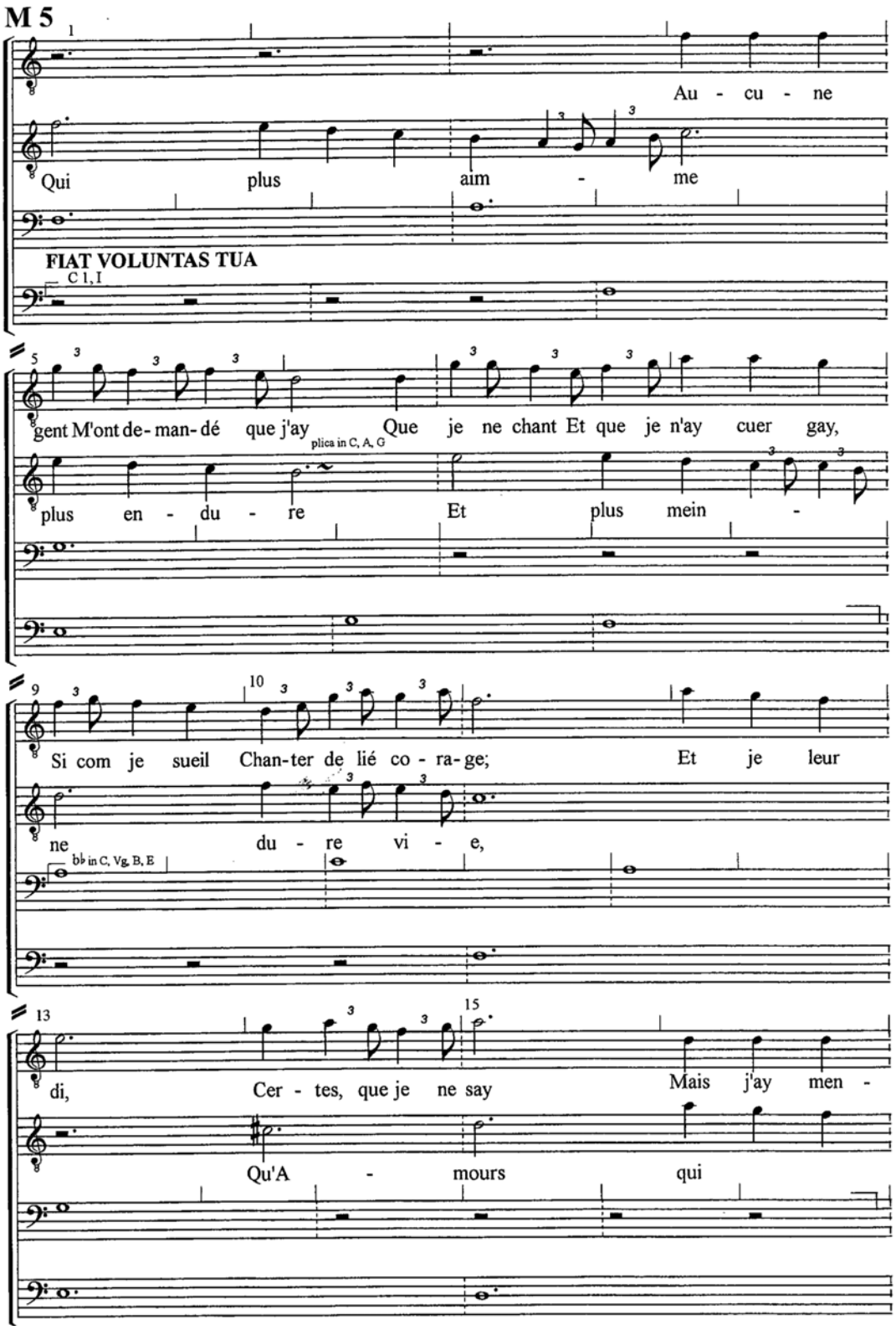
3.3.3 Average Values

- The length of the pieces is almost the same, between 198 and 460 pulses, with an average of 289 pulses
- The number of pitches of a *Color* is between 14 and 45 with an average of 28/30. Just in two cases we observe a *Color* of 100 and 106 pitches
- Usually, the *Talea* is always shorter than a *Color*, varying from 4 to 22 notes (average 9,5). We have just two instances with 49 and 53 notes.
- The average length of a *Talea* is 24 bars of modern meter

- The *Talea* is the most repeated pattern, with an average of 3,7 repetitions
- The repetition of a *Color* is not frequent at all. Most of the Motets have only one statement of the *Color*. A few of them have 2, usually with a numeric ratio of 3:2 in the cycle of the *Tenor*.
- The overlapped cycles are rare (only two instances)
- The completely *isorhythm*ic (*panisorhythmic* o*r isoperiodic*) Motets are rare (only 4 of them) but all of them have some repeated rhythmic patterns in the upper voices
- The diminution is almost always used. In the late style (Dufay) we find this technique used with a high level of sophistication.
- A certain number of Motets use different metric notation (and thus different meters) between the voices. This happens at the layer of *Modus* that can be, for example, *perfectus* in the *Tenor* and *imperfectus* in the Upper voices. Therefore, the upper voices are grouped in 2 bars of binary meter (implying a modern 4/4 or 12/8) meanwhile the *Tenor* is grouped in 3 bars of binary meter (implying a modern 6/4 or 18/8). This creates a shifting at this layer that is used mostly for creating syncopation between the voices as we can see in the following examples:



Ex. 3.7 – G. De Machaut, Motet n°2, mm 1-12 – Overlapping of different *mensural* notations. (Transcription by J. Boogaart, "O series summe rata – De Moteten van Guillame de Machaut)



Ex. 3.8 – G. De Machaut, Motet n°5, mm 1-16 – Overlapping of different *mensural* notations. (Transcription by J. Boogaart, "O series summe rata – De Moteten van Guillame de Machaut)

3.4 Final considerations and conclusions of the analysis

3.4.1 General observations

At the end of this detailed analysis is important to reach some conclusions in order to point out the main characteristics of the style, and the chances for incorporating and using them in my compositions.

So, despite of the so long distance in time and cultural perspectives, I will try to give a modern interpretation to the style and techniques also getting out from a strictly philological point of view.

Firstly, it is important to understand what was the technical and practical reason for creating pieces using, as fundament of them, an arrangement of some pitches with a repeated rhythmic pattern.

Considering the long values of each note of the *Talea* (indeed they last 1 bar of *Modus* or *Tempus* each), and also the fact that the *Tenor* is usually the lowest voice, it is pretty clear that *the main function of the Tenor is to provide the lowest notes of the harmony, that is an actual "bass line", for the entire piece*.

Looking at the *Tenor* as a bass line, because of its arrangement, it is a bass line (and thus a harmony) repeated several times on regard to the rhythmic values but always different at each repetition (even if with some common elements -the pitches- used yet in different rhythmic positions).

So we can say that the *Talea* provides the harmonic rhythm that is cyclic repeated, but each cycle has different harmony and consequent melodic variations.

Let us compare this form with a modern song or with a jazz-chorus-form. Both these modern forms consist in several sections with the same length but also with the same harmonic progression. The bass line thus is the same (at least in its main harmonic function) and can have only melodic variations. In the *isorhythm*ic Motets instead the *Talea* provides the length of each "chorus" or repetition and its harmony that is always different.

So the difference is that *in a song or in a jazz-chorus-form the harmonic progression and the harmonic rhythm are equal at each repetition. In the Ars Nova style only the harmonic rhythm is the same but the harmonic progression is different*. It is worth to notice that the definition of the *Talea* as *rhythmic pattern* can be a bit misleading. Actually, in the *Ars Nova* style, it has more the function of *harmonic-rhythmic pattern*.

3.4.2 The shifting principles

It is noteworthy now to consider in which way the shifting principles were used in the *Ars Nova* style either in relation with the theoretical basis exposed in chapter 2, or for a comparison with the next analyzed styles.

Apparently, in the Motets of *Ars Nova* the shifting principle is present only in one layer, the arrangement of the *Color* with a *Talea*, and their difference in number of elements. As I have highlighted above, this shifting principle seems to have the main function of providing a form and variations of it. Thus, it does not provide at all a feeling of irregularity but exactly the opposite, even because the shifting effect is not actually perceptible.

So, at a superficial look, the principles I have treated in the introduction chapter are not so much present in the *Ars Nova* style. But, at a subtler analysis, there are in it a lot of elements worth to be considered.

Of course we cannot compare the goal of composers of the Middle Age with those of composers of the XX century, after the dissolution of the tonal system. We can imagine that the composers of *Ars Nova* were not looking for an irregular form in opposition to a previous regular one. On the contrary we can imagine that they were looking for a "perfect" form in according to their theoretical, philosophical, aesthetical and poetical principles. But, at the same time, they were dealing with combinations of elements and numbers, for the first time in the history of western music, and moreover, they had been using the *Mensural* Notation System and the Modal system, that both provided more metric and harmonic freedom in comparison to the systems that will be used some centuries later.

So, focusing our attention beyond the shifting *Talea*/*Color*, we can see shifting principles of different kind in other tools or techniques used in these Motets.

Among them the most important is the use of the *Mensural* notation system in relation with the diminution and the overlapping of different *Mensural* notations (meters) in the different voices.

3.4.3 Diminution

The diminution is a technique of variation that provides the use of the same rhythmic material equally divided for a certain number. The first goal is the variation of a recognizable material; the second one is an increase of the speed and/or of the harmonic rhythm. It has been used from the beginning of the style, in a simple diminution of one half or one third of the original values.

This reduction of value was obtained with a changing of meter. Due to the characteristics of the *Mensural* Notation System it was easy to switch from *Modus* to *Tempus* (from a group of 2 or 3 bars to a single binary or ternary bar) and from one *Prolatio* to another (from a binary subdivision to a ternary one). This technique was called *Proportio* and, in the late period of the *Ars Nova* style, it was used several times in a composition. For instance, in the Motet "Nuper Rosarum Flores" by Dufay, the same material is diminished through the successive *proportiones* of 6/4/2/3.

This technique is very close to what I have called a *Horizontal Polymetric Principle* that is the successive use of different meters, or, in other words, a *Polymeter preserving the pulse.*

3.4.4 Superposition of Meters

Another direct consequence of the use of the *Mensural* Notation is the simultaneous use in some Motets of different *Mensural* notations or meters, as I have already pointed out in the statistic observations. This is instead an example of *Vertical Polymetric Principle*. (See Ex. 3.8)

3.5 Application of the Isorhythmic technique to jazz composition and arrangement

3.5.1 Various possibilities

Trying to apply the principles and techniques of *Ars Nova* to Jazz it is important to highlight what we can find closer to some jazz concept in order to feel the music of Middle Age less far than usual.

By the point of view of the form, it is pretty clear that the repetition of a *Talea* is very similar to the chorus-form, with one fundamental difference: each *Talea* has always the same harmonic rhythm (the same number of measures for each chord)

but different chords for each repetition. The chorus-form has same chords and same harmony at each repetition.

Then we can start to have a look, after a brief brainstorming, at the way in which the *isorhythm*ic technique can be used in a Jazz style. In a sense it is necessary to expand the shifting and cyclic principles. I have found these ideas for the application:

1. Variations on Ostinato patterns using a *Talea*/*Color* arrangement
2. Escaping from the functional harmony by using the melody also in a vertical way (Harmonic *Talea*, see later)
3. Expanding the *Talea*/*Color* arrangement to more than one voice/part
4. Creating a shifting among the *Talea*e of each voice/part
5. Creating a shifting between the *Talea* and the basic meter
6. Using the shifting between *Talea*e (or rhythmic patterns) only at a rhythmic level, without using a *Color*
7. Using the *Isorhythm*ic technique for arranging a Jazz Theme
8. Using the *Isorhythm*ic technique for arranging a Jazz Rhythm Section

In order to create more possibilities and an extended effect of shifting I have also increased the combination of numbers and ratios typical of the technique. In particular I experimented on these numbers:

1. Meters - I have used various meters, explicit and implied, e.g. 3/4, 4/4, 5/4, 6/4, 7/4 etc.
2. *Color*/*Talea* ratios – I have used greater ratios than 6:1 and 3:2, like 5:2, 7:2, 4:3, 5:3 etc.
3. *Talea*/*Color* Length – I have used *Color*es and *Talea*e longer or shorter than the average length of *Ars Nova*
4. Overlapped Cycles – instead of the rare 2:1 I have used from 2 to 4 overlapped cycle, also using the *Talea*/*Color* arrangement for each.

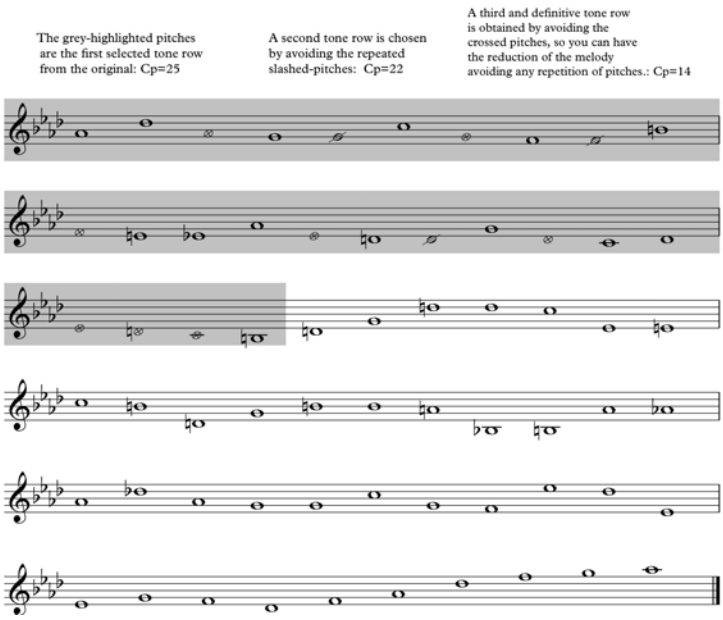
The shifting principles and the *Talea*/*Color* arrangement can have the main goal of stating a melody in different rhythmic arrangements, and/or to provide harmonic/bass lines based on the same pitches of the melody.

3.5.2 Exercises and experiments

For experimenting the *Isorhythm*ic techniques in a clearer way, I decided to use only one melody for all the experiments and exercises, also for having a quick idea of the differences when applying the tools.

The melody I have used is the famous song (become a jazz Standard) *All the Things You Are*.

Firstly, I extracted the pitch collection of the whole melody. Then, I did a series of successive reductions of it, until I had a pitch collection of 14 pitches. With this collection I had a condensed form of the first two phrases of the A section of the Standard. I have limited myself to this collection for creating shorter and easy-to-read examples. See the example below:



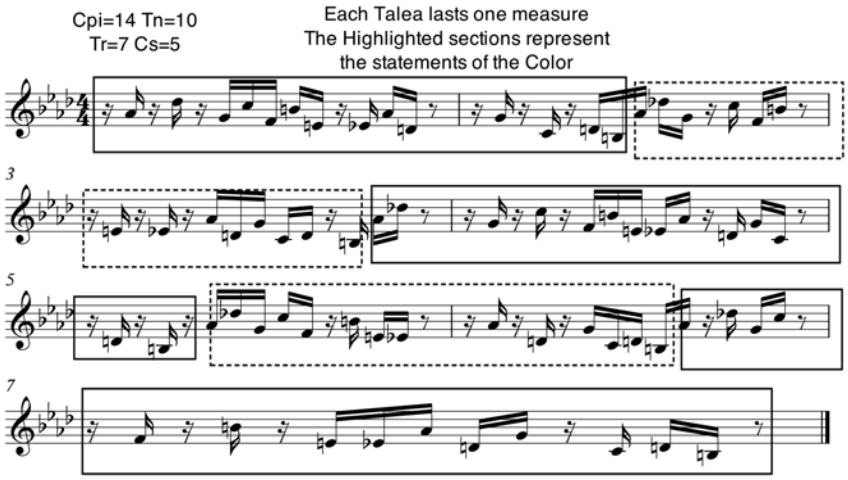
Ex 3.8 – All The Things You Are, reduction of the melody – Pitches of the *Color*

Then I started to arrange these 14 pitches (*Color*) in very many different ways. For the detailed passages of this process I refer to the score attached to this report. In synthesis I created *Talea*/*Color* arrangements of this collection for:

1. Soloist (for experimenting the chances of melodic variations)
2. Three monophonic instruments (Saxophones, Strings etc.)
3. Rhythm section
4. Rhythm section + soloist

Doing these exercises I have tried different combinations of implied polymeters, numeric ratios, overlapping cycles.

Here are some examples:



Ex. 3.9 – Arrangement of the 14 pitches of the *Color* extracted by All the Things You Are, for solo instrument. **CD track n° 4 (attached score 6)**

Sop sax: Cp=14, Tn=6, Tr=7, Cs=3 i.e. 42 pitches
Alto sax: Cp=14, Tn=4, Tr=7, Cs=2 i.e. 28 pitches
Baritone sax: Cp=14, Tn=7, Tr=2, Cs=1 i.e. 14 pitches

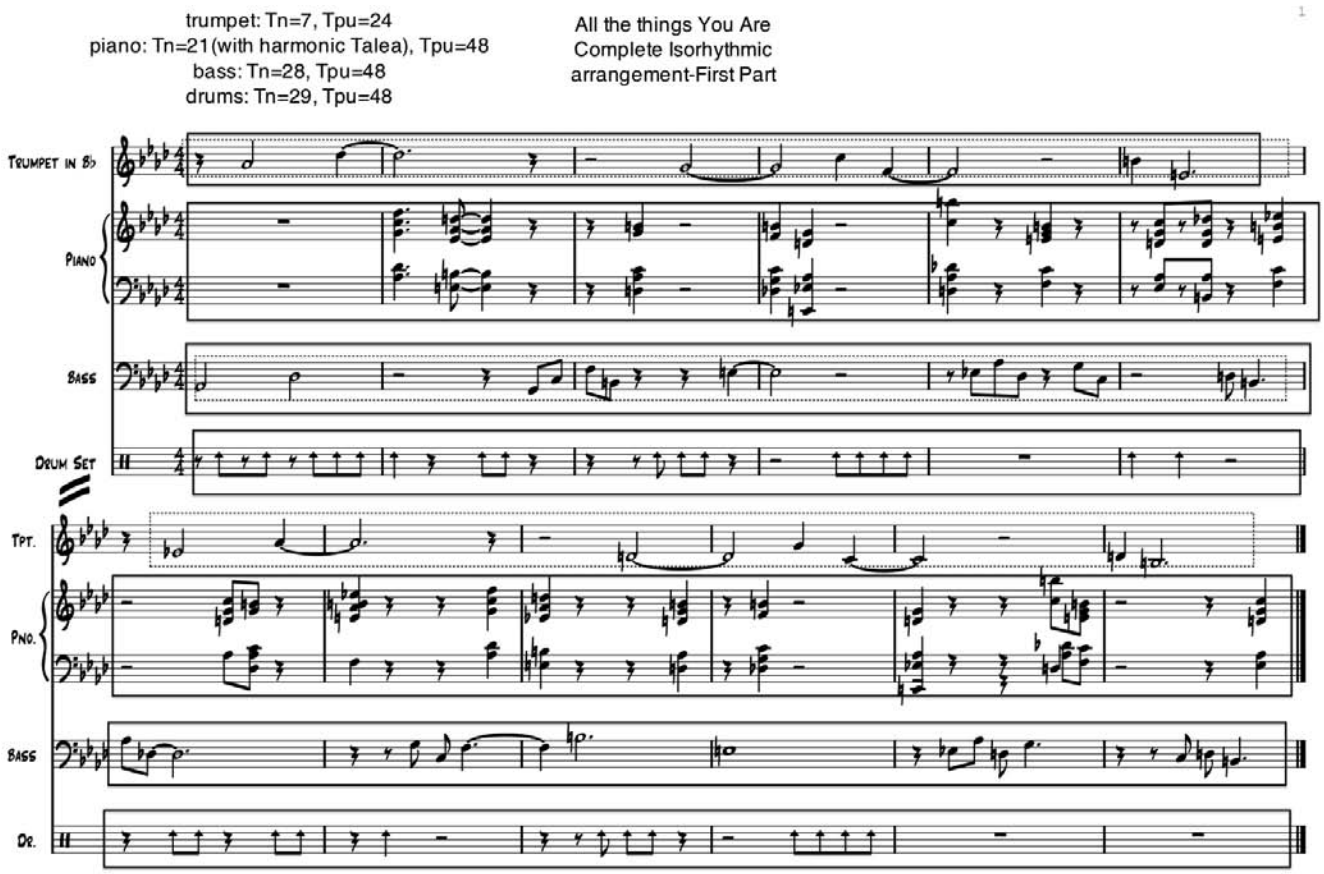
All the things you are ISO2

A. Coppini

The 3 voices use strictly the arrangement of the 14 pitches-Color creating 3 different cycles in the same number of bars

Soprano Sax
Alto Sax
Baritone Sax

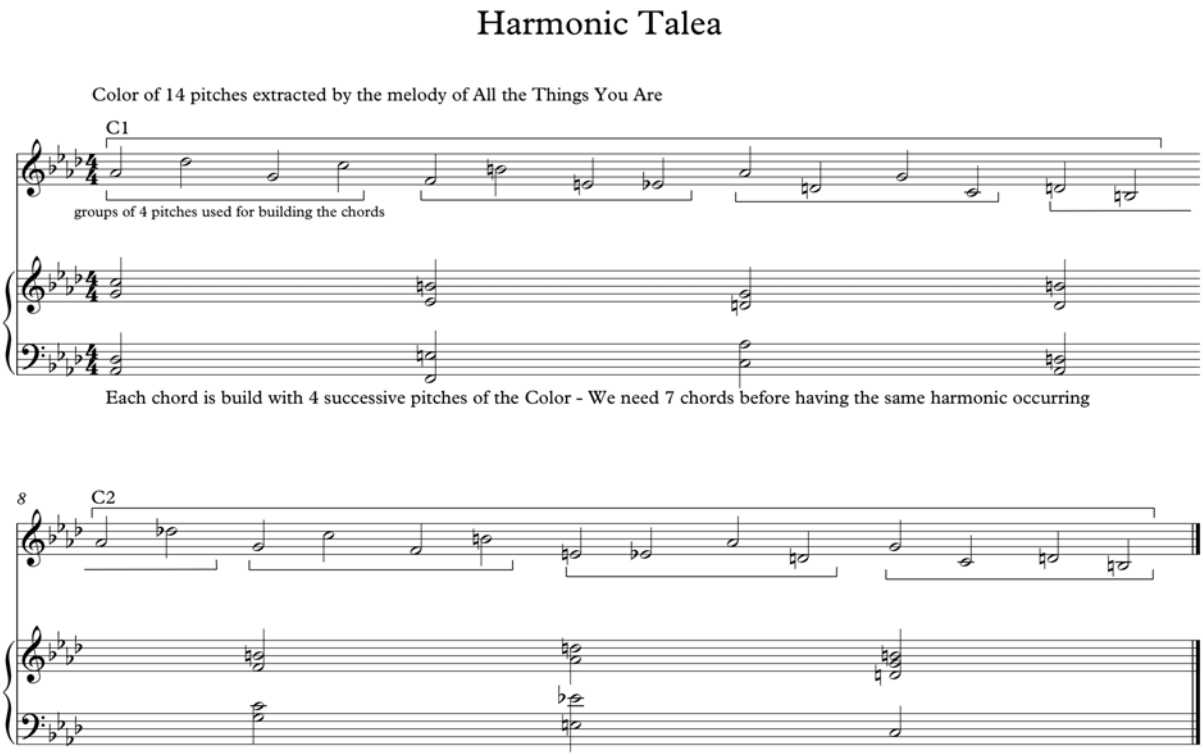
Ex. 3.10 – Arrangement of the 14 pitches of the *Color* extracted by *All the Things You Are*, for saxophone trio. The 3 *Talea*e are highlighted by the continuous line-boxes, the 3 *Color*es by the dashed line-boxes.



Ex. 3.11 – Arrangement of the 14 pitches of the *Color* extracted by All the Things You Are, for jazz quartet. As in the previous example the *Talea*e are highlighted by the continuous line-boxes, the *Color*es by the dashed line-boxes. For the piano part and his arrangement see the Ex. 3.12. **CD track n°13 (attached score 18)**

What is noteworthy here is the fact that I used almost only the 14 pitches to create melodic, bass, and harmonic lines, and the number of possible combinations really has amazed me.

I discovered another possibility of using the tool: the Harmonic *Talea*. I have actually used, in some piano parts, chords made by four or five notes. For creating the first chord I used the first four notes of the *Color* and so forth. Of course, also here there is a shifting that creates the possibility of more chords (see the example below):



Ex. 3.12 – Harmonic *Talea*

The arrangement of a rhythm section by the point of view of the *isorhythm*ic and cyclic techniques was challenging and interesting at the same time, since there were no examples of such an application of *isorhythm*.

I experimented different combinations with the whole rhythm section in unison (only one *Talea*) or with 2 or more different *Talea*e for each member of the section.

On regard to the melody I used my 14-pitches *Color* for Piano Chords and Bass line or added a different harmony upon the bass line build with the aforementioned *Color*.

For the Drums *Talea* I had not any problem of pitches and I could focus only to rhythm, creating counterpoint or unison in turn with Bass, Piano, or both.

There are examples of all this combinations in the attached scores.

Going back for a while to the Ex.3.11, it is a statement of the two first phrases of the song by using 3 different *Talea*e: in the Melody part, in the Piano part (harmonic *Talea*, see above), and in the Bass line. The Drums part is done with a rhythmic *Talea* in rhythmic counterpoint with the others.

Let us make an *isorhythm*ic analysis of this example. These are the numbers:

- Cycle 1 – Melody part:

Pitches of the *Color*	Cpi = 14
Notes of the *Talea*	Tn = 7
Talea repetitions	Tr = 2
Color statements	Cs = 1
Talea pulses (in quarter notes)	Tpu = 24

- Cycle 2 – Piano part:

Pitches of the *Color*	Cpi = 14
Notes of the *Talea*	Tn = 21

	Talea pulses (in quarter notes)	Tpu = 48
Harmonic *Talea*:	Notes of each chord	Chn = 5
	Talea of chords	Tchn = 14
• Cycle 3 – Bass line:	Pitches of the *Color*	Cpi = 14
	Notes of the *Talea*	Tn = 28
	Talea repetitions	Tr = 0,5
	Color statements	Cs = 2
	Talea pulses (in quarter notes)	Tpu = 48
• Ratios:	C1, *Color*/*Talea* ratio	2:1
	C1, *Talea* Pulses/Meter ratio	6:1
	C2, *Talea*/*Talea* chords ratio	3:2
	C2, *Talea* pulses/Meter ratio	12:1
	C3, *Color*/*Talea* ratio	1:2
	C3, *Talea* Pulses/Meter ratio	12:1

I want to do some considerations about this exercise. First of all, observing the numbers and the numeric ratios of each cycle, we can see that there are some analogies with the *Ars Nova* style but also some differences. In my example the ratios and numbers are similar to that of the *Ars Nova* but I have superposed 3 different cycles, each one with different length, in a way that meanwhile in one cycle there are 4 *Talea*e in the other two we can see two *Talea*e. Similarly, the *Color*, present in each cycle with the same pitch collection in the same order, is stated at a different length in a way that we have two *Color*es in the first cycle, three in the second one, and 4 in the third one, playing simultaneously and contained in the same number of bars. In this way I have obtained a shifting of the pitches of the *Color* to each other mixing them in different harmonic combinations. To these superpositions I added also the above Harmonic *Talea*. Moreover, the 3 *Talea*e have been build using an idea of rhythmical counterpoint to each other, filling the gap of each part.

As final consideration we can say that this example is only one choice among the many possibilities we have in combining cycles, numbers and different layers.

Nonetheless this example has been interesting and convincing and has pushed me to keep on finishing the arrangement and to do some other one for jazz quartet. It is possible to listen to some examples in the attached CD with all the audio and midi files. **(CD track n° 13)**

4. OLIVER MESSIAEN – THE CONTEMPORARY *ISORHYTHM*IC TECHNIQUE

4.1 The musical language of Messiaen - General considerations

4.1.1 Introduction

Treating now about the style and technique of Messiaen, I will observe them referring to the point of view of my research and the theoretical basis I have described in the 2nd chapter. Of course, in doing that, is not possible to avoid what the composer himself said about his music in the huge and exhaustive *Traité de rhythme, de couler et d'ornithologie*, or in his more synthetic *The Technique of My Musical Language*. The reading of this two important works is fundamental, in particular to better understand the point of view of the composer and his aesthetical goals. At the same time, I will try to make clear how techniques and principles used and stated by Messiaen fit the guidelines of my research. This is, as in the chapter about the style of *Ars Nova*, the best way to penetrate the different techniques and to get inspired by or to incorporate them in my music.

When I started approaching the music and techniques of Messiaen, I quickly realized the extreme complexity of his musical language. His techniques and principles work at different and several layers that, of course, interact to each other, creating his peculiar style. Therefore, I do not presume to treat here the details of his language that deserve a separate dissertation.

4.1.2 Rhythmic and Metric Conception

As a common thread of this research, I will start with the peculiar Messiaen's conception and use of Rhythm and Meter.

The rhythmic conception of Messiaen has been developed throughout what I consider three layers of complexity:

1- Monophonic rhythms, about how to create a single rhythmic line
2- Polyphonic rhythms, about how to superpose 2 or more of the previous rhythmic lines
3- Melodic and harmonic rhythms, how to apply melody and harmony to the superposition of rhythmic lines.

(Just a brief note. I am deliberately trying to use my terminology instead the one of the composer himself. I perfectly know that this can be a questionable choice but I have two precise goals. One is to incorporate the techniques and style in my personal language, and calling things with the words I have chosen is the starting point of this process. The other one, strictly connected to the previous one, is to filter my analysis and studies throughout the theoretical basis I have exposed in chapter 2. This is also a way for combining the result of a so wide research in a unitary vision)

4.1.3 Monophonic Rhythmic Lines

For the composition of monophonic rhythmic lines (that Messiaen calls simply Rhythms), he suggests three different techniques:

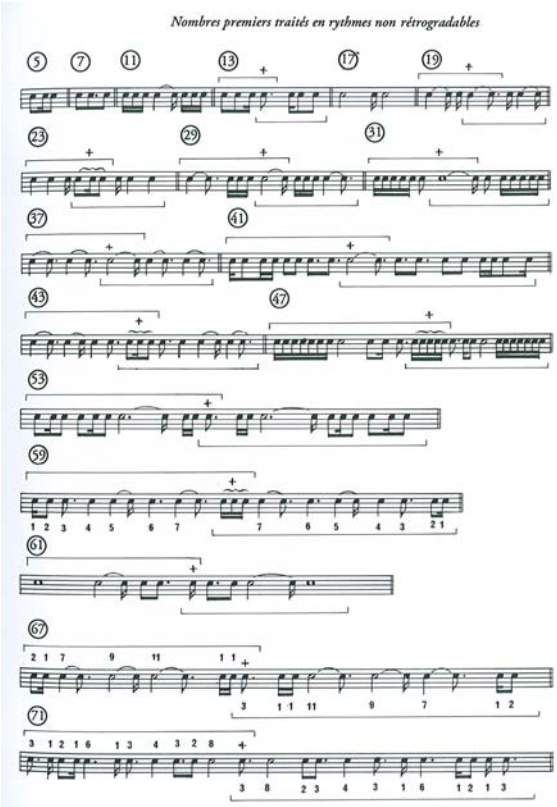
1- Added values
2- Augmentation and diminution
3- Nonretrogradable Rhythms

This is not the place for analyzing the details of these techniques, for which I suggest the reading of the two aforementioned treaties, but I want to point out the meaning of them in relationship with my theory of meters.

The stated goal of Messiaen is to completely avoid the metric organization of the classic European music, and his regularity. Does this mean that his music is completely non-metrical? Yes and no. Yes, in the sense of the metric organization of classic European music, with one meter per piece and everything related to it. No, if we see it in a wider meaning. In fact he creates very irregular rhythmic lines with the juxtaposition of values of different length, and the use of prime numbers for determining the durations of every single value, and of all the lines. But every line has always one common denominator that, most of the times, is the value of one-sixteenth note.

This is exactly what happens in African music, Indian music and in the *Ars Nova* and Franco-Flemish styles. They all share that, despite the irregularity of their use of Rhythm, there is a common denominator that is the divisor of the durations, and each duration is multiple of it. This common denominator is nothing else but what I have called the pulse or the 1/1 meter, often a fast and steady pulse.

The peculiarity of Messiaen, which he shares only with Indian music (but also with Bartok and even more with Stravinsky) is that, over the steady pulse (the common denominator or the 1/1 meter) he creates rhythmic lines that, actually, consist in a juxtaposition of different and constantly changing meters. Coming back for a moment to chapter 2, we can say that he uses the Polymetric principles with an additive organization or with an additive concept. For having a better idea we can have a look to this example, done by the composer himself and extract from his treatise *Traité de rhythme, de couler et d'ornithologie*. It represents a list of what he called *nonretrogradeable* rhythms, built with the use of prime numbers:



Ex. 4.1 – *Nonretrogradable* rhythms built using prime numbers.

We can say, therefore, that, at the basis of the rhythmic concept of Messiaen, there is a *Horizontal Polymetric principle*. The effect is to create a *disruption of regularity* also with only a monophonic line.

This is an important difference to point out in comparison to African music, where the polymetric concept occurs mainly in a polyphonic contest. In that music indeed we can observe the superposing of repeated rhythmic lines (patterns), each one with a different metric organization (see Ex. 2.12). It also true that each pattern can be also seen as made by juxtaposed different meters, showing the presence of a Horizontal Polymetric Principle also in this music (see the polymetric analysis of the same example). But the disruption is, in a way, regular since it is repeated in the same way each one or two cycles of 4 basic pulses.

The rhythmic conception of Messiaen instead, provides the use of different juxtaposed meters without any regular repetition of them and without containing them in any regular metric organization.

This is exactly the difference we have already pointed out about additive and divisive concepts or rhythm and meter.

Of course, the music of Messiaen is not reducible only to this principle. Actually, the repetition and a kind of regularity are also present in his music, but, because of their length and their complex construction, his structures avoid the organization of the common meters of Classical Western music.

I will come back again to this argument when I will treat the music of Ligeti and the cyclic techniques in jazz, but I would like to briefly consider some differences between these two approaches that have, however, many things in common.

First big difference: the Horizontal approach of Messiaen, about the single rhythmic lines, is not, so far, a cyclic technique. Does not provide any repetition, unless the repeated reversed values of the *nonretrogradeable* rhythms or the repetition of augmented and diminished values. But actually there is no cycle because there is no shifting between two parameters with different length. It is exactly the ratio of the various meters with the pulse (always 1!) that does not permit any shifting.

Let us go a bit further and try to focus on the acoustic effect of the two techniques. The Horizontal line of Messiaen gives to a listener two possible impressions:

1- If played at a medium/fast tempo it gives the impression of constant movements of accelerando or rallentando, or as continuous jumps in tempo and accents. It is not so easy to perceive and count the common pulse, because of the continuous changing, its speed and the fact that it is often not explicit.
2- If played at a very slow tempo it gives the impression of a rubato, floating time, free rhythm. To count the common pulse here could be easier, but sometimes the values are so long that one stops simply counting. Therefore, also the perception of the pulse itself is often lost.

So, already with one line we have a clear disruption of the (metrical) regularity. At this level we can also observe another phenomenon that is also a keyword of my research: the *Acoustic Illusion*. The two impressions I described before indeed are not real but only perceptions generated by the difficulty of finding a pulse. In this sense, the Horizontal lines can have an effect of disrupting the regularity in a way less predictable and more variable than the Vertical **Hemiola** techniques. On the other hand they can also bring toward the dissolution (at least in the perception) of the pulse.

Messiaen provides also a peculiar technique of development for the rhythmic lines based upon the adding or cutting of rhythmic values to each passage, both to *nonretrogradeable* rhythms and not. This is similar to the technique of adding values to a simple rhythm but spread on a more macro-level. He uses a similar melodic technique adding different pitches to an ostinato at each repetition.

4.1.4 Polyphonic Rhythmic Lines

From the building of a single line, and using the same principles, Messiaen goes to another layer thus creating complex and interesting structures. He describes at least 7 different possible types of superposition of rhythmic lines:

1- Overlapping of Patterns or lines. Superposition of rhythmic patterns with different length (or metric organization, this is the case in which the structure coincides with that one of African music)
2- Superposition of one ostinato pattern upon its series of augmentations and diminutions.
3- Superposition of one ostinato pattern upon its ostinato retrograd or upon a *nonretrogradeable* rhythm.
4- Rhythmic canons. Canons created with rhythmic lines.
5- Rhythmic canons with augmentation or diminution.
6- Canons of *nonretrogradeable* rhythms.
7- Rhythmic pedals. An extension of point 1. The patterns can be very long and also formed with *nonretrogradeable* rhythms. The superposition of the patterns, always shifted, creates a cycle repeated several times that is called *pedal* by Messiaen because it is the background for upper or melodic voices.

Considering all these possibilities just by a rhythmic point of view we can say that here Messiaen uses what I called a Vertical Polymetric principle. The rhythmic lines, most of the times already polymetric or metrical disrupted, are superposed thus creating a very complex multi-layer polymetric structure. In this sense this principle is very similar to that one of African music and all the other styles where a Vertical Polymetric Principle is used.

Since the superposed rhythmic lines are often repeated patterns, we can say also that this is for sure a cyclic technique or a cyclic principle at the rhythmic level.

Also here we can have an acoustic illusion that is the perception of a *super-rhythm*, a rhythm that does not exist but that is the result of the superposition of different layers.

It is noteworthy here the large use that Messiaen does of the so-called "canonic variations", in particular augmentation, diminution and retrograde. The first two techniques started to be used largely in the *Ars Nova* style.

4.1.5 Melodic and Harmonic Rhythms

In each one of the aforementioned 7 points Messiaean provides the possibility of applying melodies and harmonies to his rhythmic lines. In this sense he gives two possibilities:

1. Melodic/Harmonic ostinato applied to a coincident rhythmic ostinato
2. Melodic/Harmonic ostinato applied to a not coincident rhythmic ostinato

Is clear that on point 1 we have a real ostinato, whereas on point 2 we have nothing else but a modern version of the *isorhythm*ic technique, with a clear shifting between rhythmic and melodic/harmonic patterns.

I will analyze more in details some pieces in which these techniques are used and combined together. For the time being we can say that Messiaen adds another layer of complexity. The shifting between melody/harmony and rhythms creates other cycles, often overlapped to rhythmic cycles, which provide the possibility of several repetitions with always different occurring of the same material.

As I have already done with the Motets and compositions of the *Ars Nova* style, I will analyze some pieces of Messiaen not in a so descriptive and detailed way, but trying to get an idea, also using quantitative analysis, of the variations and different applications of the techniques to different pieces. I will also use some of the analytical concepts I developed during the analysis of the *Ars Nova* style.

4.2 Liturgie de Crystal from Quatuor puor la fin du temp – An isorhythmic analysis

4.2.1 Introduction

This piece is a wonderful example of the use of a large number of the techniques described above, and of their combination in a multi-layer structure with a high degree of complexity.

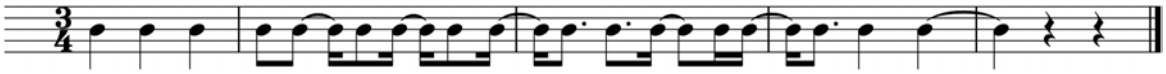
Following my theoretical premises, I will start the analysis from the level of rhythm and meter.

4.2.2 Metric Analysis

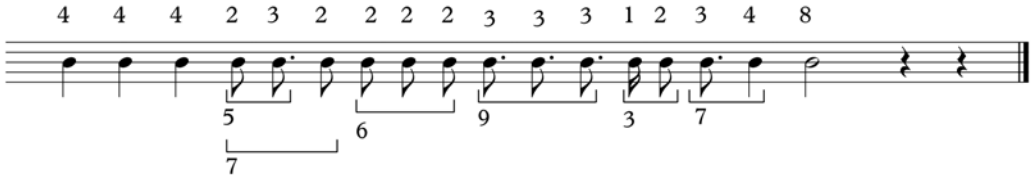
As anyone knows, the piece is a quartet for violin, clarinet, cello and piano. In this movement, the first one, the roles are clearly divided in two couples of instruments. In fact the piano and cello play a part of accompaniment throughout the piece, meanwhile violin and clarinet play melodic variations in a very free way, imitating the singing of birds and angels. My analysis will focus exclusively on the accompaniment part of piano and cello, which Messiaen calls *Rhythmic Pedal* and that, actually, is a very complex and elaborated *isorhythm*. In fact both instruments play two different repeating rhythmic patterns with at least 3 levels of shifting: with the basic meter, with each other and with the pitches or chords combined with them.

Before analyzing the superposition of the different patterns it is worth to have a look to the rhythmic (or metric) structure of each rhythmic line.

Here are 3 different transcriptions of the piano pattern, each one showing different point of views:



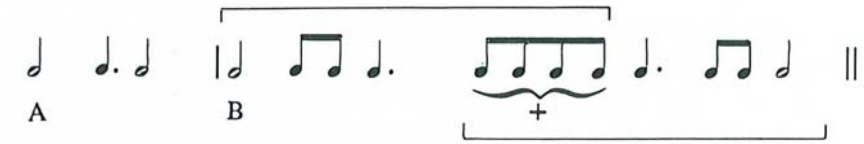
Ex. 4.2 – Liturgie de Crystal – Subdivision of the piano *Talea* in according to the formal meter 3/4



Ex. 4.3 - – Liturgie de Crystal – Subdivision of the piano *Talea* with each value belonging to a different implied meter

Ex. 4.4 – Liturgie de Crystal – Subdivision of the Piano *Talea* proposed by Messiaen

And here is a transcription, proposed by Messiaen, of the *Talea* played by the cello:



Ex. 4.5 – Liturgie de Crystal – Subdivision of the Cello *Talea* proposed by Messiaen

In the first example we can see the pattern in relationship with the basic meter of 3/4. In the second one we can see the pattern subdivided like if any single note belonged to a different metric organization, with other suggested possible organization. In the third one we can see the metric organization proposed by the composer himself.

In the last one (ex. 4.5) it appears very clearly the origin of the patterns according to the theory of Messiaen. In fact the cello pattern derives from the juxtaposition of two *nonretrogradeable* rhythms, one of 11 and the other one of 22 pulses (eights) with a total of 33 pulses.

The piano pattern instead is formed by three of the *Deci-Talas*, the Hindu rhythms that Messiaen used in his technique. These three rhythms seem formed by the juxtaposition of simple 2 notes and 3 notes-rhythms and their respective augmentation or diminution. They form a pattern of 17 notes with a total duration of 13 pulses (quarter notes) or 26 pulses (eight notes). From this moment on, I will start to call these patterns *Talea*e, by analogy with the rhythmic patterns of *Ars Nova* style. In the same way I will call the melodic or harmonic patterns arranged by the *Talea*e, *Color*es.

Thus we can see as, at a horizontal level, Messiaen uses polymetric rhythmic lines that fit perfectly to his principle of avoiding the metric organization of European music, or, as I like to say, of disrupting the regularity.

4.2.3 *Isorhythm*ic Analysis

But these *Talea*e are played together, and each in combination with different *Color*es. To have a look at what happens with the superposition we need to use a quantitative analysis. Let us define the needed numbers.

I will call the cello pattern *Talea* 1 (T1) and the piano pattern *Talea* 2 (T2). These are the needed numbers for the analysis:

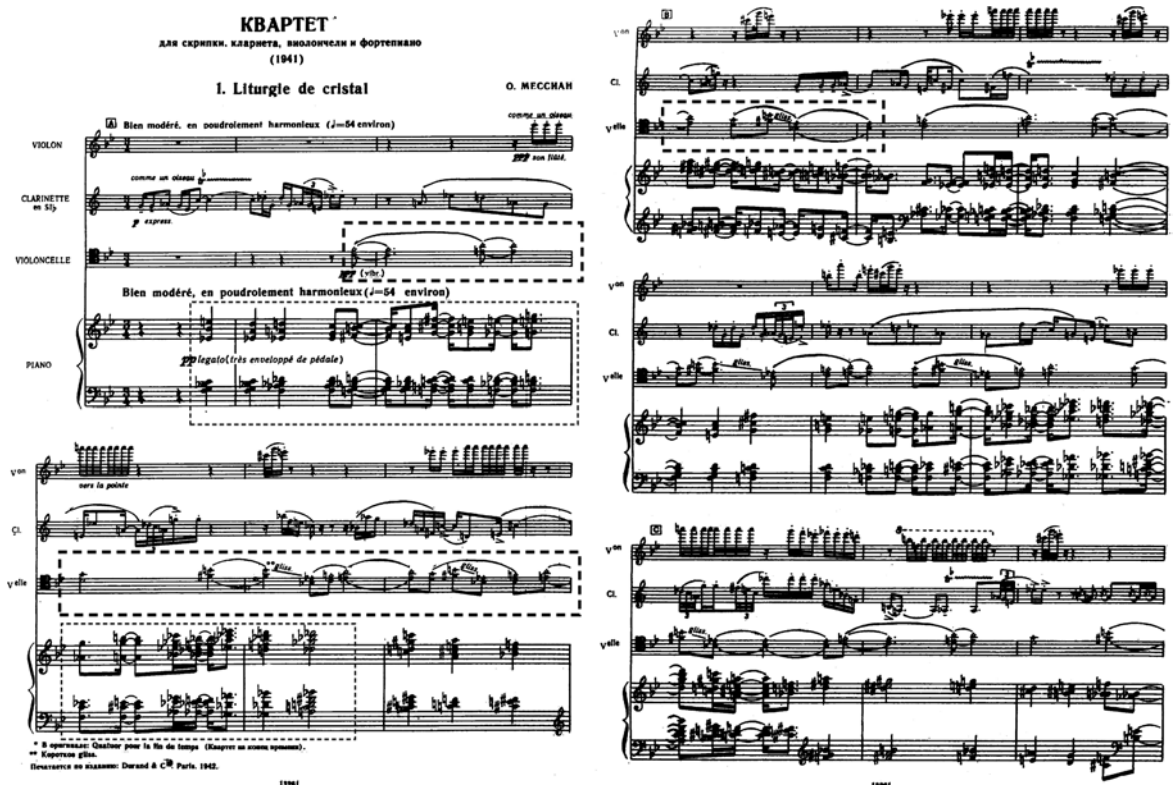
Talea 1 (cello)

- Number of notes, T1n=15
- Number of pulses, T1pu=33 (eights)
- Number of pitches of the arranged *Color*, C1pi=5

Talea 2 (piano)

- Number of notes, T2n=17
- Number of pulses, T1pu=13 (quarter) 26(eights)
- Number of pitches of the arranged *Color*, C1pi=29

In the following example we can see the beginning of the piece with the two-highlighted *Talea*e:



Ex. 4.6 – Liturgie de Crystal – mm 1-15

Since we have to consider also the relationship with the basic meter we need also the 3/4 numbers and its possible subdivision in eights (6/8) or sixteenth (12/16)

4.2.4 Considerations

We need to observe at this point that, among the numbers that we collected, there is a large use of prime numbers and we can find just one couple of numbers in relationship of multiple/divisor to each other, the cello *Talea* notes, 15 and the number of pitches of the *Color* arranged by it, 5.

We already know that different numbers provide the shifting and the consequent cycle. The less the different numbers are multiple/divisor to each other the longer will be the cycle before having the same occurring. So, <u>using prime numbers is a very effective way for having the longest cycles as possible</u>. Actually, Messiaen does not use all the repetitions implied by his cycles and ends the piece very earlier. For the sake of clarity he ends the piece at the 8th repetition of T1, and at the 10th repetition of T2. Furthermore, he does not wait the finishing of the cycles and interrupts them in their middle.

To understand what happens when the patterns are overlapped and which relationship is created among them in order to create a cycle, the best way is to refer to a series of ratios between the numbers showed above. I will start from the lowest or most internal layer and then I will proceed layer by layer, like in a *matryoshka* doll or in an artichoke, but in the opposite direction, instead of from outside to inside I will go from inside to outside.

4.2.5 Metric layer

The first shifting I have to consider is the one between the two *Talea*e and the number of pulses of the basic meter.

These are the ratios:

- T1pu:Mpu=33:6 (we have to consider 6 as pulses of the meter because the pulses of the *Talea* are expressed in an eighth subdivision) = 11:2

- T2pu:Mpu=26:6 = 13:3

These two ratios are the measurement of the cycle, and mean that, for having the same occurring between the *Talea*1 and the meter, we need 2 repetitions of the *Talea* and 11 bar of 3/4. In case of *Talea*2 we need 3 repetitions over 13 bars.

I want to consider also the ratio between the two *Talea*e. These two patterns indeed can be considered as two meters superposed to each other. Their number of pulses determines the length of each meter.

The ratio is:

- T1pu:T2pu = 33:26

That means that, by a metric point of view, the two meters will coincide only after 26 repetitions of *Talea*1 and 33 repetitions of *Talea*2.

4.2.6 Melodic/Harmonic layer

Then we will consider the melodic or harmonic patterns arranged by the two *Talea*e. I have already called them *Color*1 (C1) and *Color*2 (C2).

The ratios are:

- C1pi: T1n = 5:15 = 1:3

- C2pi:T2n = 29:17

This means that for having the same occurring in these cycles I need 1 repetition of *Talea*1 with 3 repetition (statements) of *Color*1, and, for *Talea*2, I need 29 repetitions with 17 statements of *Color*2.

That is all about the rhythmic and metric structure. We can easily say also that this structure is actually the form itself, is the fundament of the whole piece. In this sense we have a strong similarity with the *Isorhythm*ic technique of *Ars Nova*. As we already know, also there we have the *Talea*e that, repeated with the different occurring of the *Color*es, are the skeleton of the whole piece. The great difference is a huge injection of irregularity through the use of the Horizontal and Vertical Polymetric principle, the use of prime numbers and the use of a multi-layer cyclic technique. Nonetheless all these development were already potentially present in the *Ars Nova* style.

As I have already done with the *Ars Nova* style, I hereunder show a table for the quantitative and qualitative analysis in which I put some examples of the result of the analysis of other pieces of Messiaen:

Title	*Basic Meter*	*Formal pulse and speed*	*Polymetric common pulse*	*Number of overlapped cycles*	*Number of notes of the Color for each Cycle*	*Number of notes of the Talea for each Cycle*	*Number of pulses of each Talea*	*Color-Talea ratio*	*Talea pulses/Basic meter pulses ratio*	*Talea pulses ratio between the cycles*
Liturgie de Crystal	**3/4**	**crotchet=54 bpm**	**semiquaver =216 bpm**	**2**	**cello Color (Cp1)=5 pitches piano Color(Cpi2)=29 chords**	**cello Talea (Tn1)=15 notes piano Talea(Tn2)=17 notes**	**cello Talea (Tpu1)=33 quavers piano Talea(Tpu2)=13 crotchets**	**Cello=1:3 Piano=29:17**	**Cello=11:2 Piano=13:3**	**Tpu1:Tpu2=33:26**
Amen de la Creation	**4/4**	**quaver=50 bpm**	**semiquaver =100 bpm**	**3 (1 ostinato)**	**Cycle1 Color (Cp1)=3 chords Cycle2 Color (Cpi2)=3 chords Cycle3 Color (Cpi3)= 21 chords**	**Cycle1 Talea (Tn1)=88 notes Cycle2 Talea (Tn2)=31 notes Cycle3 Talea (Tn3)=21 notes**	**Cycle1 Talea (Tpu1)=106 quavers Cycle2 Talea(Tpu2)=58 quavers Cycle3 Talea(Tpu3)=64 quavers**	**C1=3:88 C2=3:31 C3=1**	**C1=53:4 C2=29:4 C3=8:1**	**Tpu1:Tpu2=53:29 Tpu1:Tpu3=53:32 Tpu2:Tpu3=29:32**

Table 4.1 – Example of quantitative analysis of *isorhythm*ic technique in 2 compositions of Messiaen

Of course I have to point out again that the style and the various techniques used by Messiaen are not at all strictly reducible to the *Isorhythm*ic technique, that is only one of the different choices he does, and that I have already briefly treated in paragraph 4.1.4.

4.3 Application of the Messiaen's techniques to jazz - Exercises

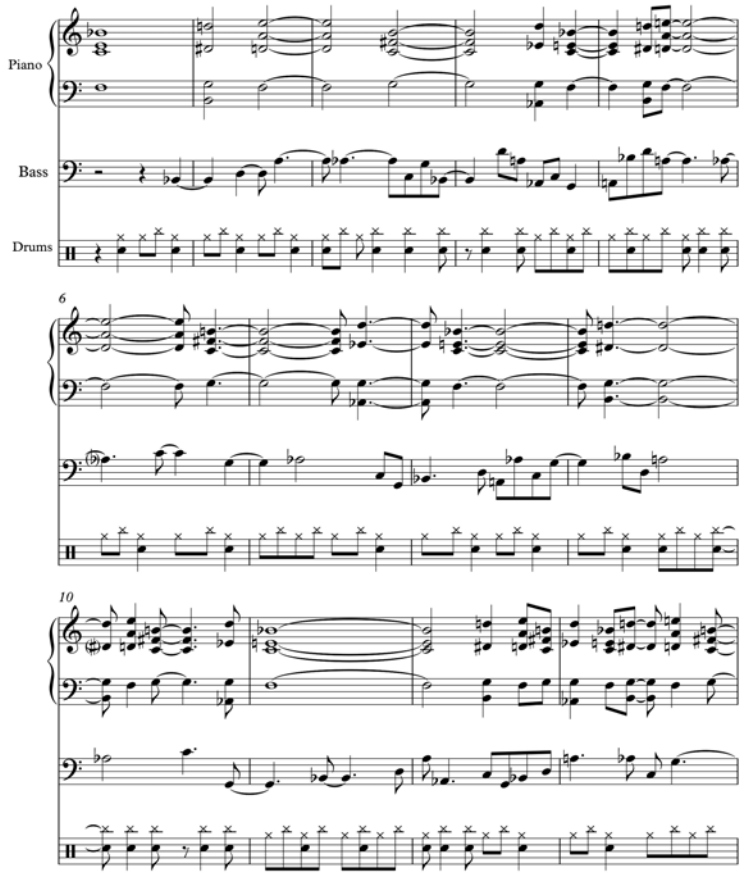
4.3.1 Exercise n°1

From this moment onward, instead of doing exercises and experiments on short sketches, as well as I have done with the techniques of the composers of *Ars Nova*, I have begun to use or apply the principles and techniques I was studying directly in my compositions.

Nonetheless, I have done one exercise consisting in the application of the Messiaen's techniques to jazz. It is a piece of 2 minutes ca, for jazz rhythm section (dr, b, p) in which I have used 3 different cycles. I have created the cycle for the piano by using 5 chords on a *Talea* of 39 notes. For the bass I have created a cycle arranging 6 pitches with a *Talea* of 15 notes. The drums plays a repeated pattern lasting 26 pulses (quarter notes). The pattern, as well as the other *Talea*e, is built using a Horizontal Polymetric Principle with the Messiaen's technique of additive rhythms. The juxtaposed meters can be interpreted with this succession (considering 1/8 as the common pulse): 4 – 4 – 4 – 2 – 3 – 2 – 2 – 2 – 2 – 3 – 3 – 3 – 1 – 2 –3 – 4 – 8.

Here is a transcription of the beginning measures. The complete score is among the attached scores:

Exercise on Messiaen's techniques 1



Ex. 4.6 – Exercise on Messiaen's technique – mm 1-13.**CD track n°14 (attached score 19)**

4.3.2 Conclusions

To conclude this chapter I can say that I find interesting the previous exercise. It can be a background for other instruments that can play melody above but it can also be a part of a longer piece. In the techniques of Messiaen applied to jazz I find interesting and deserving to be deepened the following principles:

- The use of *isorhythm*ic technique on very long cycles without worrying about the regularity of meters and structures
- The use of *isorhythm*ic technique applied to harmony and chords
- The technique of additive rhythms, that we can call a Horizontal Polymetric Principle without regular repetition, or with repetition only after a very long cycle

Especially the latter can be a very effective way for the disruption of regularity, also in a "groove-related" music like Jazz is.

5. GYORGY LIGETI – THE CHAOTIC ORDER

5.1 Introduction

Talking about Ligeti and the connections between his works and this research, I need to come back for a while to the chapter about the theoretical basis of my research.

If I would find one or some keywords for the ideas and compositional approaches of him, for his whole life and works, I doubtless would say that they coincide with some keywords of my research, which are: shifting, cycles, overlapping, disruption of regularity, or regular-irregularity.

Of course, the composer himself used different words when he described his various techniques of composition, like wave patterns, micropoliphony, clocks and clouds, canons, etc. but, despite the terminology, deepening the poetic and techniques of Ligeti, I discovered that they are really interesting and close to the subject of my research.

5.1.1 Style and Periods

As well as I have already done with Messiaen, I am not going to deepen and analyze the complete work, poetic and art of Ligeti, but just some compositions and some compositional techniques, filtering them through the specific point of view of my research and through the theoretical premise I exposed in chapter 2.

One thing to say is that, in comparison with the other two periods/composers I have discussed in the previous chapters, Ligeti's approach focuses more on a metric/rhythmic level. This does not mean that melody or harmony do not participate in the cyclic techniques he uses, but, in my opinion, more on a background level, sometimes as a consequence and not a cause of the shifting cycles. I would also say that Ligeti deals with the principles of shifting and displacement more on a micro-level than the other composers and periods previously analyzed.

According to the literature, we can divide the style and the consequent compositional techniques of Ligeti in two periods:

1. From 1958 until 1980's
2. From 1980's until his death

There is, of course, a lot of articles and analysis about the music of Ligeti and the main differences between the two periods, but which is the main difference, looking at them through the lens of my research?

In order to give a clear vision of the different use of the shifting principles by Ligeti I will analyze three pieces belonging to different periods:

1. String quartet n°2 (1968)
2. Continuum – for Harpsichord (1968)
3. Désordre – for piano (1985)

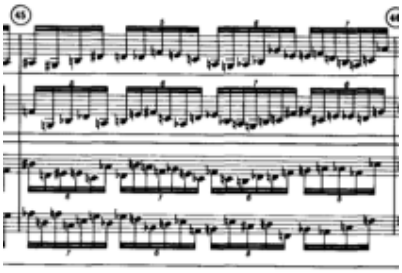
5.2 String quartet n°2 (1968) – Analysis

About this string quartet I will not do a complete analysis of the entire composition. Instead I will analyze some fragments in order to have an idea of the use of Polyryhthmic and Polymetric principles in the style of Ligeti.

In this period Ligeti himself called *Clocks* the structures generated by these techniques as opposed to another kind of structures called *Clouds*. In 1972 he composed a piece for orchestra called indeed *Clocks and Clouds*. Basically, *clocks* are precise rhythmic structures that gradually can be transformed, with techniques of blurring, into diffuse soundscapes not rhythmically defined anymore that are *clouds*. As examples of the first conceiving of this idea we can quote the *Poeme Simphonyque for one hundred metronomes* and, indeed, the two pieces I am going to analyze here under.

The technique that Ligeti uses in his String Quartet n°2 for obtaining his *clocks* or, as he says other times the *meccanico* textures (referring to structures that remind him the working of a skewing machine), is basically always the same, used in a huge number of variations. He preserves the barlines and thus the metric organization but, inside each bar, he juxtaposes and superposes several irregular subdivisions of the pulse, one after and on to each other. So he juxtaposes and superposes, in the same bar, triplets, four sixteenths groups, quintuplet, sextuplet, septuplet, groups of 9, 10, 11, 12, 13 and so forth.

Here is an example:



Ex. 5.1 Ligeti String Quartet n°2, 1st mov., m45

As we can see, in this bar there is the following scheme of juxta- and superposition:

Vl1	4	5	6	7
Vl2	5	6	7	6
Vla	6	7	6	5
Cell	7	6	5	4

Table 5.1 Ligeti String Quartet n°2, 1st mov., m 45, metric scheme

Let us briefly define the characteristics and the results of this technique by a rhythmic, metric and perceptive point of view:

- Apparently, the meter is preserved because the different subdivisions do not cross the limit of each pulse
- Actually, because of the movement of each line at a very fast speed, is very hard to perceive the basic pulse (here 4/4), even if they coincide at that level
- In according to what I exposed in chapter 2, we can see this bar as a very complex kind of cross-rhythm but we could also theoretically find a common denominator that is the real basic pulse. The problem is that this denominator would be actually too little for being counted and perceived. We can say that Ligeti obtains here a *pulverisation* of the pulse in a way that it is not perceptible anymore.
- So the final result is a constant changing sound texture generated by precise rhythmic structures (*clocks*). The listener can hear *accelerando* or *rallentando*, changing of texture or density or harmony, but always instable, irregular, and eventually, the effect is a *fusion of successive events in an acoustic illusion of simultaneity*. What we perceive actually is a kind of **Continuum** of sound.
- By the point of view of my theoretical premises I can define this technique a Polymeter with same measure and different pulse (Polymeter preserving the measure). Actually is not possible to reduce it to a Polymeter preserving the Pulse. Nonetheless both a Horizontal and Vertical Polymetric principles are present in it.

In the following table I have put the scheme of some juxta- and superposition of the first movement of the quartet. Where numbers are not there is because the part is not participating, at that moment, in the polyrhythmic texture.

4	5	4		4	3	4	5	4	3	4	
3	4	5		4	4	3	4	5	4	3	
			5	4	3	4	5	4	3	4	
			4	5	4	4	4	3	4	4	

Table 5.2 Ligeti String Quartet n°2, 1st mov., mm 15/19

5	4	3	4	5	4	3	4	5	4	3	4	5	4	3															
4	5	4	3	4	5	4	3	4	5	4	3	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5
4	3	4	5	4	3	4	5	4	3	4	5	4	3	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4

Table 5.3 Ligeti String Quartet n°2, 1st mov., mm 23/32

4	5	6	5	4	5	6	5	4
5	4	5	6	5	4	5	6	5

Table 5.4 Ligeti String Quartet n°2, 1st mov., mm 33/36

																		4	5	6	7	6	5	4	5	6	7
																		5	6	7	6	5	4	5	6	7	6
4	3	4	5	4	5	4	5	4	5	6	5	6	5	6	7	6	7	6	7	6	5	4	5	6	7	6	5
3	4	5	4	5	4	5	4	5	4	5	6	5	6	5	6	7	6	7	6	5	4	5	6	7	6	5	4

6	5	4	5	6	7	7	6	5
5	4	5	6	7	6	6	7	6
4	5	6	7	6	5	5	6	7
5	6	7	6	5	4	4	5	6

Table 5.5 Ligeti String Quartet n°2, 1st mov., mm 39/49

The previous tables represent some succession and overlapping used for some *clocks*. The divisor lines represent the barlines. Each irregular subdivision is written in sixteenths, apart from the number 3 that here means an eight-triplet. Each one of these "clocks" starts or finishes in some "cloud" throughout the whole movement.

In the third movement (Come un meccanismo di precisione) Ligeti applies perfectly his idea of a *skewing machine*. In fact the four strings start together at the same speed and with the same rhythmic values. But, from the second measure onward, the subdivisions begin to be different in each part, and Ligeti creates a very effective accelerando, always shifted (and so *skewing*), until a moment in which the musicians must play as fast as possible, forgetting the meter and the rhythmic values. This is the moment of the *fusion of successive events in an acoustic illusion of simultaneity.* We really perceive here a *continuum* sound.

Here is the table of the development of this part (meter 2/2 – subdivisions are in eights until number 8, sixteenths until number 15, and Thirty-seconds over 15)

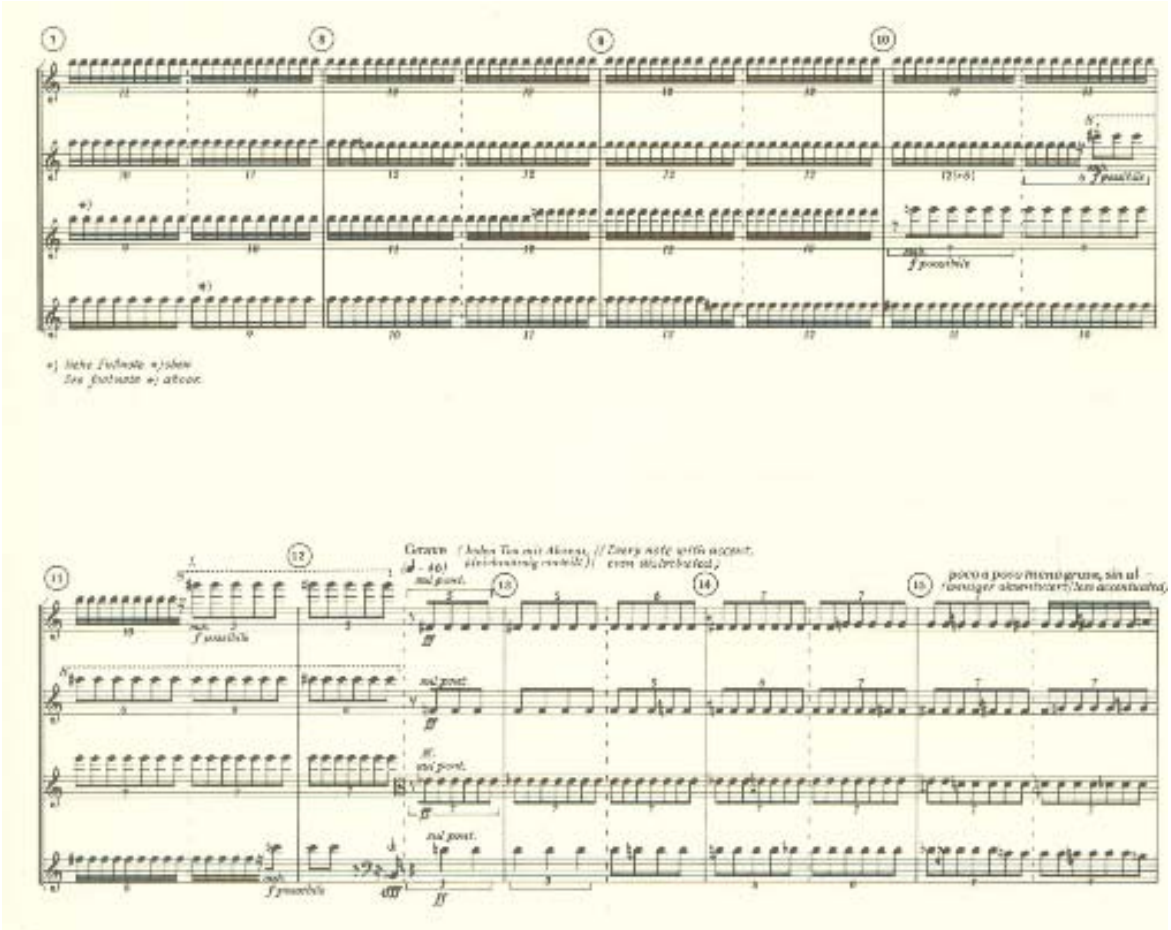
4	4	5	6	7	8	9	10	11	12	12	12	12	12	12	12	10	5	5	5	5	6	7	7
4	4	4	5	6	7	8	9	10	11	12	12	12	12	12	6	6	6	6	4	4	5	6	7
4	4	4	4	5	6	7	8	9	10	11	12	12	12	7	7	7	7	7	7	7	7	7	7
4	4	4	4	4	5	6	7	8	9	10	11	12	12	11	10	9	8	4	3	3	4	5	6

7	7	9	10	10	10	10	10	10	10	10	10	11	12	13	14	15	16	16	16	16	16	16	16
7	7	8	9	10	10	10	10	10	10	10	10	10	11	12	13	14	15	16	16	16	16	16	16
7	7	7	8	9	10	10	10	10	10	10	10	10	10	11	12	13	14	15	16	16	16	16	16
7	7	7	7	8	9	10	10	10	10	10	10	10	10	10	11	12	13	14	15	16	16	16	16

Table 5.6 Ligeti String Quartet n°2, 3rd mov., mm 3/26

As we can clearly see the progression is very precisely build. There are also moments in which the *clock*, let us say the *machine*, is synchronized.

Here is an excerpt of the original score:



Ex. 5.2 Ligeti String Quartet n°2, III mov., mm 7/15

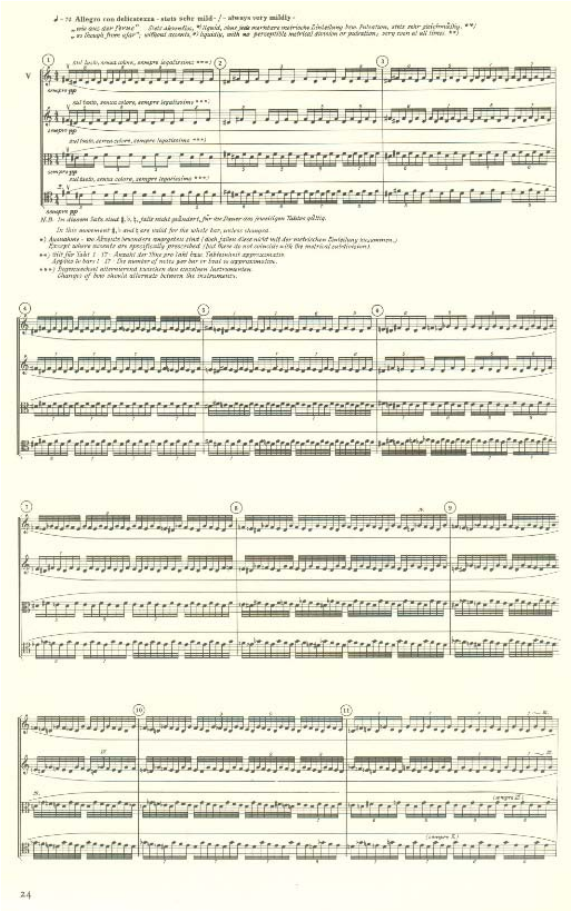
Looking at the two examples, there is something that, although is not the main subject of this analysis, nonetheless is worth mentioning. The two examples look very different on regard to the melodic/pitch material chosen and used in a very similar rhythmic technique. In the example from the third movement (Ex. 5.2) we have mostly repeated notes with a very low frequency of changing, despite of the very fast rhythmic repetition. This creates a kind of repeated chord with slow changing. In the first movement, instead, the pitches are organized in a kind of ascending/descending scales/arpeggios movements. These movements, in addition to create a counterpoint with contrary and parallel motions, also affect the rhythmic layer. Indeed, if a series of pitches (e.g. 3) with the same rhythmic duration have an ascending motion and are followed by 4 pitches with a descending motion, we perceive those pitches organized in two different metric structures (3 + 4), with the common pulse represented by the value of each note. We can say the same if the 7 pitches are organized in two sequences both in an ascending motion (e.g. C,D,E – D,E,F,G). This can happen at

the level of perception, even if the metric organization is not highlighted by accents. These are exactly what I have called in chapter 2 melodic/metric patterns.

The overlapping of different implied meters due to the organization of the melodic/metric patterns creates another layer that is superposed to the previously analyzed rhythmic layer. In this way we can observe the following layers:

1. A horizontal layer of the successive different subdivisions in each voice. We have here the ratios between the subdivisions and the basic pulse (4:1 – 5:1 – 7:1 etc.) and the ratios between each successive subdivision (3:4 – 4:5, etc.)
2. A vertical layer of the superposing of the different subdivisions between the different voices. The ratios are the same of above but in a vertical perspective.
3. A horizontal layer created by the superposing of the melodic/metric organization on the different subdivisions. The ratios are between the implied meter (e.g. 3) and each subdivision (3:3, 3:4, 3:5, etc.).
4. A vertical layer that is the vertical perspective of the previous one. We need to use two ratios for defining this layer.

Here an example from the fifth movement in which the melodic patterns are clearly organized as I have described above:



Ex. 5.3 Ligeti String Quartet n°2, V mov., mm 1/11

Getting to the conclusion of this analysis, what can we say about the use of cyclic techniques in this part of the style of Ligeti? I can say that they are present but not in a large scale and with not so much importance as they have in the *Ars Nova* or in Messiaen's style.

First of all we have very short cycles due to the superposition of each subdivision to each other. It is easy to say that these cycles last exactly one pulse each and are defined by the ratio between the subdivisions themselves. Of course, in the case of four different subdivisions overlapped, the cycle is defined by a ratio like 3:4:5:6. There are other cycles formed by the overlapping of the melodic/metric patterns with the subdivisions and by the superposing of them in a vertical way. These cycles can be also longer than one subdivision and can create interesting cycles with the other voices. What I noticed is that, in my opinion, Ligeti is not too much interested in creating and ending each cycle. The effect he wants and reaches is that of constantly shifting something. My impressions is that he uses this melodic/metric patterns more for creating "acoustic illusions", using for example the same pitches to shift them in any possible way, than for creating a metric cycle.

5.4 Continuum for harpsichord (1968) – Analysis

In this piece, belonging to and written in the same period of the String Quartet n°2, Ligeti applies his concepts of *clocks* and *clouds*, acoustic illusion, *pattern-meccanico*, and fusion of successions, on an instrument actually not able to do sustained notes in any way. So the challenge was: how to obtain a continuous sound with the Harpsichord? To reach his goal Ligeti limited himself only to some of the techniques previously analyzed, composing a very clear and unitary piece.

The first goal to reach was what I have called the *pulverisation* of the pulse. Ligeti had developed two different techniques for obtaining it:

1. The overlapping of different and irregular subdivisions (as we have already seen in the String Quartet n°2)
2. Playing steady and fast durations (quavers, semiquavers, demisemiquavers) at a very fast tempo or as fast as possible. In this way the distance between the successive notes is cancelled, and the perception is that one of a continuous sound. This technique is also present, even if less than the other one, in the third movement of the String Quartet n°2. In this way also the concepts of pulse and meter do not make any more sense.

In Continuum, Ligeti choose the second solution. Indeed the piece is totally written in quavers, to be performed at a "Prestissimo" speed that Ligeti himself defines:

> "Extremely fast, so that the individual tones can hardly be perceived but rather merged in a continuum"

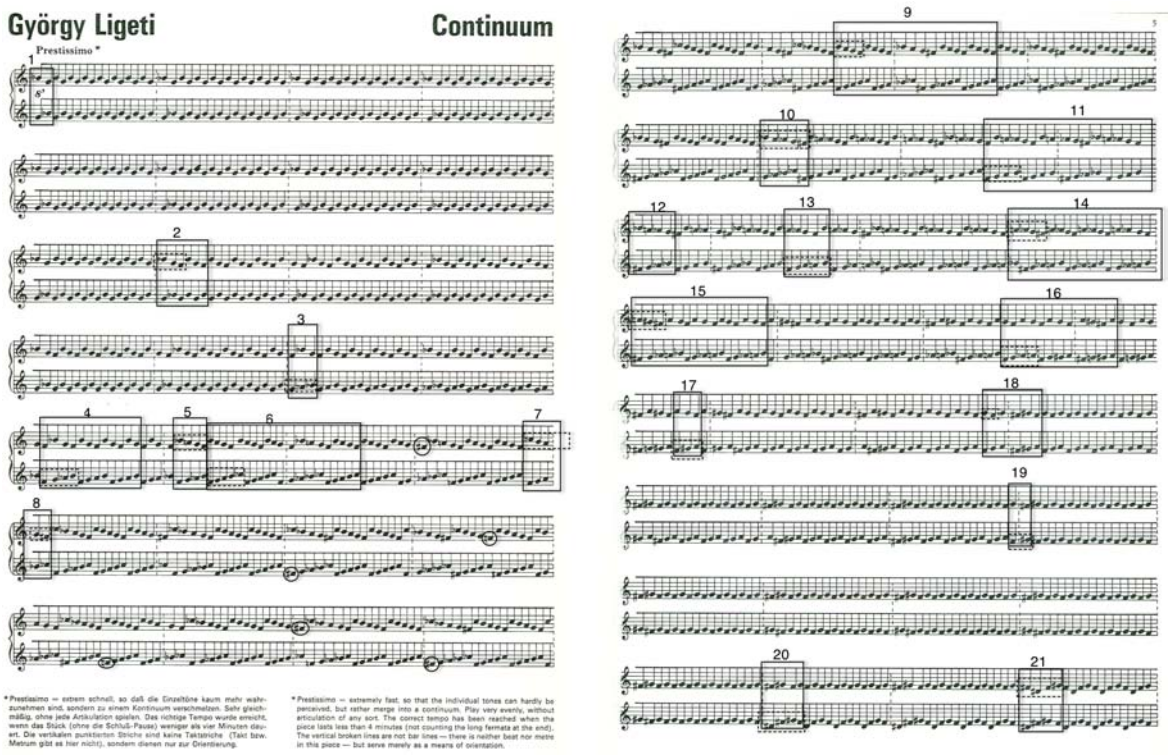
Then, on this level of very fast quavers he uses the idea, also already seen in the String Quartet, of melodic/metric patterns, very clearly organized in structures from 2 to 8 notes in each hand, with ascending and descending movements, most of the time in contrary motion. The melodic patterns use mainly stepwise motion (minor or major seconds), even if there are few moments in which the jumps can be larger (3rd, 5th,

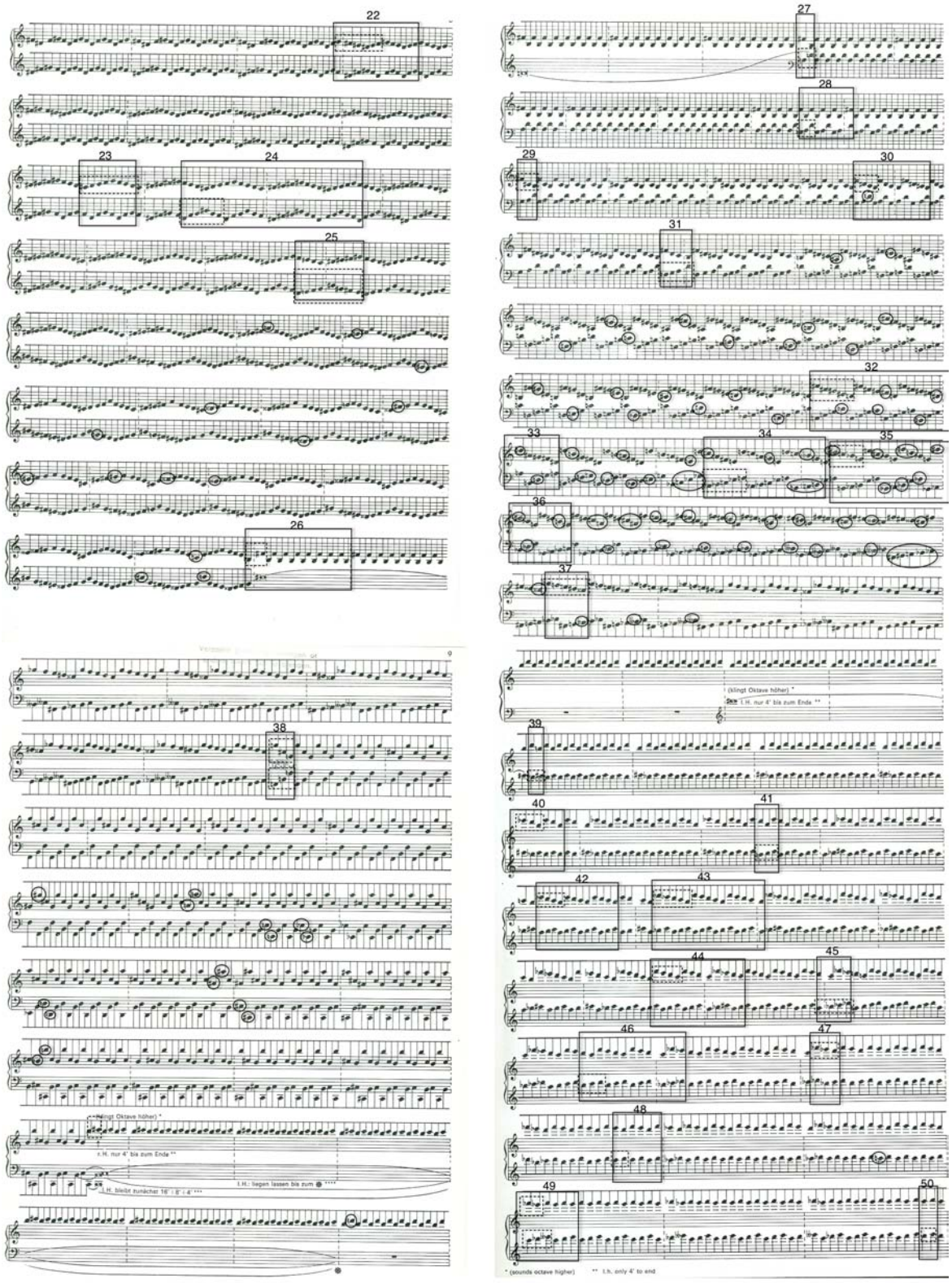
8th). Of course, the melodic/metric patterns are shifted. The shifting creates cycles that Ligeti here usually lets play beyond their conclusion, before starting a new one. As it happens in the String Quartet, there are some points of synchronization like balancing or resting points, and then the shifting stars again. The shifting is obtained in a very simple way.

The two hands start with a melodic pattern of two notes, the same notes, at a *minor* third of distance. So they coincide and the impression is to listen to a simultaneous interval of *minor* third. Suddenly, in a point that is not predictable and always at a different distance, one of the two hands adds a note to its pattern, creating the shifting. In this way we have a cycle based on the ratio of 3:2. This cycle finishes very quickly (after 2 of 3 and 3 of 2) but Ligeti keeps it for a while, almost as if he would like that a listener could appreciate the changing and the shifting. Again, some cycles later, also the other hand adds a note and starts with a three-note-pattern. But also these patterns are not synchronized in their motion because the second one starts in the middle of the first one, and thus the same material is presented in a different occurring. Indeed, one of the patterns (the first changed) starts in a different point in the new cycle, presenting itself in a different perspective.

The best way to understand what happens in the successive development of the piece is to have a look to the complete analyzed score. To better interpret the analysis:

- In the numbered boxes the cycles are highlighted in the moment in which they occur for the first time.
- The length of the boxes corresponds to the length of a complete cycle.
- The dotted boxes point out the changing pattern that origins the cycle
- The circled boxes point out the changing notes inside the same patterns

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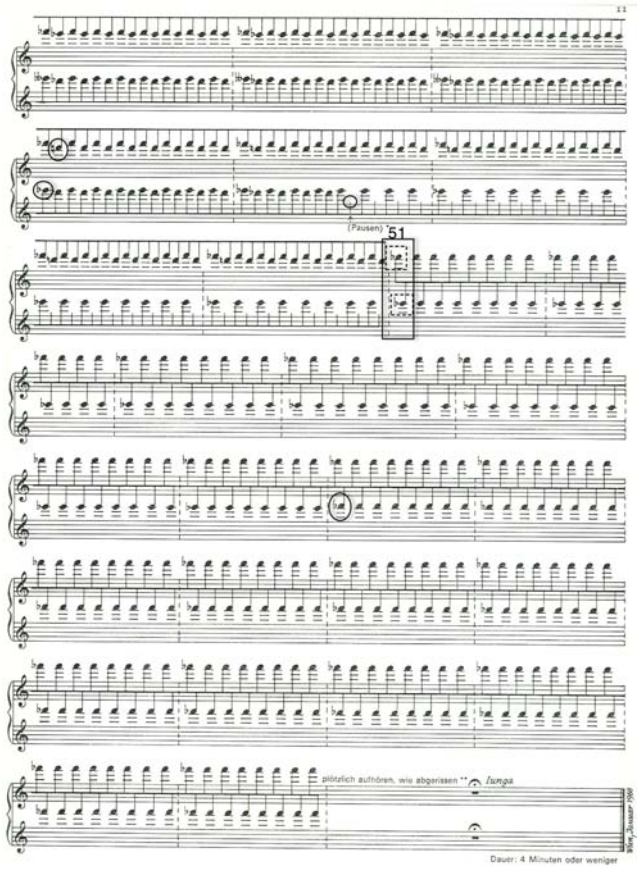
(klingt Oktave höher) *
r.H. nur 4' bis zum Ende **
l.H. bleibt zunächst 16' | 8' | 4' ***
l.H.: liegen lassen bis zum ● ****
* (sounds octave higher)
** l.h. only 4' to end



Ex. 5.4 Ligeti, Continuum for Harpsichord, complete analyzed score

Looking at the analysis we have to do some more considerations.

- The effect of continuum and fusion of successions is reinforced by the range of the two hands that, in the first part, stays on the same 3, 4 or 5 notes. In the middle the two hands separate themselves for coming back together at the end of the piece, in a high register and playing only one note, the same one.
- It is very interesting to observe how Ligeti, in such a limited piece, creates a development and a dynamic curve. The elements he uses are:
    - The number of pitches, increasing or decreasing
    - The different metric illusions created by the shifting of the melodic patterns
    - The range of the two hands
    - The harmonic result. Of course there are no proper chords in the piece, but each couple of melodic patterns, because of their length and the fusion of successions, sound as an actual chord, each one as a consequence of the melodic material.
    - Melodic material. Certainly this subject deserves a deeper analysis but we can say that the melodic material in both hands is mainly diatonic. We can see it as fragments of different modes combined in a way that both hands play on different modes at the same time. The resulting effect is chromatic but originated by diatonic structures. The position of the voicings in each hand suggests diatonic cluster chords that are the main harmonic structure in the

piece, but there are also intervals of perfect fifths (see box n° 26, 27, 28) and diatonic seventh chords (box 30,31,32). We can say that the melodic/harmonic progression has a curve of widening (range and intervals) and then narrowing again until the end of the piece.

- Coming back to the main goal of this research we can observe interesting things by the point of view of rhythm and meter. I think that, even if Ligeti wants to avoid the perception of meter and pulse, he actually does something that is, in this sense, contradictory. Indeed, the technique of playing the same fast durations, even if at a perceptive level creates an impression of a continuous sound, nonetheless is based on a clear and present steady pulse that is not subdivided anymore, as it happens instead in the superposing of different irregular subdivisions we saw in the String Quartet n°2. So, whatever happens in the piece, it happens at the layer of the pulse or at the layers of its multiples. Moreover it is true that there is no basic meter and that the vertical broken lines, as stated by the composer himself, "serve merely as a means of orientation", but, whenever a new melodic pattern appears by the adding of one note, we have an actual metric structure that is introduced in the piece and that is also, in a way, perceptible. So we can say that here are present both Horizontal and Vertical Polymetric Principles. Let us quote the composer himself from selected excerpts of Ligeti's interviews or conversations (Ligeti et al, 1983) about his compositional techniques regarding this piece:

> "What you perceive as rhythm is not rhythm coming from the succession of notes your fingers play. The actual rhythm of the piece is a pulsation that emerges from the distribution of the notes, from the frequency of their repetitions." (ibid p. 61).

- I would say, in other words, that the various implied metric structures create several rhythmic and metric perceptions that are always different from the basic pulse.
- Following this principle we can say that the cyclic techniques serve to create and to keep on for a while the acoustic illusion of a new rhythm generated by the superposed implied metric structures

For an interesting analysis of Continuum by different perspective as perceptual and psychological, and by the point of view of melodic/harmonic development, I can quote this interesting work: E. Cambouropoulos and C. Tsougras, *Auditory Streams in Ligeti's Continuum: A Theoretical and Perceptual Approach*, journal of interdisciplinary music studies spring/fall 2009, volume 3, issue 1&2, art. #0931207, pp. 119-137.

5.5 Piano Étude 1: Désordre (1985) – Analysis

5.5.1 Introduction

Before proceeding in the analysis of this peace I have to briefly mention the most important influences that Ligeti had at the beginning of the 1980's, even if they are well known and studied. Those influences were:

1. The compositions of the American composer Conlon Nancarrow (1912-1997). The compositional techniques of this composer provided the use of different speed at the same time in different voices. The effect was that of

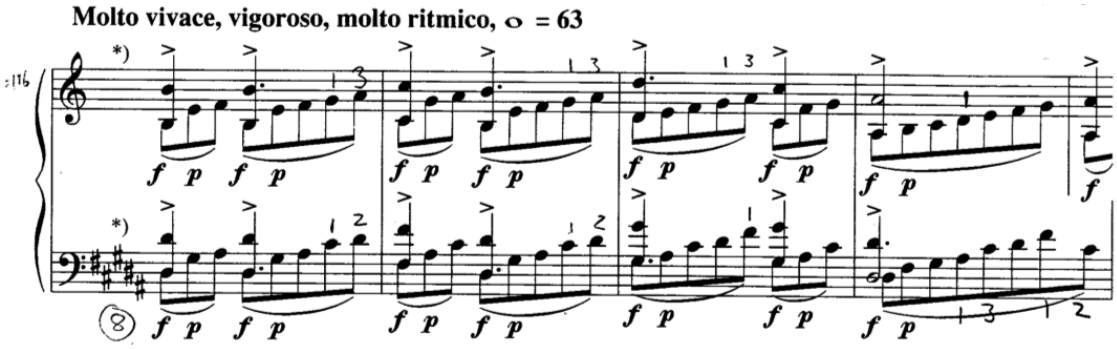
creating a very complex polyrhythmic structure, with all the characteristics of Cross-Rhythm or Polymeter preserving the measure.

2. The structures of African music in which repeating rhythmic patterns (*Talea*e) based on different rhythmic values, or different organizations of a basic pulse, are superposed for creating a steady meta-pattern. (See Ex. 2.12)
3. The **hemiola** principle, present in the whole history of European music, but for him especially present in the piano music of Chopin, Shumann, Brahms and Listz, and already treated in chapter 2.
4. The fractal theory. Briefly, a fractal is a geometric figure in which a single motif or pattern is repeated in a continuously decreasing scale. When examining just a small part of a fractal, the smaller part looks similar to or exactly like the whole fractal. We can say that, basically, a fractal is a detailed pattern repeating itself. Analyzing Piano etude n°1 we can easily see that it is build with small fragments very similar to each other, but subtly different at each repetition. I would call those fragments *modules* and thus, the technique for using them *modular technique*.

So we can say that, with the piano etudes, the goal of Ligeti was to experiment with Polyrhythm and Polymeter, using a *modular* and multi-layer-technique.

5.5.2 General Analysis

The whole piece is based on variations and recombining of a basic complex rhythmic/melodic pattern that is already fully present in the first line of the composition. Here is the pattern:



Ex. 5.5 Ligeti Piano etude n°1, Désordre, mm 1/4

This pattern is actually a multi-layer pattern. Indeed we can notice a pattern that is at the layer of each bar and that is rhythmically the same for the first two bars: we can see it as a juxtaposition of a 3/8 and a 5/8 meter that divides the virtual 4/4 (or 8/8) bar with a so-called additive rhythm. The pattern is build with the already treated technique of melodic/metric pattern. Then the pattern is inverted in the next bar (5+3) and varied in the fourth bar as a juxtaposition of a 7/8 meter.

The 3+5 pattern seems to be the basic "cell" of the piece, considering also its variations but, at a deeper look, we notice that the whole four bars-pattern is then repeated with the same succession of bars and this four bars-pattern is really one of the basic patterns that are the fundament of the whole piece. Here is one of the evidence of the influence of the fractal theory. Indeed the four-bars-pattern is a unity that is formed by smaller unities similar to each other. The four-bars-pattern can be

highlighted as [(3+5)+(3+5)+(5+3)+7] and, because of its use in building the form I called it *module.* It is a clear example of Horizontal Polymetric principle.

The same pattern is played by the left hand, but here it becomes [(3+5)+(3+5)+(5+3)+8]. From this moment onward, a shifting starts that creates rhythmic and metric displacement with an effect of increasing the amount of disorder (irregularity) and different rhythmic perceptions. In this way there is also a superposition of different meters, generated by a shifting, with the use of a Vertical Polymetric principle.

However, we have also to observe another layer. In fact, coinciding with the starting note of each melodic/metric pattern, there are longer rhythmic accented values that highlight a layer of multiples values of the juxtaposed meters. In the first line and in general, these multiples coincide with the meters, and in this case their durations are 3+5+3+5+5+3+7 for the right hand and 3+5+3+5+5+3+8 for the left hand. Occasionally, also these values are shifted to the underlying meters. So, considering the rhythmic *Talea* of this piece, we have to take count also of these 7 longer notes.

Finally, looking at the melodic organization, we can see that also here there are different layers coinciding more or less with the rhythmic and metric layers. At the layer of the basic metric patterns (3+5) that is the layer of the pulse (1/8), the melodic patterns are organized in fragment of scales moving in parallel motion between the two hands. The right hand plays only on white keys, meanwhile the left one plays only on black keys. Therefore, the modal content of the two hands is clearly defined and separated. The right hand plays only modes of the C *major* scale, and the left hand plays only modes of the F# pentatonic scale. Since both hands play always together, they always cover the twelve tones.

But what is noteworthy here is the organization of the melodic material exposed by the longer accented values. Indeed, the scales of quavers have mainly a rhythmic and harmonic function: they play the steady pulse, and, at the same time, they provide a harmonic contour to the melody. Instead, if we analyze the succession of pitches of the longer values, we discover soon that it is also organized in repeating patterns, let us say the *Color* of the piece. Also this *Color* is build in a modular way that is not done by an only stream of pitches repeated after its end, but rather by one smaller series, varied and repeated three times. The first series and its variations are the real *Color* of the piece. This *Color* is made by 26 pitches divided in 4 series, 3 made by 7 pitches each and 1 by 5. After its end the *Color* is repeated almost exactly but transposed on a different degree of the C scale. This, briefly, is the basic structure of the whole piece. We have to notice that the *Color* creates another cycle that, because of its length, lasts 4 times of the previously described rhythmic cycle, the one that I called *module*. We can eventually call this longer cycle, by a metric and a rhythmic point of view, the real *Talea* of this piece.

Let us now proceed with the analysis to better appreciate this complex and detailed form. I divided the analysis in two parts, one rhythmic-metric-numeric analysis, and one pitch-melodic analysis.

5.5.3 Metric analysis

Let us start with the first one. In the following table I tried to put all the important numbers of every layer. So in the first row we have the durations of the longer notes, in the second one the numbers of pulses of each pattern. I put same values, but for the left hand, in the third and fourth row.

T 1

1

3			5					3			5					5					3			7						
3			5					3			5					5					3			7						
3			5					3			5					5					3			8						
3			5					3			5					5					3			8						

2

3			5					3			5					5					3			7						
3			5					3			5					5					3			7						
	3			5					3			5					5					3			8					
	3			5					3			5					5					3			8					

3

3			5					3			5					5					3			3						
3			5					3			5					5					3			3						
		3			5					3			5					5					3			3				
		3			5					3			5					5					3			3				

4

4				5					3			3			5				
4				5					3			5					3		
		5					5					3			3			5	
		5					5					3			3			5	

T 2

3			5					3			4				5					3			8						
3			5					3			4				5					4				7						
			3			5					3			5					5					3			8			
			3			5					3			5					5					3			8			

3			5					3			4				5					3			8						
3			5					3			6						3			3			8						
				3			5					3			5					5					3			8		
				3			5					3			5					5					3			8		

3			5					3			4				5					3			3						
3			5					5					2		4				3			1	3						
					3			5					3			5					5									
					3			5					3			5					5									

5					5					3			3			4													
5					5					3			3			4													
3			8								3			5					3											
3			8								3			5					3											

T 3

3			5					3			5					5					3			7						
3			7							3			5					4				2		7						
		5					5					3			3			5					5					3		
		5					5					3			3			5					5					3		

3			5					3			5					5					3			7						
3			5					3			6						4			3			8						
3			5					3			5					3			5					5					3	
3			5					3			5					3			5					5					3	

3			5					3			5					5					3			3						
	7					4				4						5					3			3						
	8							3			5					3			5					5						
	8							3			5					3			5					5						

4				5					3			3			5				
4				5					3			4				2		3	
			3			8								3			5		
			3			8								3			5		

Table 5.7 Ligeti Piano etude n°1, Désordre mm 1/45

As we can see, each line corresponds to one of the modular series that form the *module*, highlighted with different colours. Four successive lines (*modules*) form the complete *Talea*.

This is the basic skeleton of the piece, repeated throughout the whole composition and apparently very rigid and symmetric. But each "module", since from the first one, contains, despite of the general symmetry, some random disruptions that increase the shifting, the irregularity, and the disorder. Looking, for example, at line 4 (the shorter module) we can see a shifting between the longer values and the melodic/metric pattern of eights. When one lasts 5, the other one lasts 3 and vice versa, creating a kind of contrapuntal dialogue between these two layers. From this moment onward we can observe similar disruptions in every line. One of them, in line 7, can be considered a major disruption because makes shorter the length of this module.

Nonetheless, as I have already done in the other chapters, I will make a list of the principal and fundamental numbers from this metric analysis, on regard to the right hand:

- Number of notes in each *module* — 7 – 7 – 7 - 5
- Number of pulses (quavers) in each *module* — 31–31–26(27)–20
- Number of notes in a complete *Talea* — 26
- Number of pulses in a complete *Talea* — 108 (109)

Now, as soon as we consider the left hand, it is clear that it contains a similar but different, and thus shifted, *Talea*. These are the concerning numbers:

- Number of notes in each *module* — 7 – 7 – 7 - 12
- Number of pulses (quavers) in each *module* — 32–32–27–53
- Number of notes in a complete *Talea* — 33
- Number of pulses in a complete *Talea* — 144

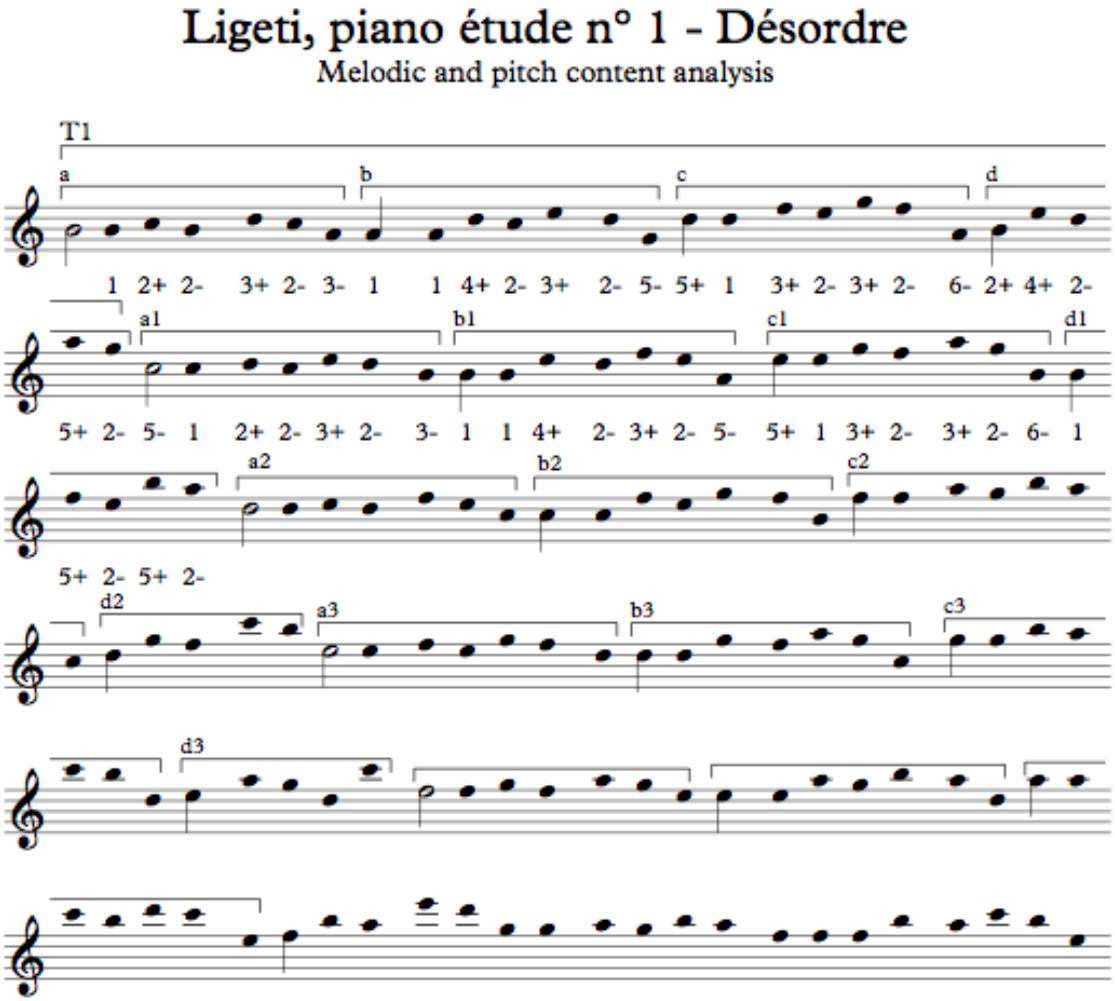
As it is pointed out by these two lists and by the table 5.7, the main shifting is obtained at the layer of each module, sometimes with a longer duration of some notes, as it occurs between the first two modules where the note of the right hand lasts 7 while that of the left hand takes 8, and other times using a different number of notes, as it occurs in the fourth module, with a ratio of 5:12. Similarly, we can extract all the ratios occurring between the different metric organizations both successive and simultaneous.

5.5.4 Melodic analysis

As I have already mentioned, we can consider the melodic organization with the same "modular" point of view we used for the metric one. In the following example I have reduced the score to the pitches used for the longer values. I have used brackets to highlight the pitch content of each module. I have called each collection with a different lower case letter (a, b, c, d). Then I have used longer brackets to highlight the union of the 4 modules in a longer *Color*, corresponding to each rhythmic *Talea*. Finally I have highlighted the intervals between the pitches, and the starting note of each module and of each *Color*/*Talea*. For describing the intervals I have used this system:

- The number means a diatonic interval, e.g. 2 means a second (major or minor, depending on the degree of the diatonic scale).
- The + or – means an ascending or descending interval, e.g. a 3+ means a diatonic third above.

Because of the diatonic context, using this method of classifying intervals makes the analogies between the modules clearer than the using of a chromatic method.



Ex. 5.6 Ligeti Piano etude n°1, Désordre, melodic reduction

So we have a modular structure corresponding to the metric structure previously analyzed. What is noteworthy here is the development of the pitch content in each module, between modules, and between *Colore*s/*Talea*e. This is what we can observe:

- The three modules **a**, **b**, and **c** can be considered a variation of the same intervallic structure. In fact they all start with a repeating tone and create, more or less, ornamentation around the starting notes.
- The idea of ornamentation is reinforced if we connect the starting pitches of each module to each other. We can consider the melodic movement as a combination of a neighbouring tone with a third downward movement (e.g. **B, A, D, B**).
- The **d** module seems to have a more "harmonic" function. In fact it contains two intervals of 4 or 5, and its ending note is always a perfect fifth above the starting note of the successive *Color*/*Talea*, suggesting a *dominant* function.
- After its ending each *Color* is repeated, keeping the same intervallic structure (by a diatonic point of view), but transposed one diatonic step

above at each transposition. If we create a line with the starting notes of each *Color*/*Talea* we have nothing but a very simple C major scale, or, since we start from **B**, a **B** locrian mode.

So, also by a melodic point of view we can see different layers:

1. The *modules* with their intervallic structure
2. The four note melodies created by the first note of the *modules*
3. The **B** locrian mode created with the starting notes of each *Color*/*Talea*.

For concluding this analysis I put hereunder a scheme of the different layers and their relationships (only for the right hand):

Cell layer 1	3	5	7	4
Cell layer 2	3 + 5 / 5 + 3		7	4
Module Layer	M1, M2= 3+5, 3+5, 5+3, 7 M3=3+5, 3+5, 5+3, 3 M4=4, 5+3, 3+5 (5, 5+3, 3+4)			
Talea Layer	M1 + M2 + M3 + M4			

Table 5.8 Ligeti Piano etude n°1, Désordre, Scheme of metric layers

And a scheme of the pitch/melodic layers:

Layer of pulse	Melodic/metric patterns (3, 5, 7, 4 etc.)
Layer1 of multiple of pulse (meters)	Series of pitches (Modules) of longer values = 4 modules of pitches (Mp1=7, Mp2=7, Mp3=7, Mp4=5)
Layer2 of multiple of pulse (meters)	Melodic connection between the starting note of each module = 4 pitches
Layer of Color1	Mp1 (a) + Mp2 (b) + Mp3 (c) + Mp4 (d)= C1
Layer of Color 2	Melodic connection between the first note of each *Color*
Layer of Color 3	Succession of *Color*es in the whole piece = C1, C2, C3 etc.

Table 5.9 Ligeti Piano etude n°1, Désordre, Scheme of melodic layers

5.6 Conclusions

Looking at the style that Ligeti uses in the pieces I have analyzed, we can do some considerations. First of all we can say that he dealt with the same principle that are at the basis of this research, that are cycles and shifting, and he dealt with them mainly

at the level of rhythm and meter. But he does it in a very peculiar way in comparison to the previously analyzed styles. Instead of creating long cycles generating by some kind of shifting between rhythmic and melodic/harmonic material, in order to provide a regular (*Ars Nova*) or irregular (Messiaen) fundament for a whole piece, he rather creates short structures like precision mechanisms that are like *cells* or *grains* for the building of a piece (or of a part of it). Then, using shifting and random variations and disruptions, he combines those regular and precise structures in a way that what is in the beginning, or in itself, ordered and precise leads to the chaos.

In this sense the early and the late style of Ligeti does not differ too much. The final goal seems to be the same but, anyway, there is an important difference, which I have already treated, but that is worth to mention again as a conclusion.

The best way to clarify this difference is going to the level of perception. If we try to identify the pulse we can always do it in the pieces of the late style and we cannot ever do it in the early pieces. The reason is simply the fact that in the early pieces the technique consists in overlapping different subdivisions of the pulse, obtaining an actual pulverization of it. In the late pieces, influenced by African music and Nancarrow, a pulse exists, is perceptible, and is also clearly notated, as the quavers in "Désordre" (See Ex.5.5). Ligeti does not divide that pulse anymore; it is the smallest common pulse. Over that pulse, acting on the layers of the multiples of the pulse (so all the values that are longer than 1/8), he superposes patterns (or implied meters) using shifting and cycling principle, like the 3 or 5 grouping of notes of the melodic/metric patterns and the longer notes with the same duration (3/8 and 5/8) both in Ex. 5.5. We can say that, instead of dividing the same pulse in very short values, and thus working on the layers of subdivisions of the pulse, in the later pieces he works on the layers of multiples of the pulse, leaving the pulse itself unchanged.

On regard to the use of the different principles I defined in chapter 2 we can say that Ligeti always uses both Horizontal and Vertical Polymetric principle. In the early style he uses more what I called Polymeter preserving the measure, in the late style he uses more a Polymeter preserving the Pulse.

Moreover, it is interesting to notice that his techniques are based mostly on a divisive concept. This concept could be more regular than an additive one, but Ligeti finds his formula to the irregularity creating shifting and displacement, often at a very micro-level, between otherwise regular structures.

6. CYCLIC TECHNIQUES IN JAZZ – FROM GEORGE RUSSELL TO STEVE LEHMAN

6.1 Introduction

Starting to study the techniques of cycling and shifting in jazz we must be aware that jazz can be defined, doubtless, a **groove-based** music. In the English language the word **groove** can have various meanings. We will restrict ourselves in according to the follow definition by Barry Kernfeld, *The New Grove Dictionary of Jazz, 2nd edition, Oxford Music Online*:

> In the realm of jazz, a persistently repeated pattern. More broadly, Feld (1988), studying groove from an ethnomusicological perspective, defines it cautiously as "an unspecifiable but ordered sense of something that is sustained in a distinctive, regular and attractive way, working to draw the listener in." Connections to dance are important, and the statement that a performance has, or achieves, a groove, usually means that it somehow compels the body to move. Still more generally, the term has a sexual origin and connotation which is obvious, requiring no explanation.

So, if we simply say that the presence of a persistently repeating pattern is an indispensable condition for every kind of Jazz music, we also state that Jazz music has always, explicit or implied, a steady pulse. In this way and too obviously Jazz music is strictly related with African music, that is indeed one of its most influences. Thus it is also quite obvious that a several number of cyclic and multi-layer techniques used in jazz have their reference in similar techniques used in African music. Therefore it is also simple to do a close comparison with the techniques used by Ligeti in his late style and previously analyzed, with the main characteristics of Vertical Polymetric principles, with a divisive organization.

There are, however, as we shall see, examples of experiments in an apparently different direction. Looking at the work of Don Ellis, Steve Lehman and Vijay Iyer, probably under the influence of Indian music, but also of Messiaen, it is possible to observe a prevalent use of a Horizontal Polymetric principle, with an additive organization, rather than a Vertical/divisive one.

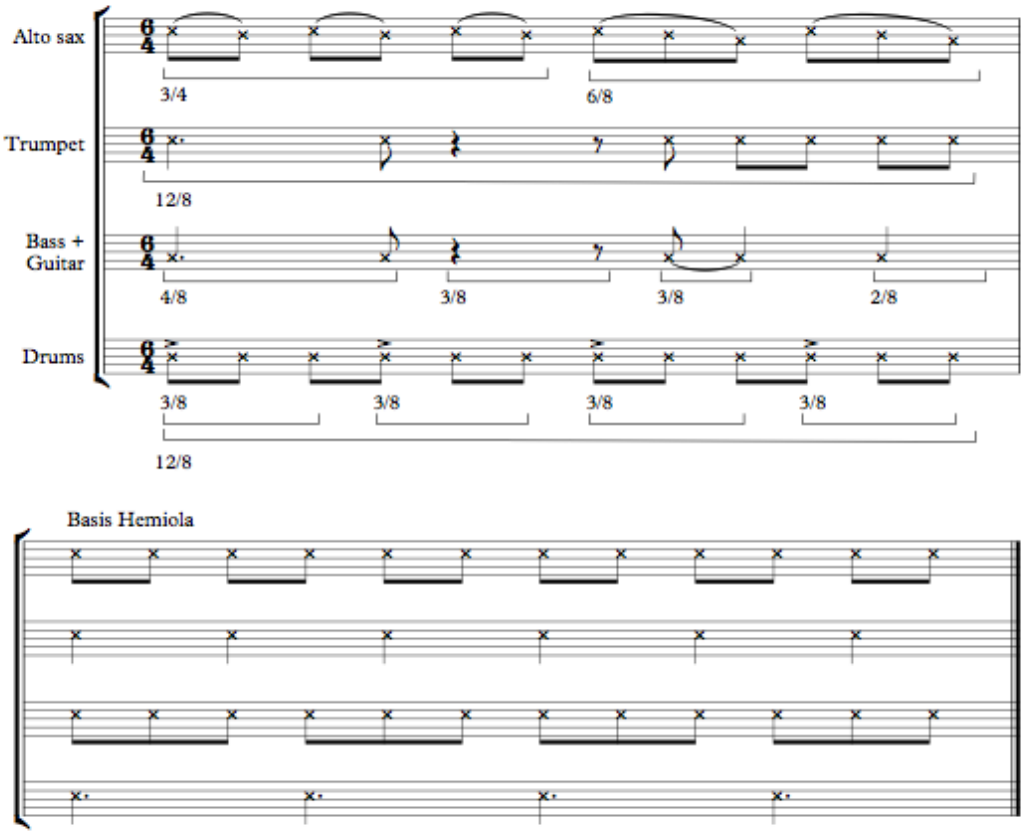
Another important thing to say about the studies on Jazz is that, unlike any Classical music, the analysis is more focused on the recordings and their transcriptions, due to the predominant oral character of this music.

What was really important to me is to have the larger number of examples of overlapping different rhythmic layers on a basic groove. Thus, my analysis and transcriptions will point out exactly the elements that I needed to deepen.

6.2 George Russell – Jazz Workshop (1955) – Excerpt of Cyclic analysis

6.2.1 Ye Hypocrite, Ye Beelzebub

The examples showed hereunder are taken from an amazing album that the percussionist, composer, theorist and bandleader George Russell (1923 –2009) recorded in 1955, called *The Jazz Workshop*. Russell leads a jazz sextet with drums, bass, piano, guitar, alto sax/flute, trumpet.



Ex. 6.1 G. Russel - Ye Hypocrite, Ye Beelzebub (The Jazz Workshop) – Superposed rhythmic patterns and basis **hemiola** **CD track n°15**

In this example we can see the overlapping of rhythmic patterns in the intro of the piece. The rhythmic ambiguity is due to the simultaneous use of two basic metric layers, a 12/8 with the pulse (quarter dotted note) equal to 150 bpm, and a 6/4 with the pulse (quarter note) at 225 bpm. In the line under we can see that this passage is based on the well-known **hemiola** 2:3.

In this piece Russell makes doubtless use of a Vertical Polymetric Principle, even if in the bass and guitar part the notes can also be organized in successive meters (juxtaposed), suggesting a Horizontal Polymeter.

As we have already faced in this research, this example can be seen in both ways as a Polymeter preserving the measure or a Polymeter preserving the pulse, with the simultaneous use of a Vertical and a Horizontal Polymetric principle. The organization of meters is clearly divisive because the basic *hemiola* is repeated exactly after 6 pulses (1/4).

It is interesting to notice that the different layers are actually played, or at least perceptible, and not only implied. Indeed, the drums part plays on the layer of subdivisions (eights) that is also the smallest common pulse, but with its accents every 3/8, highlights also a layer of multiples of the common pulse itself. So we can say that in the drums part the basic **hemiola** is contained at the layer of subdivision, and hence as a Polymeter preserving the pulse.

On this fundament, the other instruments play different multiples of the basic pulse often maintaining a character of ambiguity between the two meters implied. At these layers the superposition appears more like a Polymeter preserving the measure.

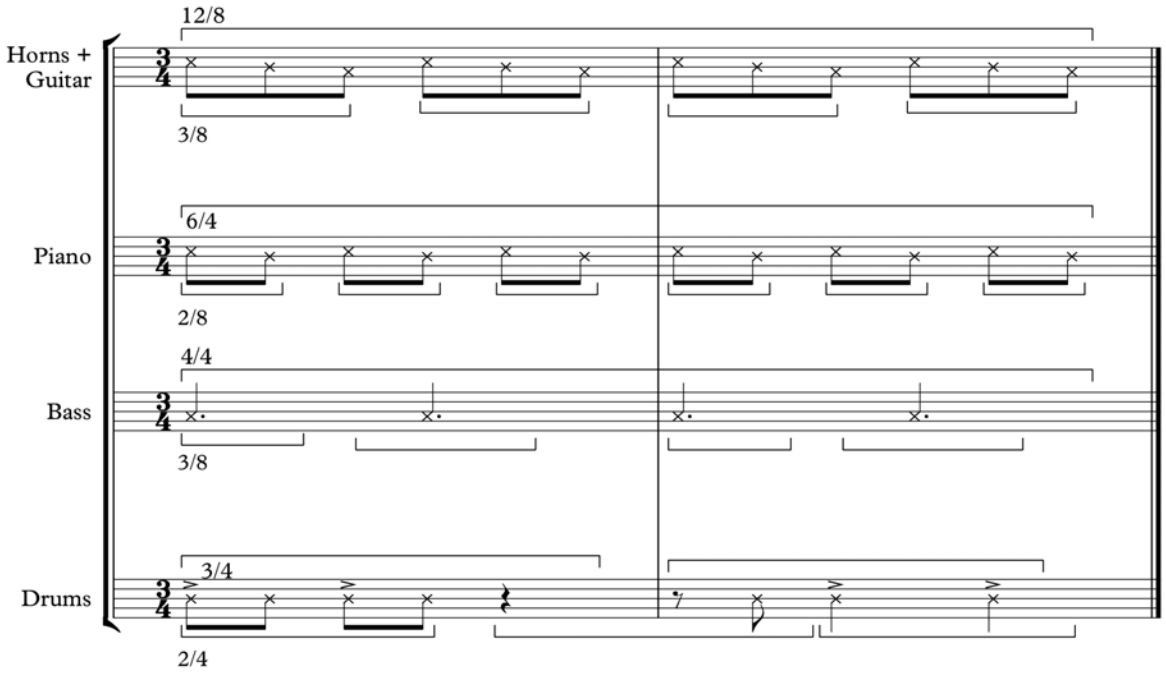
The Horizontal Polymetric Principle pointed out in the bass/guitar part is very similar to what we have already found in the African Standard Pattern (see Ex. 2.12) and in "Desordre" by Ligeti (see Ex. 5.5). It serves to create an *irregular* pattern that is contained in a *regular* meter, usually a 4-units-meter. In fact the patterns last 1 bar of 12/8 (or the corresponding bar of 6/4) and then are repeated. So, we can also say that the cycle corresponds to 1 bar of the aforementioned meters. As usually happens, these irregular patterns are created alternating meters organized in two pulses to meters organized in three.

Upon this complex texture the alto sax plays on the layer of subdivisions of the two implied meters (but that is the layer of the smallest common pulse). He switch very freely from a meter to another one, remaining at the layer of the smallest common pulse, and thus making use of melodic/metric patterns for highlighting the 12/8 or the 6/4.

So, resuming, we can say that the piece is based on the superposition of two meters with different pulse, overlapped to their smallest common pulse that is the real fundament of the piece. All the parts play with the switching and overlapping of these 3 layers.

6.2.2 Livingstone, I presume?

Here is another scheme of Polymetric structure from the piece *Livingstone, I presume?* from the same album:



Ex. 6.2 G. Russel – Livingstone, I presume? (The Jazz Workshop) – Polymetric scheme. **CD track n°16**

In the above example the implied and explicit meters present in the piece are shown. There are different overlapping in different layers or between the layers, most of them played at the layers of subdivision and therefore Polymeters preserving the

pulse. As it happens in Ye Hypocrite, Ye Beelzebub (see Ex. 6.1) everything is built upon the 2:3 ratio, and the upper voices do not play just repeating patterns but are more free of moving within a certain layer or meter, sometimes using melodic/metric patterns.

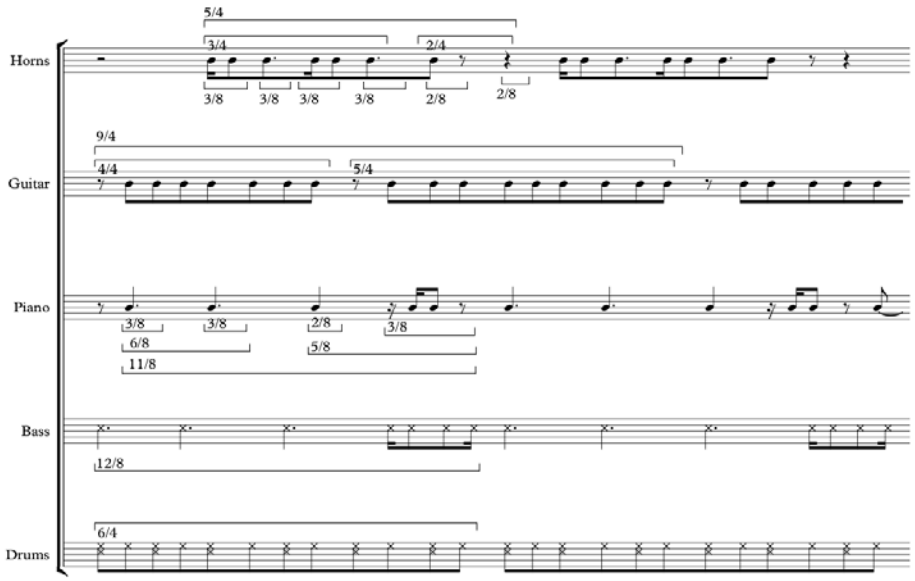
6.3 Steve Coleman and Five Elements – Examples of Cyclic techniques

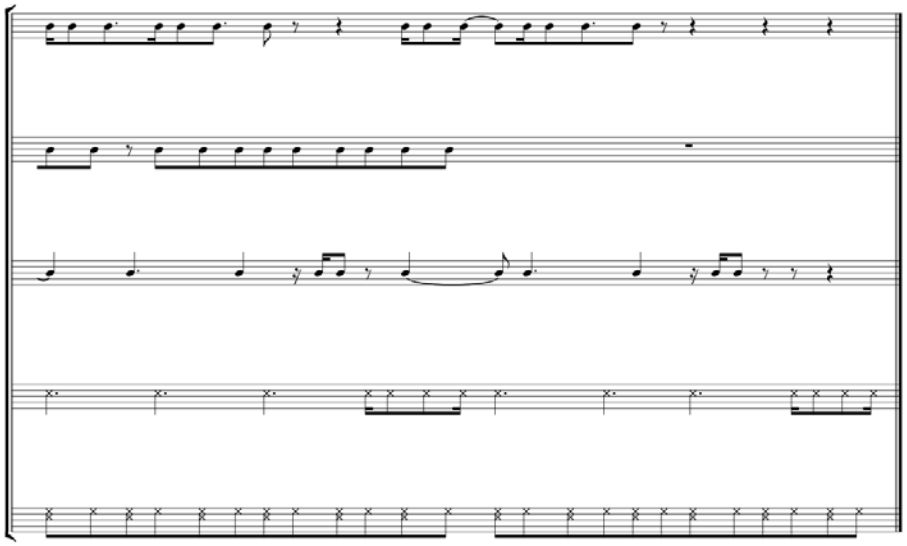
With Steve Coleman (1956), saxophonist, composer, bandleader, producer, we are really approaching to Contemporary Jazz. Since the mid 1980's to date he is experimenting the superposition of different metric structures. Basically, in his music the groove is always present and wanted, reached or filled in with the overlapping of complex meters. The effect is that we can perceive very clearly a steady pulse, that is responsible for the groove, but, despite the abundance of meters, they are so complex and shifted that is not possible to perceive any regular meter in particular. So the actual effect is to dissolve a regular metric organization of the pulse. The main used principle is a Vertical Polymetric Principle but used in a way that can affect also the horizontal perception of meters. Practically, it is not difficult to perceive a pulse but it is very hard to understand what could be the "one" of a supposed meter. The best way for playing and listening to this music is to think that every pulse is a "one" and thus this is a 1/1 meter.

On this regard let us quote what the composer himself says in one interview entitled: "Steve Coleman, Digging deep" by Anil Prasad, Copyright © 2008, Anil Prasad, and present on the official website of Steve Coleman:

> Time signatures are a great example of what I'm talking about. People have always told me my music is in odd time. It's not. This is just how they perceive it. I don't use time signatures that much, especially nowadays, unless I'm talking to someone who can only think in those terms and I have to translate something for them. […]
> So today, most people think of time signatures as a norm. If something falls outside of that, they say "You're working with odd time signatures, because I can't count it." I say, "That's not in an odd time signature. It's not in a time signature at all." Then they'll say "What do you mean?" And I'll say "Time signatures are just one way of doing things." It's a recent method. It came from people who learned music by reading music. They talk about time signatures because they learned to read in Western notation. Remember, there are cultures right now that don't deal with that kind of stuff. I took my trumpet player to Cuba […..]One of the things I told him when we went to Cuba was "Don't ask these guys questions about time signatures or 'Where's the one?' because there may not be any one." He said "What do you mean by that? Of course there's a one." I said "There's some music where there's no one." And he couldn't accept that from me. So, he asked a Cuban percussionist we were working with through a translator "Where's the one?" The guy said "Where do you want it?" [laughs] The trumpet player said "What do you mean?" The percussionist said "One can be wherever you imagine it. So, where do you want to put it?" The trumpet player looked at me in confusion and I said "I told you not to come down here and ask cats where's the one!" [laughs] I encountered that "no one" thing in Ghana when I went there in 1993 too. I knew that it existed and that there were other musical concepts in which you being in the right place in the music is based on different kinds of relationships. There are a lot of other ways of organizing rhythms and pitches that aren't common in the West.

Here are some excerpts from his album Drop Kick, 1992:





Ex. 6.3 S. Coleman – Drop Kick – Polymetric scheme. **CD track n°17**

In the example above I have pointed out the explicit, implied and suggested metric layers. Of course other interpretations are possible, but my point of view should make sense in the light of my research and of what I have said so far. I also tried, in

according to what Coleman says, to avoid any time signature, but we can still see that the different patterns are organized in metric structures. The point is that these metric structures are often not coincident and active at different layers. So, as we already know, the common pulse is clear (the eight note or quaver), but the "one" of each meter is shifted, firstly because it has different starting points, and then also because of the different length of each patterns. In this sense we can say for sure that this is a cyclic technique, and, at the rhythmic level, a real *Isorhythm*ic technique.

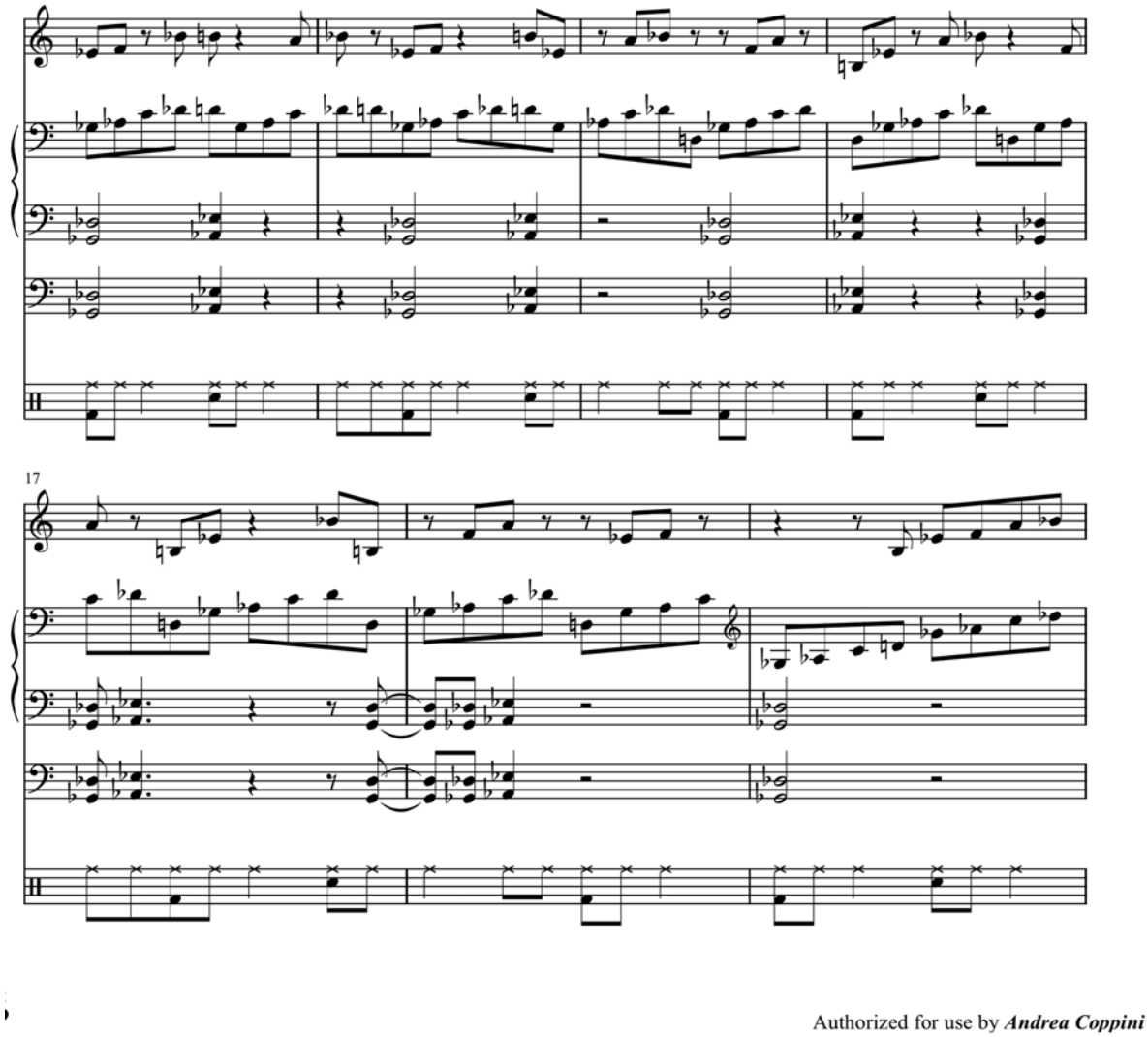
Other things to notice are:

- The basic groove created in the parts of Drums and Bass is quite regular, even if shifted, and is very similar to the other examples from George Russell (See Ex. 6.1 and 6.2). It is build on the ratio 3:2 and the two superposed meter of 12/8 and 6/4. It is again the old **Hemiola** principle.
- In the other parts the patterns are less regular. They can always be reduced to a 3:2 ratio, but organized in a way of creating suggested meters with length of 5, 9, and 11. These patterns, based on prime numbers, create an interesting disruption of the regularity of the basic meters.
- As already done for others analysis (*Ars Nova*, Messiaen) it is possible here to calculate the numbers of the Cycles created by the different length of the patterns.

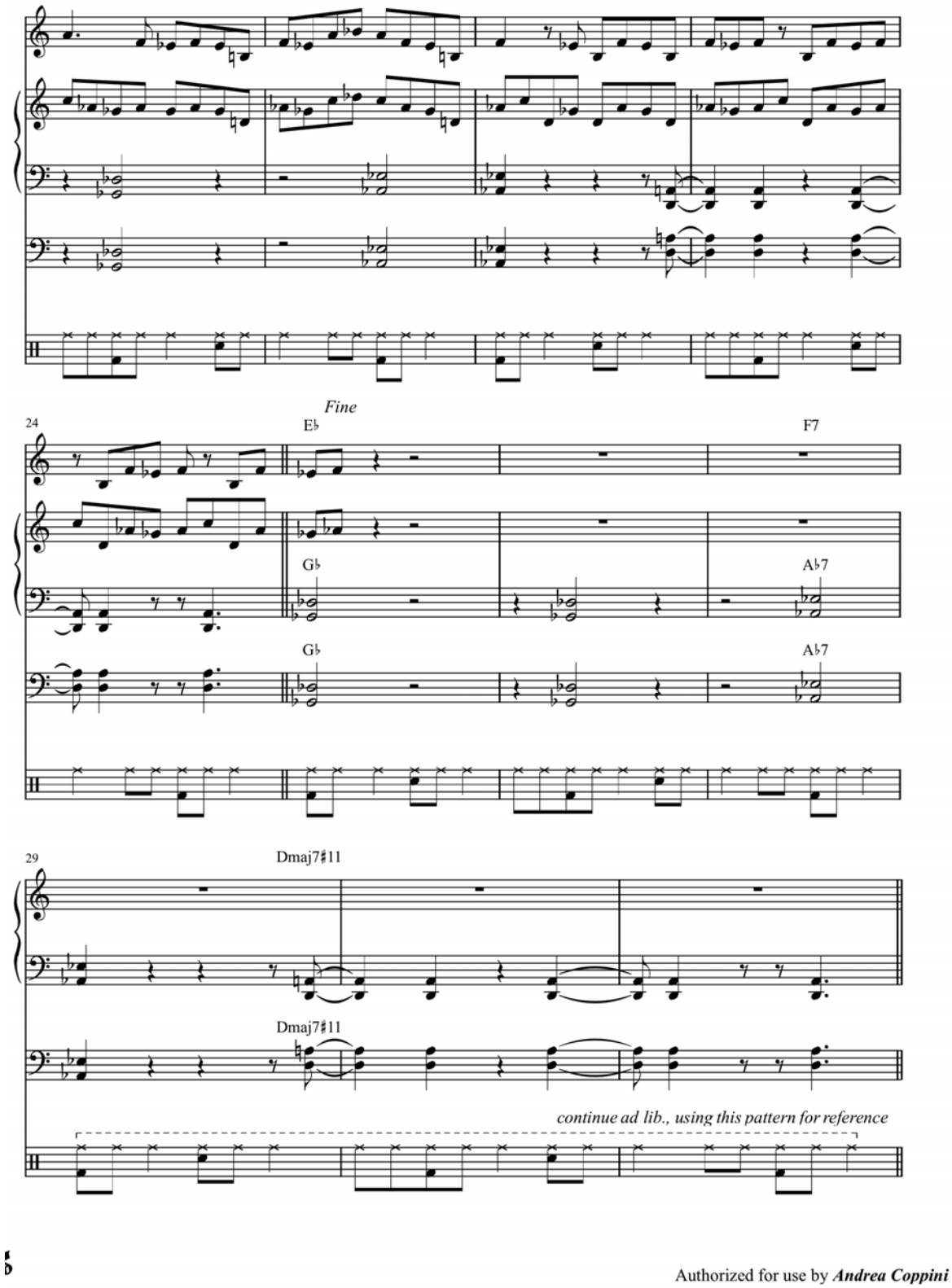
6.4 Vijay Iyer and Steve Lehman – The disruption of regularity in jazz

At this point it is worth to have a look to the music of these two young musicians. Their music is for sure in the path of what we have analyzed so far but it seems also adding something to the contemporary jazz composing.

6.4.1 Vijay Iyer (1971) – Macaca Please (Tragicomic-2008)



Ex. 6.4. V. Iyer, Macaca Please , mm 13-19



Ex. 6.5 V. Iyer, Macaca Please , mm 20-31. **CD track n°18**

In these two excerpts from "Macaca Please", a piece recorded in the album "Tragicomic" (2008), we can see the prevalent use of Polymeters preserving the pulse with 1/8 as the smallest common pulse. Even if a Vertical Polymetric Principle is present the prevalent idea is based on a Horizontal Polymetric Principle, used in all parts. Indeed, the drums plays a pattern, repeated each three bars of 4/4, made by the juxtaposition of the following implied meters: 2-3-2-3-2 (in quarter notes, 4-6-4-6-4 in eights notes). But this metric structure is highlighted by the bass and snare drum. The Hi-hat or cymbal plays a different metric organization superposed to the previous one: 2-2-3-2-3.

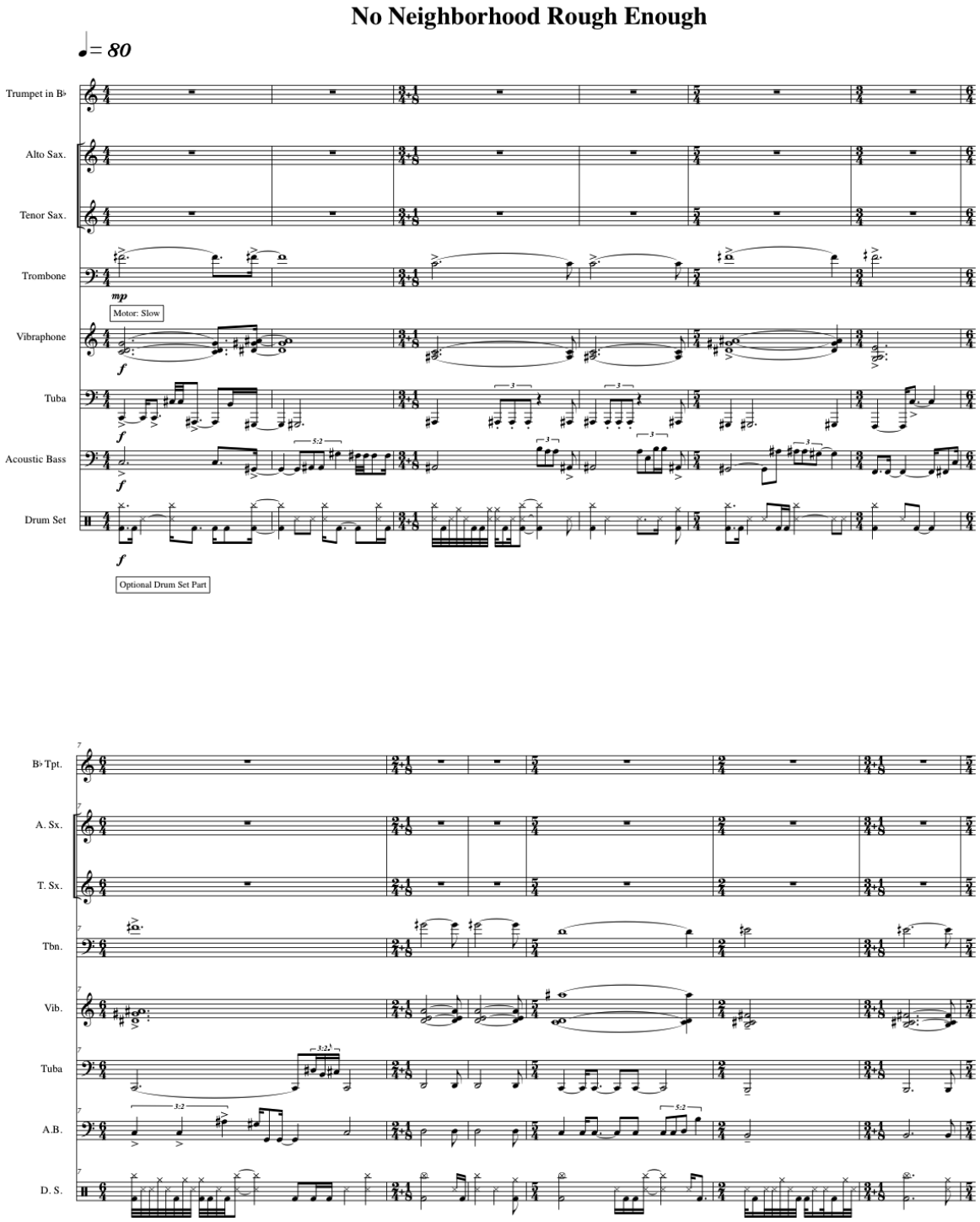
The bass part is based on a cycle that lasts two times the drums-cycle (so it lasts 6 bars of 4/4. In the first half (3 bars of 4/4) it plays accents or long notes following the metric structure of the bass/snare drum but, in the other 3 bars, it creates a disruption, switching to the layer of eights and playing different Polymeters, juxtaposing (in eights): 2-2-2-2-1-3-3-2-1-2-4 or 2-2-3-3-2-2-3-2-2-3. This polymetric pattern is overlapped to that of the drums.

The alto sax part is, as usual, the most active and also the most varied. It plays mostly in the layer of eights creating phrases of different length that suggest a metric organization constantly changing. In order to imply meters, Iyer uses two different techniques: the well known melodic metric/patterns and the length of the phrases, which is always different. But, despite of its apparent variability, actually the sax plays melodic variations on a rhythmic pattern that lasts 3 bars.

So, as we can see, both Horizontal and Vertical Polymetric Principle are present but the accent is for sure on the former. It is noteworthy that we can observe in this piece techniques or principles that belong to the styles and composers analyzed in the previous chapters.

By the point of view of the additive/divisive organization of the meters, my opinion is that the music of Iyer is at the boundary between the two concepts. Indeed, the different juxtaposed meters are repeated after a complete cycle of themselves, but this repetition has a quite long periodicity that is not exactly perceptible in the same way we perceive a short periodicity of a divisive concept.

6.4.2 Steve Lehman (1978) – No Neighbourhood Rough Enough (Travail, Transformation and Flow – 2009)



Ex 6.6 – S. Lehman Octet – No Neighbourhood Rough Enough, mm 1-12. **<u>CD track n°19</u>**

Having a quick look to the score above we can easily see that the piece is based on the use of a Horizontal Polymetric Principle. The different juxtaposed meters are explicit and expressed by the different time signatures.

It is also clear that the main organization of the successive meters is additive because we cannot observe any regular repetition of the metric structures.

7. INFLUENCES AND INSPIRATIONS OF THIS RESEARCH ON MY MUSIC AND MY PERSONAL STYLE

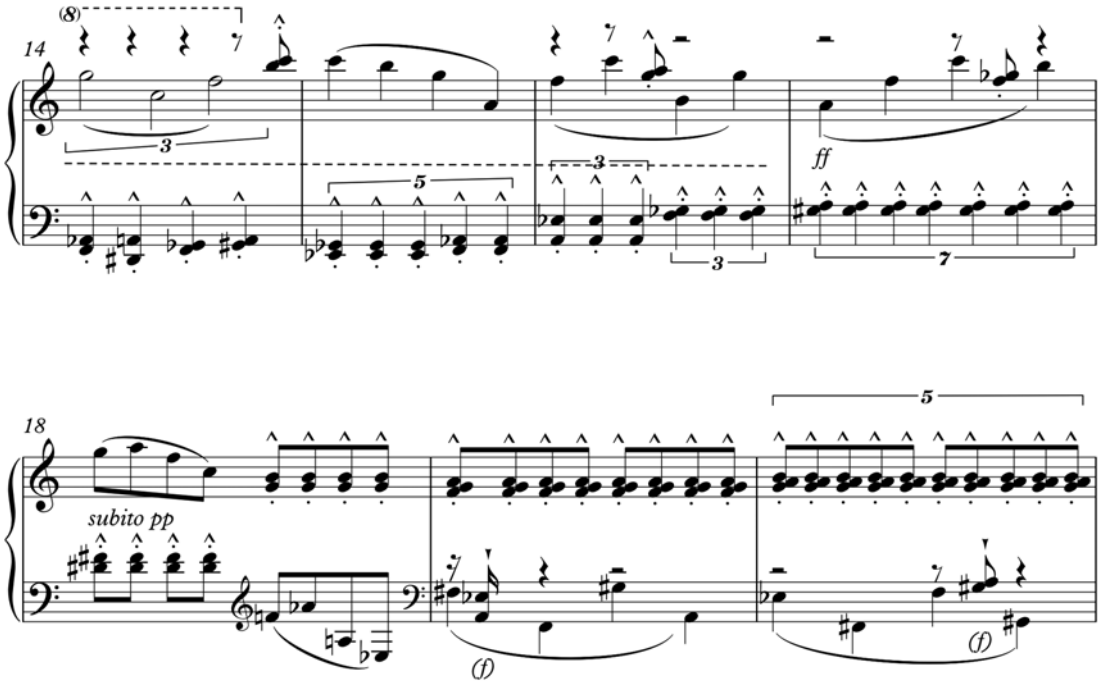
In the present chapter I will show (and make listen to) some excerpts from the pieces I composed in the past two years. Of course I will show the parts of them that I consider, in some way, related to the subject of this research.

7.1 Compositions for solo instrument

From "(Parallel) Lines (meet) at Infinity", for piano solo

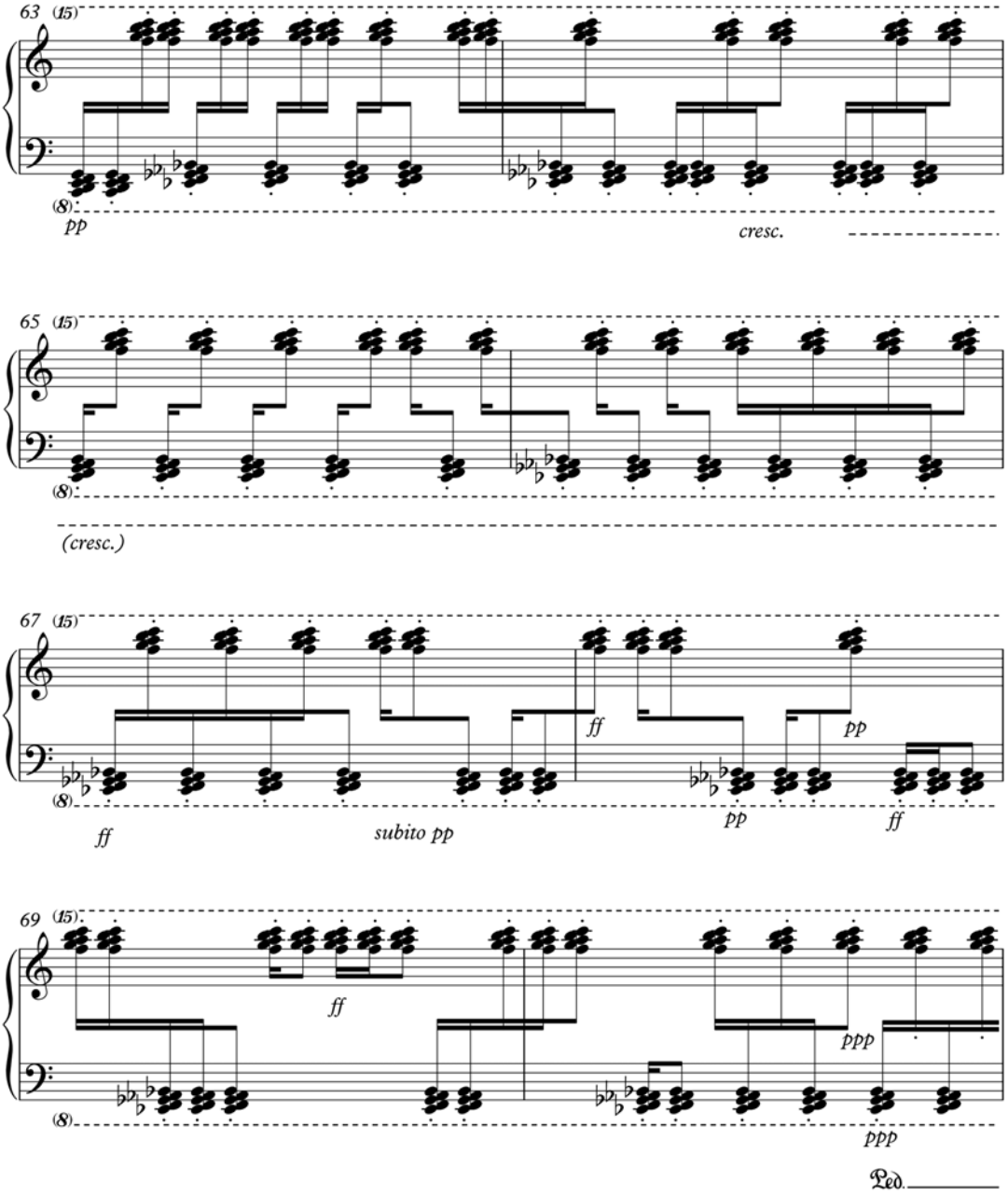
This is a piece completely based on rhythmic and metric juxta- and super-positions. The used techniques are:

- Superposition of different subdivisions of the pulse (Polymeter preserving the measure), see the example below:



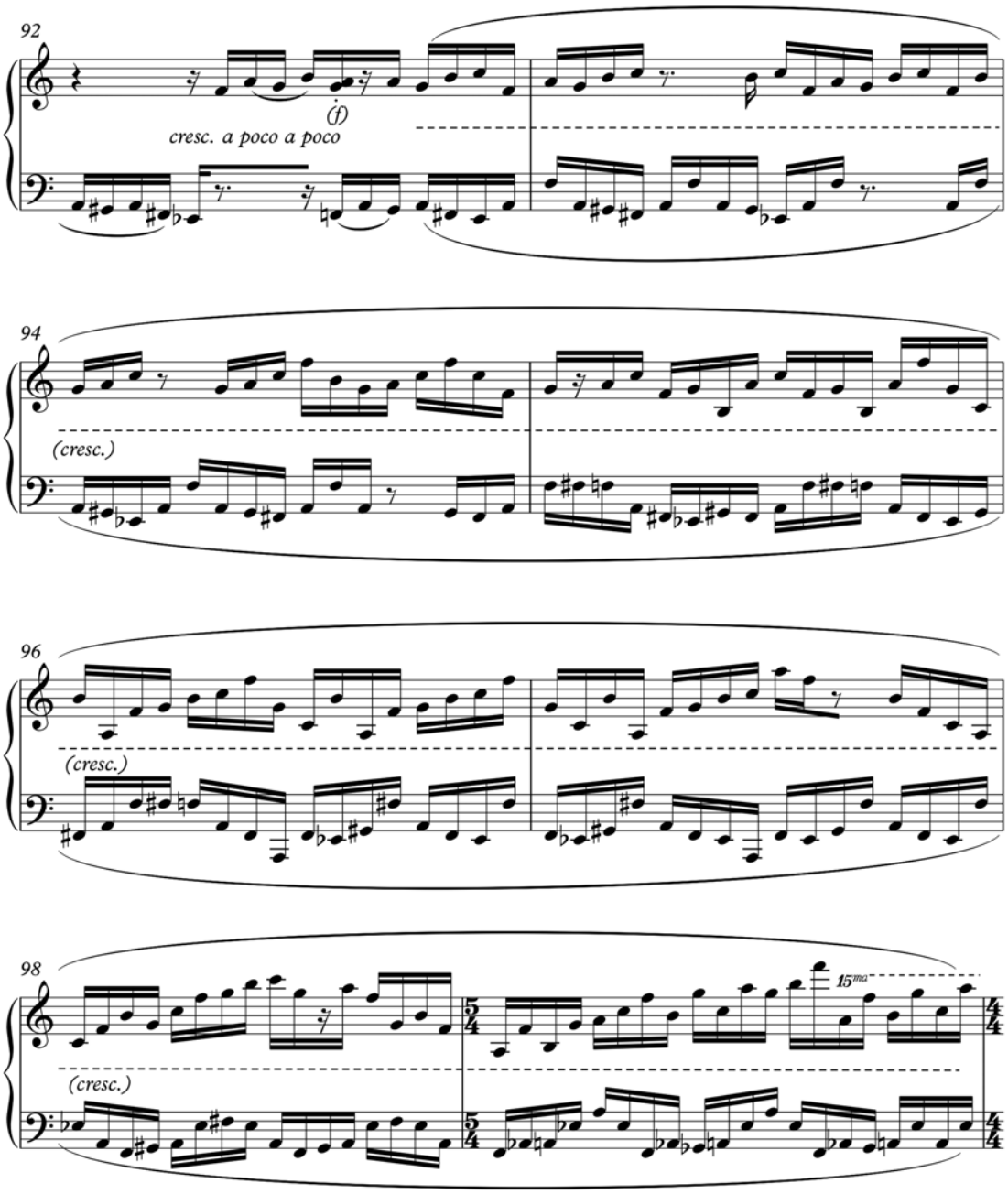
Ex 7.1 – Lines at Infinity, mm 14-20. **CD track n°20 (attached score 21)**

- Juxtaposition of different implied meters using melodic/metric patterns (Horizontal Polymetric Principle, Polymeter preserving the pulse:



Ex 7.2 – Lines at Infinity, mm 63-70

- Superposition of different implied meters using melodic/metric patterns (Vertical Polymetric Principle, Polymeter preserving the pulse):

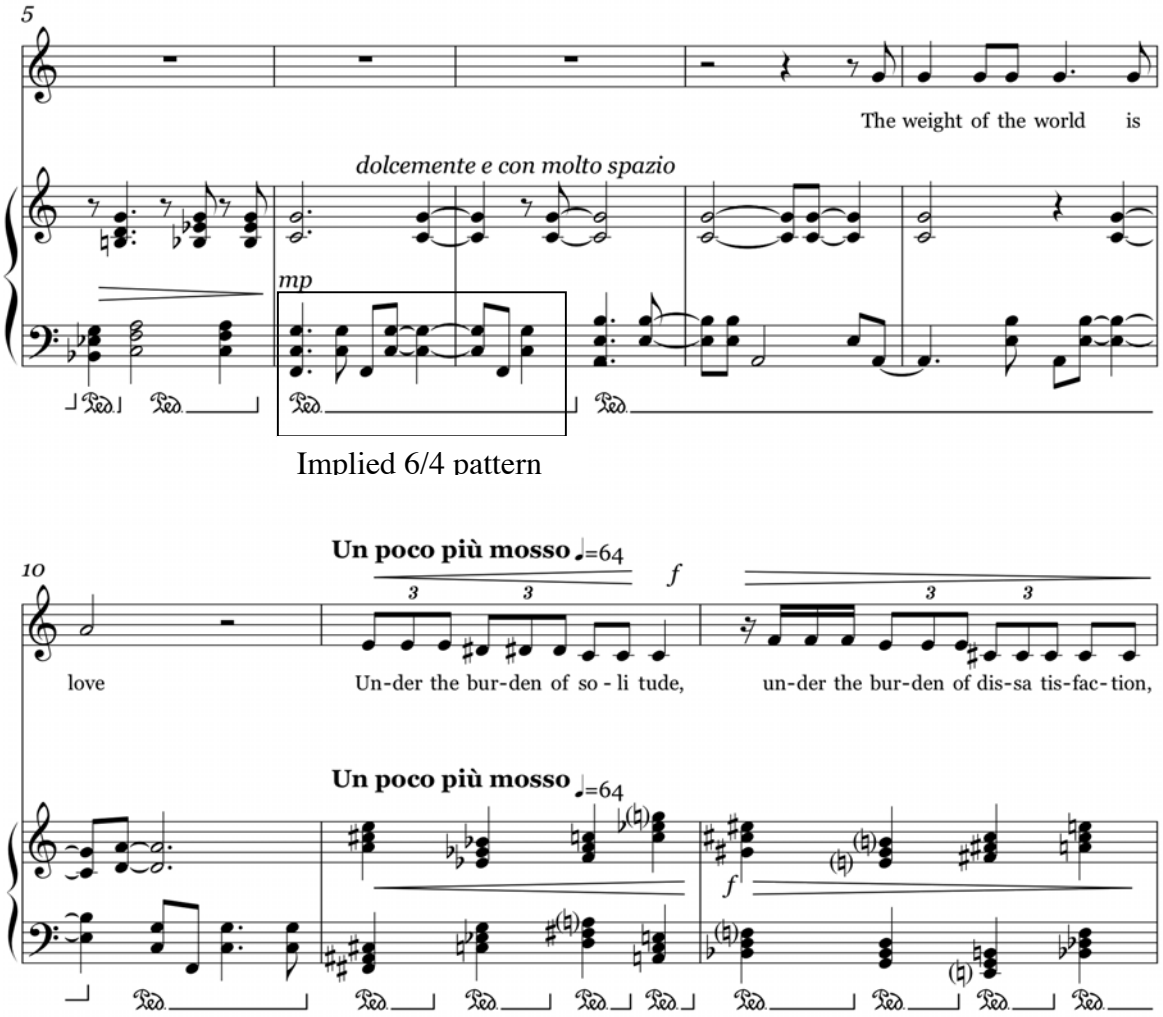


Ex 7.3 – Lines at Infinity, mm 92-99

7.2 Compositions for Chamber ensembles

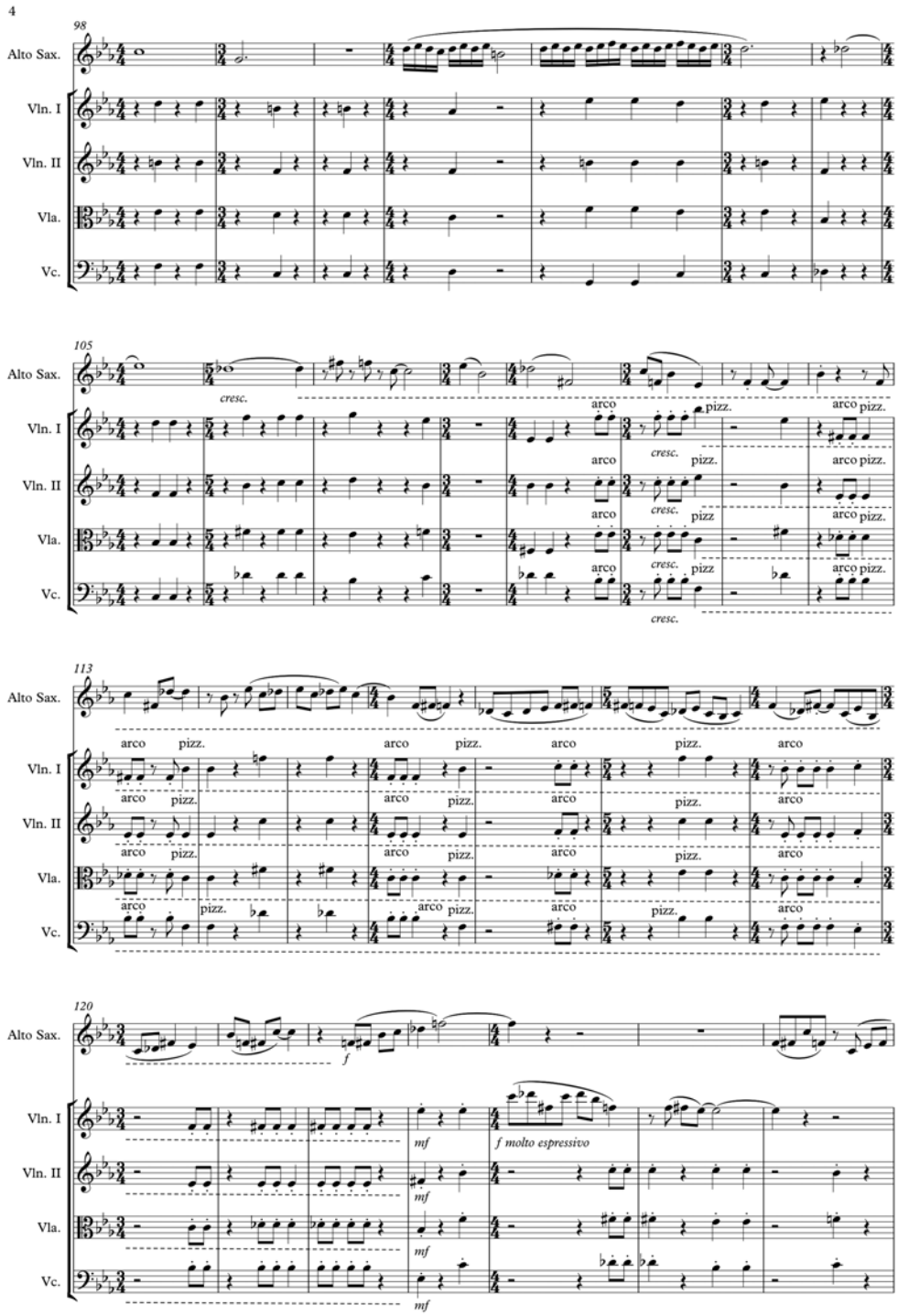
From "Song", for soprano and piano

In this piece I used a pattern in the piano part that is the fundament of the whole piece. Despite the basic 4/4 meter, the pattern lasts 6/4. It is again the use of a Polymeter preserving the pulse and the combination of a Horizontal and Vertical Polymetric Principle. The Implied 6/4 meter is superposed to the vocal part that is clearly in 4/4. The 6/4-pattern is not used in a mechanical way but it comes in and out following the different parts of the piece as we can see in the example below:



Ex 7.4 – Song, mm 5-12. **CD track n°21 (attached score 22)**

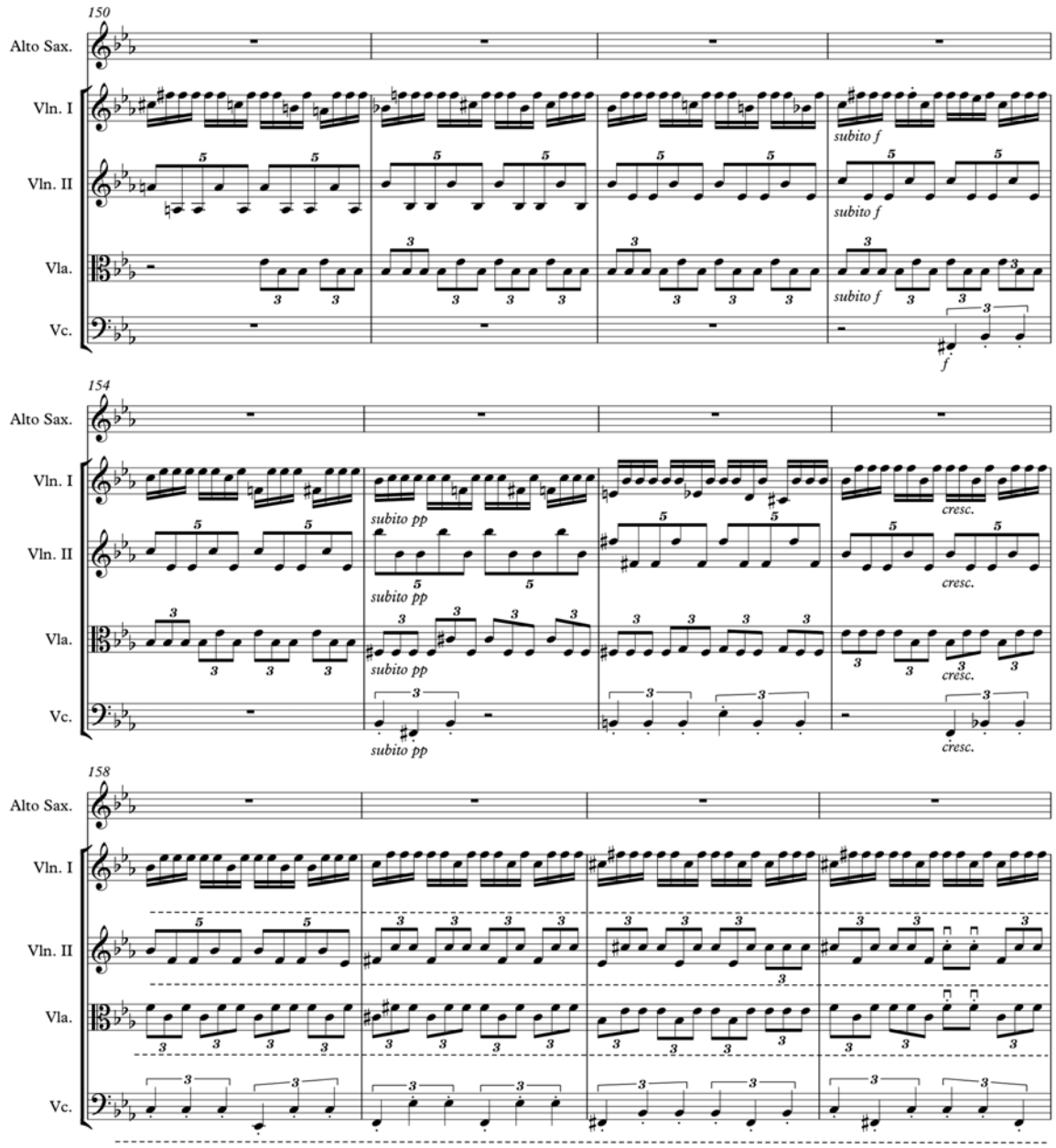
From "Softly as in a Morning Sunrise", for string quartet and alto sax



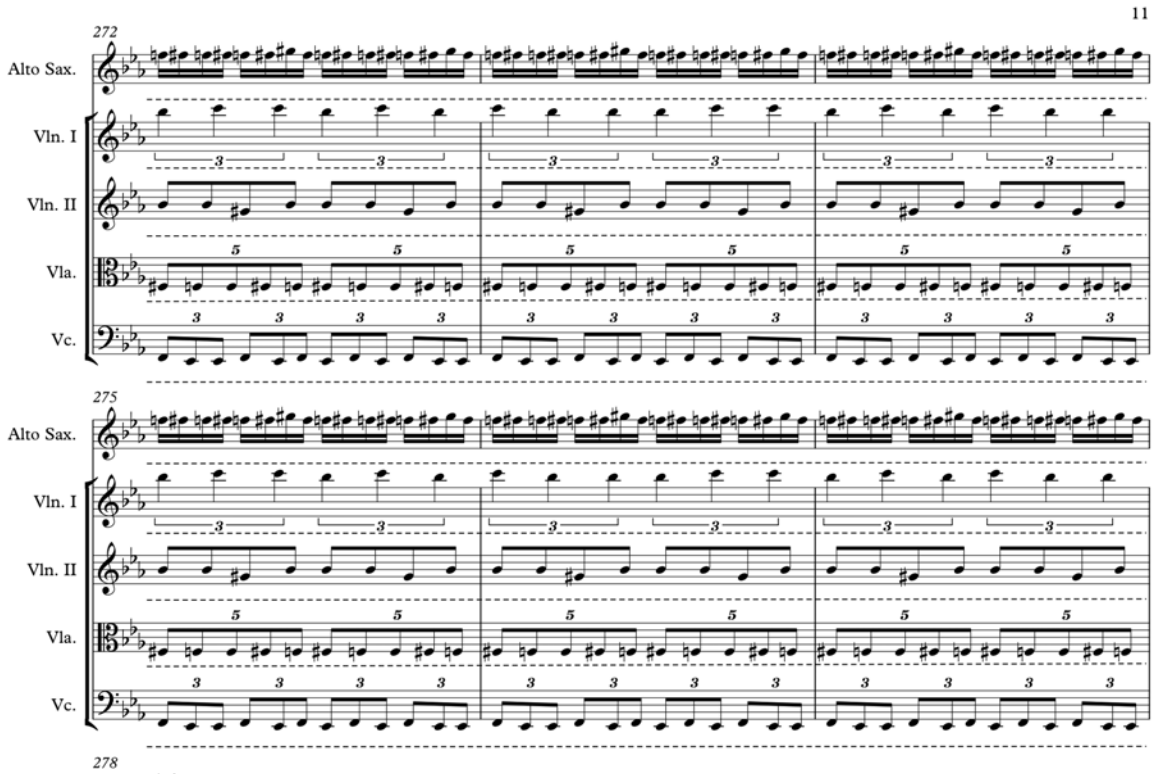
Ex 7.5 – Softly as in a Morning Sunrise, mm 98-126. **<u>CD track n°22 (attached score 23)</u>**

As we can see from the example above (Ex. 7.5) in this piece (actually an arrangement of a jazz standard) I used an explicit Horizontal Polymetric principle, juxtaposing different metric organizations, all at the layer of pulse=1/4.

The other technique I used in some parts is to superpose different irregular subdivisions in the same bar, using a Polymeter preserving the measure, in a Ligeti-like style. I found these techniques very effective for the purpose I had in this piece. (See the examples below):



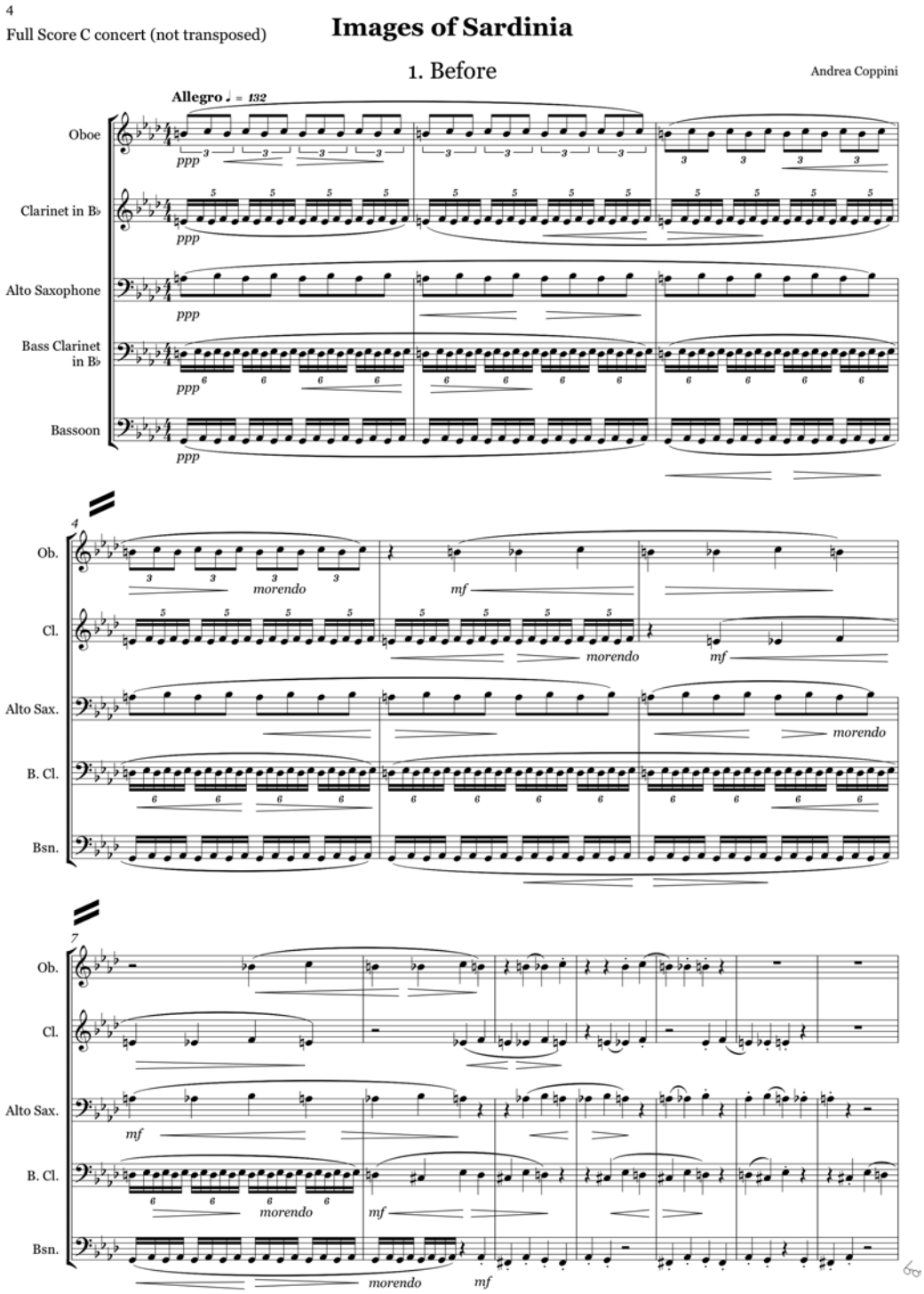
Ex 7.6 – Softly as in a Morning Sunrise, mm 150-161



Ex 7.7 – Softly as in a Morning Sunrise, mm 272-277

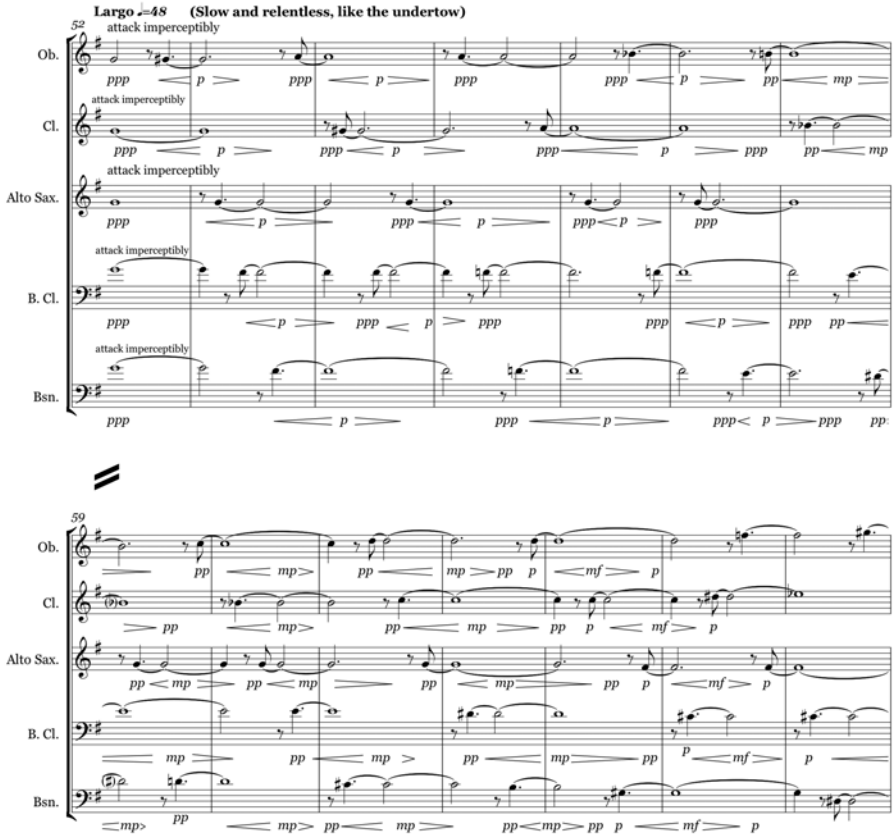
From "Images from Sardinia" for woodwind quintet (ob, cl, a.sax, bass cl., b.soon)

In this piece I used two of the *blurring* techniques used by Ligeti in his compositions. The first is showed in the example below:



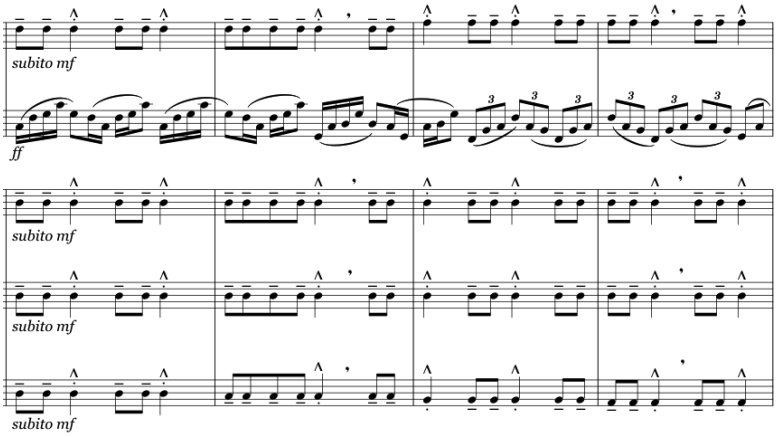
Ex 7.8 – Images of Sardinia, mm 1-13. **<u>CD track n°23 (attached score 24)</u>**

Another technique, showed in the example below, is one of the techniques that Ligeti called "clouds":



Ex 7.9 – Images of Sardinia, mm 52-65

In the final part of the piece I used also an implied Horizontal Polymetric Principle. The different meters are highlighted by the accents:



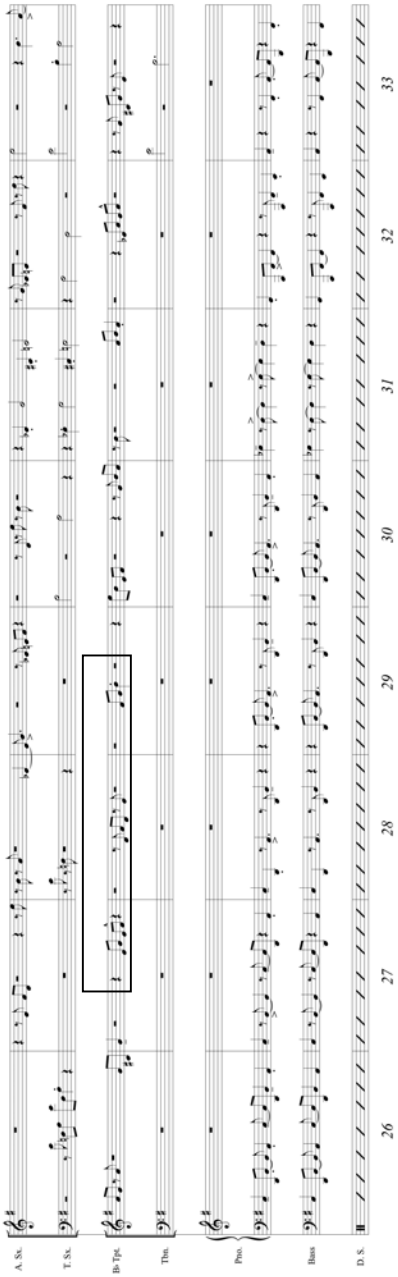
Ex 7.10 – Images of Sardinia, mm 130-132

7.3 Compositions for Jazz Combo

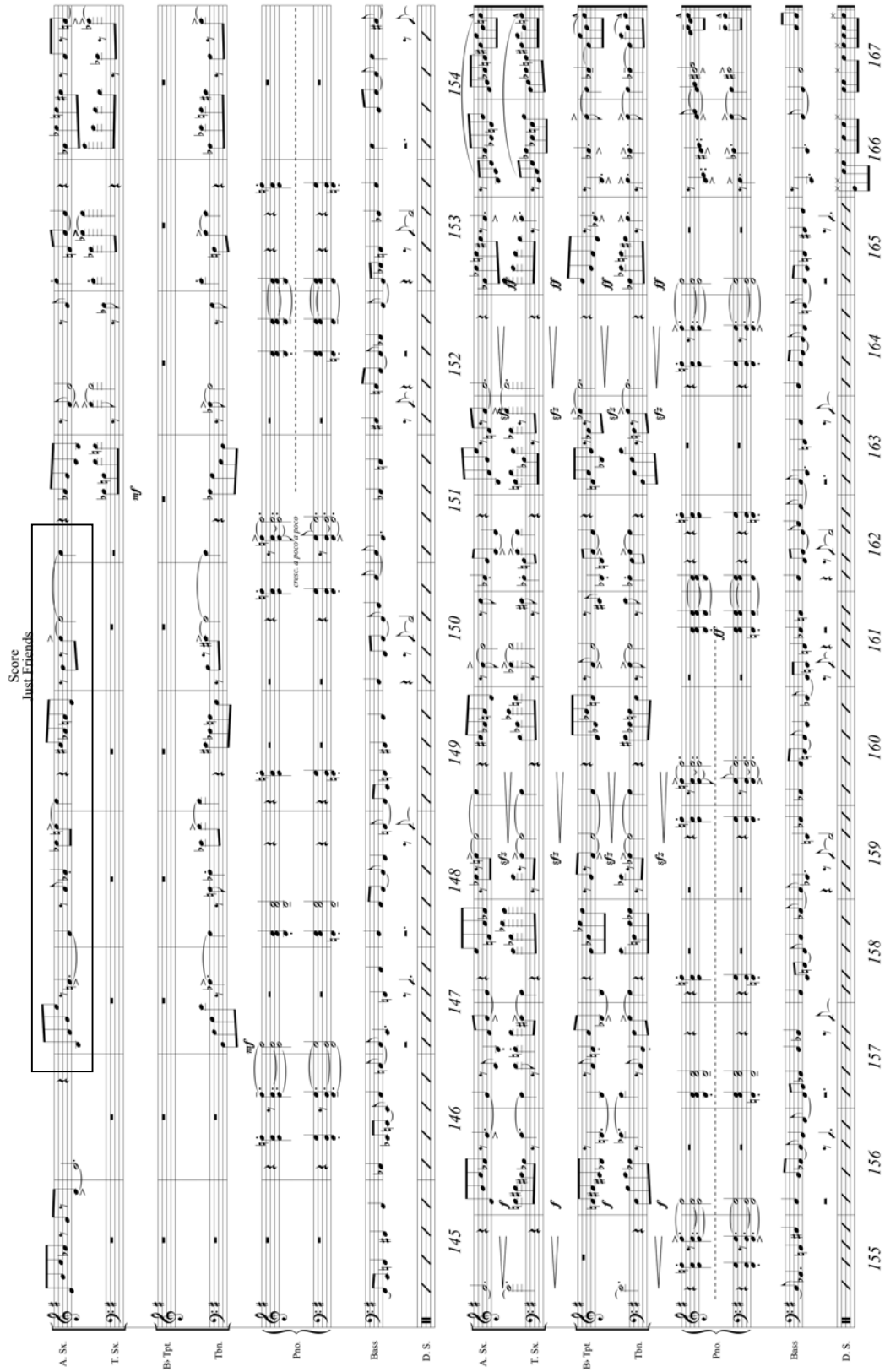
From "Just Friends", for tp, tbone, alto sax, *tenor* **sax, piano, bass, drums**

The techniques I used in this piece are:

- *Isorhythm*ic technique. A series of pitches arranged with a repeating rhythmic patterns, as we can see in these examples, where the boxed passage highlights a *Talea*, repeated several times with different pitches:

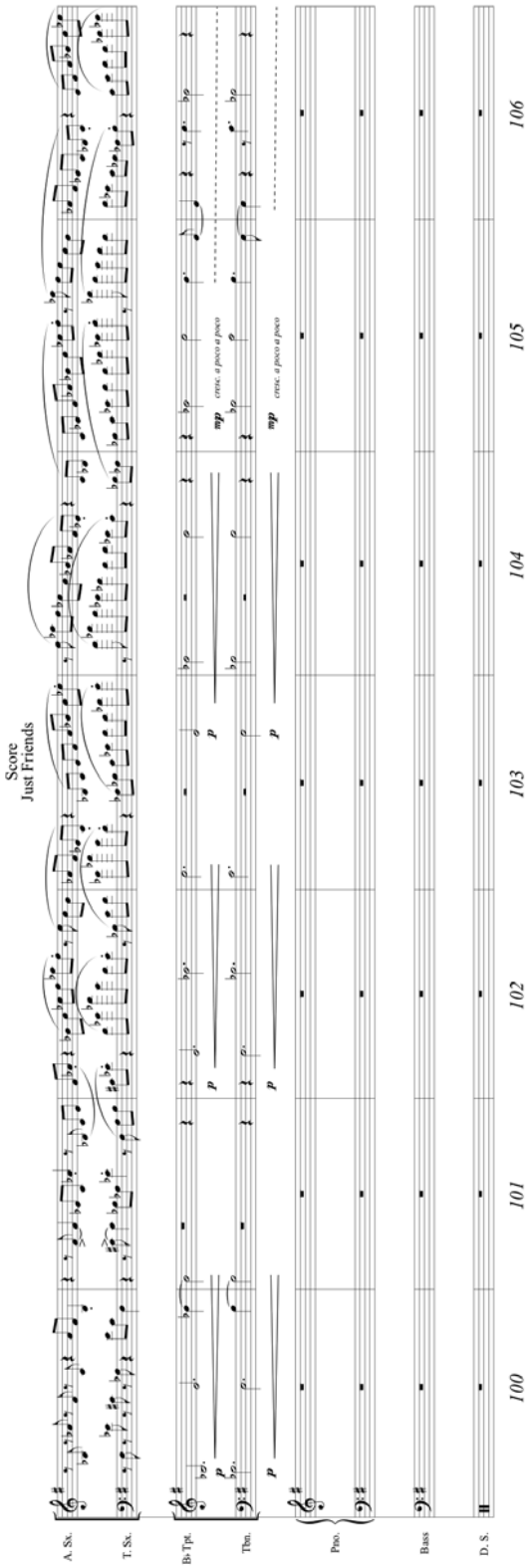


Ex 7.11 – Just friends, mm 26-33 – *Isorhythm*ic technique. **<u>CD track n°24 (attached score 25)</u>**



Ex 7.12 – Just friends, mm 155 –167 – *Isorhythm*ic technique

- A Horizontal Polymetric Principle, using melodic/metric patterns as we can see here under:



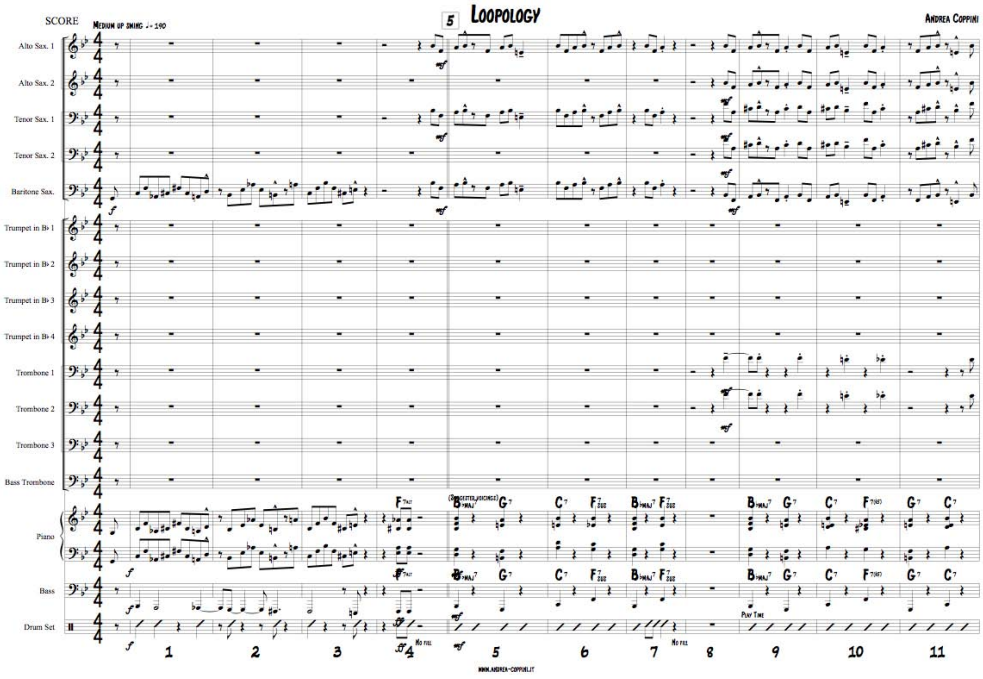
Ex 7.13 – Just friends, mm 100-106 – Implied Horizontal Polymeter

7.4 Compositions for Big Band or Large Ensembles

From Loopology, for jazz big band

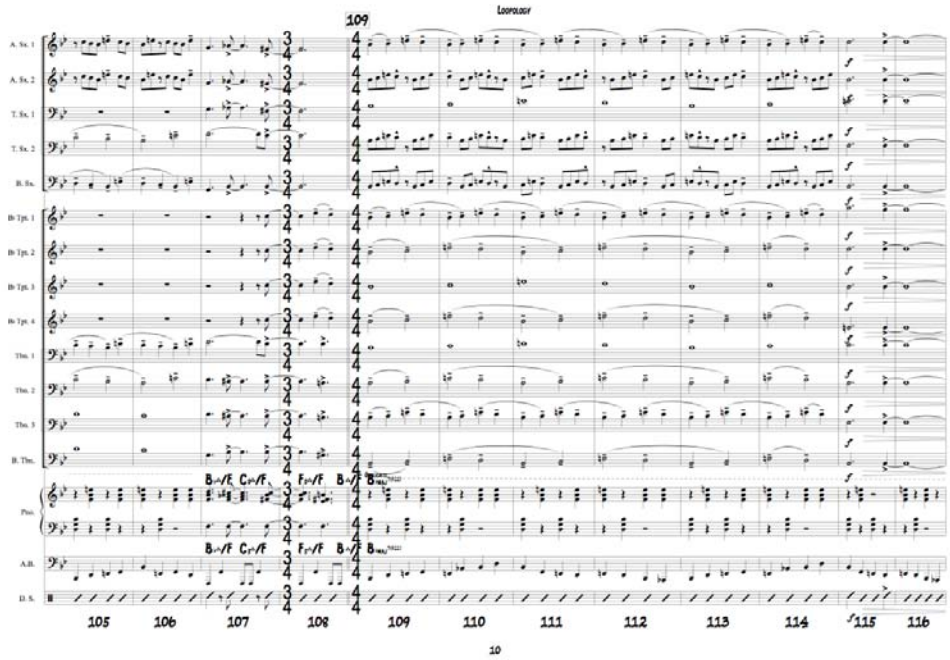
In this piece I applied the following techniques:

- A Horizontal Polymeter using melodic/metric patterns, as in the example below:



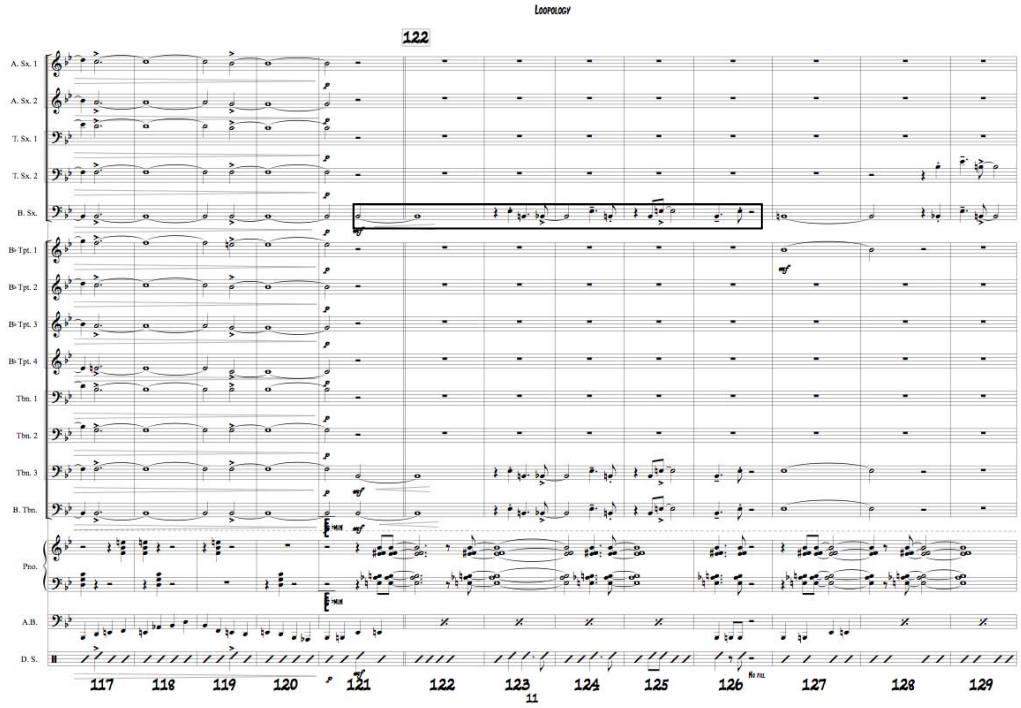
Ex 7.14 – Loopology, mm 1 - 12 – Implied Horizontal Polymeter. **CD track n°25 (attached score 26)**

- A Horizontal Polymeter using melodic/metric patterns combined with a Vertical Polymeter preserving the pulse:



Ex 7.15 – Loopology, mm 107 - 117 – Horizontal and Vertical Polymeter

- *Isorhythm*ic technique (the *Talea* is highlighted by a box):

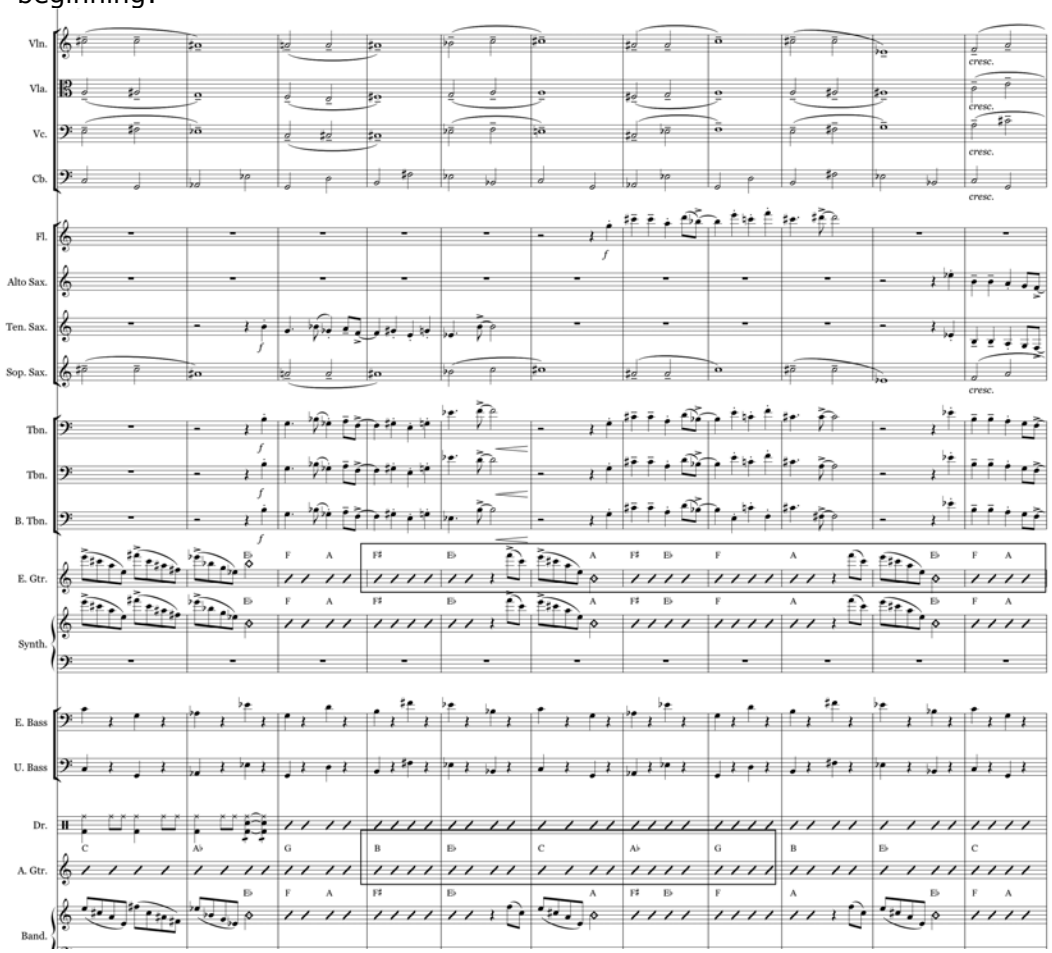


Ex 7.16 – Loopology, mm 130 - 142 – *Isorhythm*ic technique

From *The Big Bye Bye - Pot-Pourri of Dances – First Part*, for large mixed ensemble

In this piece, composed for the "Codarts Big Day" and performed in De Doelen, Rotterdam, the 27th of April 2013, I have used a particular technique of shifting at the layer of the harmonic rhythm.

The piece was a commissioned piece and the rules I had were quite strict. The outcome should have been a mixing between south-American dances, and I had to respect the rhythmic and *grooving* character of each dance. So, rhythmic or metric experiments were not allowed. But I had a certain freedom about melody and harmony. Therefore, in the last part, rhythmically a *merengue,* I decided to create two different harmonic progressions overlapped to each other. One lasts 5 measures with each chord lasting one measure, the other one lasts 8 measures and the length of each chord is: two chords half a measure, one a whole measures and then again, 1/2, 1/2, 1. The first cycle, made by all different major triads, is repeated several times. The second cycle uses only three major triads, different to each other and to those of the other cycle, always combined in a different order. Here is an excerpt of this part where the two overlapped cycles are highlighted, even if not in their beginning:



Ex 7.17 – The Big Bye Bye, mm 82 - 92 – Superposition of harmonic progressions

Here is a scheme of the different occurring created by the shifting of the two progressions:

Cycle 1	**F# Eb**	F	A F#	Eb	F A	F#	Eb F	A
Cycle 2	**B**	Eb	C	Ab	G	**B**	Eb	C

F# Eb	F	A F#	Eb	F A	F#	Eb F	A
Ab	G	**B**	Eb	C	Ab	G	**B**

F# Eb	F	A F#	Eb	F A	F#	Eb F	A
Eb	C	Ab	G	**B**	Eb	C	Ab

Table 7.1 – The Big Bye Bye – Overlapping of two harmonic progressions

As we can see in the above table, the overlapped triads create different polychords at each different occurring.

Despite the fact that the rhythmic and metric layer are not involved in this technique, nonetheless this is for sure a cyclic technique, inspired by the overlapping of chords used by Messiaen.

7.5 Electronic compositions

Since the beginning of my Master I attended lessons of electronic music, under the supervision of René Uijlenhoet. At that time I was almost completely lacking in technical expertise about the management of software for composing electronic music, and so I spent a lot of time to improve my skills in that direction. As my experience and skills grew I begun to understand the exciting opportunities that I had with the composition of electronic music, exactly in the field of this research.

Indeed, using software for electronic composition like Max Msp, I was able to manipulate the timing and the overlapping of different cyclic structures in a way that could not be possible in acoustic music.

So, I started experimenting in two basic directions:

1. The managing of timing, creating musical cycles with different frequencies of reproduction (metronomes), but also creating variable metronomes
2. The overlapping of different parameters and their possibility of shifting

The using of software for electronic music gives advantages on both directions, but I have found a lot of chances especially on the second point.

Indeed, in addition to experiencing the superposition of pitches and rhythm, as in the *isorhythm*ic technique properly said (but with combinations hardly reproducible in acoustic music), I have experimented superposition and shifting of whatever can create a rhythmic pulse in a sound generator, using wave interfering, phase modulation, and loop generators.

Of course I cannot show in this report any score of these experiments but I have added to the attached CD three electronic pieces I wrote with different concepts.

***Isorhythm*ic etude n°1 – <u>CD Track n°26</u>**

This one can be considered my actual first electronic piece. It is the one in which I used more the principles of the *isorhythm*ic technique. First I created a certain number of cycles, obtained combining pitches and rhythm. Each cycle has its musical sense and could be endless reproduced. Then I combined some of those cycles

putting them together and creating a piece by controlling density, dynamics, and range.

Etude n°2 – <u>CD Track n°27</u>

This etude is completely based on sine waves and their interfering to each other. A sine wave is in itself a cycle, so combining 2 or more sine waves with different frequencies we can have shifting and, consequently, different rhythms generated by that shifting.

8. CONCLUSIONS

Trying to make an assessment for concluding this research I can resume it in the following points:

- In its ending this research fits even more than in the beginning with the goals I started. Indeed, as I went on researching, my goals, my interests, and my preferences have become clearer and wider. I have found a lot of connections between styles and composers that I could only guess before, but not with the actual knowledge and deepness. Now I have the feeling that this was exactly what I really need to know and to study for my improvement as a composer and artist.

- Thanks to this research I have also learned better how to approach a style or a composer, and how to analyze his music in order to penetrate his principles and incorporate them in my music

- During the whole research I have felt its subject very close to what I am looking for in my composition, and, therefore, as I have showed in the last chapters I have always tried to use, apply, and experiment the principles and techniques I was analyzing and studying. That is the reason why for me this research has never been a matter of just composing one (or two or three) pieces at the end for showing the use of the techniques. Instead, during these two years, whenever I composed something it was natural and logic to incorporate or use some of that techniques and principles.

- But the most important result that this research has had on me is the fact that, for the time being, I do not feel that it is finished at all. It is exactly as my horizon was suddenly broadened and because of that, a lot of new directions of studying had come to my mind. Beyond that I feel also full of ideas for composing, and this ideas have been greatly prompted, in their number but also in their quality, by this research. So, I think that the fact that a research leaves you the will of keeping on it, is real the best result you can ask.

BIBLIOGRAPHY

1) Literature

Music Sheets and transcriptions:

Guillame de Machaut, Messe de Nostre Dame, Edition Peters

Philippe de Vitry, Garrit Gallus/In *nova* fert/Neuma, Norton Anthology of Western Music vol.1, w.w. Norton & Company

Guglielmi Dufay Opera Omnia, Dufay, Guillaume / American institute of musicology / 1947

Ouvres complétes / Guillaume de Machaut Motetten, zangstemmen [3-4] Part: Volume II: Les motets Author: Guillaume de Machaut (ca. 1300-1377) Year: cop. 1977 Publisher: Monaco

Jacques Boogaart, "O Series Summa Rata", De Motetten van Guillame de Machaut, appendices, (complete transcriptions from the original manuscripts of Motets M1, M2, M3, M4, M5, M6, M7, M10, M11, M16, M17, M20), ISBN 90-393-2706-8

Oliver Messiaen, Quatuor pour la Fin du Temps (Quartet for the End of Time): (2001, Durand Editions Musicales)

Oliver Messiaen, "Visions de l'Amen" pour deux pianos (1950, Durand Editions Musicales)

Oliver Messiaen, "Vingt regards sur l'Enfant Jesus" pour piano (1950, Durand Editions Musicales)

Gyorgy Ligeti, Continuum for harpsichord, 1970, ed. Schott

Gyorgy Ligeti, Streichquartett N°2, 1972, ed. Schott

Gyorgy Ligeti, Etudes pour piano, 1er livre, 1986, ed. Schott

Vijay Iyer, "Macaca Please", 2008, Mel Bay Publications

Steve Leheman, "Foster Brothers" and "No Neighborhood Rough Enough", 2008 and 2009, Density Music - BMI

Books: (Hystorical perspectives, analysis of composition and used techniques)

Leech-Wilkinson, Daniel, Compositional techniques in the four-part *isorhythm*ic motets of Philippe de Vitry and his contemporaries, 1989, Garland Publishing (0-8240-2016-2)

Surian, Elvidio, Manuale di storia della musica, 1991, Rugginenti Editore, Milano

Moll, Kevin N. Counterpoint and Compositional Process in the Time of Dufay: Perspectives from German Musicology. Criticism and Analysis of Early Music. Vol. 2. , 1997, Garland Publishing.

Cumming, Julie Emelyn, The motet in the age of Dufay, 1999, Cambridge University Press (0-521-47377-2) NMI MU 29 E 13

Jacques Boogaart, "O Series Summa Rata", De motetten van Guillame de Machaut, De ordening van het corpus en de samenhang van tekst en muziek, ISBN 90-393-2706-8

Messiaen, Oliver, The technique of my musical language, Ed. Leduc, Paris

Messiaen, Oliver, Traité de rhythme, de couleur et d'ornithologie, 1994, Ed Leduc, Paris

Chang, Leiling, Gyorgy Ligeti-Lorsque le temps devient espace, 2007,L'Harmattan, Paris

Articles, Dissertations, Treatises: (Hystorical perspectives, analysis of composition and used techniques)

Günther, Ursula. "The Fourteenth Century Motet and Its Development." Musica Disciplina 12 (1958).

Harbinson, Denis, *Isorhythm*ic technique in the early motet, Music and Letters, 1966 vol.47, 100-109

Fuller, Sarah. "Modal *Tenors* and Tonal Orientation in Motets of Guillaume De Machaut." Current Musicology 45-47 (1990): 199-245.

Leach, Elizabeth Eva. "Counterpoint and Analysis in Fourteenth-Century Song." Journal of Music Theory 44.1 (2000): 45-79.

Bent, Margaret, Words and music in Machaut's Motet 9, 2003, Early Music

Emilios Cambouropoulos and Costas Tsougras, "Auditory Streams in Ligeti's *Continuum:* A Theoretical and Perceptual Approach", journal of interdisciplinary music studies spring/fall 2009, volume 3, issue 1&2, art. #0931207, pp. 119-137

Ji Won Baik, György Ligeti's piano études: a polyrhythmic study, doctoral dissertation, Florida state university college of music, 2009

Arshia Cont, "Analysis of Gyorgy Ligeti's second string quartet: Second Movement" doctoral dissertation, University of California at San Diego. June 3, 2005

Jessica Rudman "Hidden Complexity: Rhythmic Processes in Ligeti's *Arc-en-ciel* ", May 2008, Revised February 2009, doctoral dissertation

Stephen Andrew Taylor, "Ligeti, Africa and Polyrhythm", Journal of the Department of Ethnomusicology Otto-Friedrich University of Bamberg Vol. 45 (2) – 2003

Stephen Andrew Taylor, "The Lamento Motifs, Metamorphosis in Ligeti's late style", 1994, doctoral dissertation, University of Michigan

Davide Penalosa, Peter Greenwood *The clave matrix : Afro-Cuban rhythm : its principles and African origins,* Redway, CA : Bembe Books, ©2009.

Roberts, John Storm 1979. *The Latin tinge: the impact of Latin American music on the United States*. Oxford.

Peter Ellis Kenagy, "George Russell's jazz workshop: the composer's style and original methods of 1956", doctoral dissertation, Graduate College of the University of Illinois at Urbana-Champaign, 2009

2) CDs and Recordings

Philippe de Vitry, Motets et Chanson, CD audio, RCA RD 77095

Guillaume de Machaut, La messe de nostre dame [COMPACT DISC] Oxford Camerata, Jeremy Summerly

Guillame Dufay, Missa l'homme armé- Motets, The Hilliard Ensemble, EMI CDC 7476282

Guillaume de Machaut, Mercy ou mort : Chansons & motets d'amour, CD, ARCANA A 305

Guillame de Macahut, Motets, The Hilliard Ensemble, CD, ECM records 472 4022

Oliver Messiaen, Quatuor pour la Fin du Temps (Quartet for the End of Time), 1990, Deutsche Grammofon, B000001G8W

Messiaen: Visions De L'Amen - Amen De La Création, Katia & Marielle Labèque, Messiaen Edition [Disc 5]

Ligeti: String Quartet #2, Arditti Quartet, 1994, Ligeti: String Quartets & Duets

Ligeti: Continuum, Elisabeth Chojnacka, Keyboard Works

Gyorgy Ligeti, Works for piano, 1997, Sony, B0000029P0.

Morton, "Jelly Roll" 1938: *The Complete Recordings By Alan Lomax*, Library of Congress Recording.

George Russell, *The George Russell Smalltet -The Jazz Workshop,* Bluebird/ BMG 6467-2-RB

Steve Coleman, *Drop Kick* (Novus/BMG, 1992)

Vijay Iyer, *Tragicomic*, Sunnyside, 2008

Steve Lehman Octet, *Travail, Transformation, and Flow*, Pi recordings, 2008

3) Internet

http://www.haverford.edu/musc/multimedia/music230/voellmy/dufay2.html
(A musical analysis of the Guillame Dufay motet "Nuper rosarum flores").

http://www.the-orb.net/encyclop/culture/music/clarkmotet.html
(A clear analysis of the *isorhythm*ic technique and its historic development).

http://en.wikipedia.org/wiki/Nuper_rosarum_flores
(Analysis of the Guillame Dufay's motet "Nuper rosarum flores", and also an interesting bilbiograpy)

kevinmwilson.com/writing/kw_*isorhythm*.pdf
(Wilson, Kevin, *Isorhythm* and Musical Identities, 2009)

http://ronsen.org/monkminkpinkpunk/9/contents.html
(6 interviews with Ligeti)

http://www.m-base.com
(The official website of Steve Coleman, a milestone about him, his music, his thoughts. With interesting interviews, essays and most of his music free for listening)

http://vijay-iyer.com
(The official website of Vijay Iyer)

http://www.stevelehman.com
(The official website of Steve Lehman)

LIST OF TRACKS OF THE ATTACHED CD

1. Succession of different Hemiolas. **Ex. 2.4**
2. Machaut's Motet M1 – (Ferrara Ensemble – Mercy ou Mort) – **Score 1-Ex. 3.5,6**
3. Machaut's Motet M4 – (A midi transcription)
4. All the Things You Are, *Talea* 3 – **Score 6-Ex. 3.9**
5. All the Things You Are, *Isorhythm* 1, rhythm section only. – **Score 9**
6. All the Things You Are, *Isorhythm* 1, rhythm section + soloist. – **Score 10**
7. All the Things You Are, *Isorhythm* 2, rhythm section only. **Score 11**
8. All the Things You Are, *Isorhythm* 2, rhythm section + soloist. – **Score 12**
9. All the Things You Are, *Isorhythm* 2, harmonic variation 1. – **Score 13**
10. All the Things You Are, *Isorhythm* 2, harmonic variation 2. – **Score 14**
11. All the Things You Are, *Isorhythm* 2, 3 different *Talea*e. – **Score 15**
12. All the Things You Are, *Isorhythm* 2, 3 different *Talea*e + soloist – **Score 16**
13. All the Things You Are, Complete arrangement – **Score 18-Ex. 3.11**
14. Exercise on Messiaen. **Score 19-Ex. 4.6**
15. Ye Hypocrite, Ye Beelzebub (George Russell, The Jazz Workshop, 1956). **Ex. 6.1**
16. Livingstone, I Presume (George Russell, The Jazz Workshop, 1956). **Ex. 6.2**
17. Drop Kick (Steve Coleman, Drop Kick, 1992). **Ex. 6.3**
18. Macaca Please (Vijay Iyer, Tragicomic, 2008). **Ex. 6.4,5**
19. No Neighbourhood Rough Enough (Steve Lehman, Travail, Transformation and Flow, 2008). **Ex. 6.6**
20. (Parallel) Lines (Meet) at Infinity (A. Coppini, 2012). **Score 21- Ex. 7.1,2,3**
21. Song (A. Coppini, 2012). **Score 22-Ex. 7.4**
22. Softly as in a Morning Sunrise (A. Coppini, 2012). **Score 23-Ex. 7.5,6,7**
23. Images of Sardinia (A. Coppini, 2013). **Score 24-Ex. 7.8,9,10**
24. Just Friends (A. Coppini, 2012). **Score 25-Ex. 7.11,12,13**
25. Loopology (A. Coppini, 2012). **Score 26-Ex. 7.14,15,16**
26. Isorhythmic Electronic Etude n°1
27. Isorhythmic Electronic Etude n°2

ATTACHED SCORES

1. Machaut's Motet n°1
2. All the Things You Are, standard chart.
3. All the Things You Are, choice of the pitches for a *Color*
4. All the Things You Are, *Color* arranged with *Talea*1
5. All the Things You Are, *Color* arranged with *Talea*2
6. All the Things You Are, *Color* arranged with *Talea*3
7. All the Things You Are, *Isorhythm*ic arrangement n°1 for saxophone trio
8. All the Things You Are, *Isorhythm*ic arrangement n°2 for saxophone trio
9. All the Things You Are, *Isorhythm*ic arrangement n°1 for jazz rhythm section
10. All the Things You Are, *Isorhythm*ic arrangement n°1 for jazz rhythm section + soloist
11. All the Things You Are, *Isorhythm*ic arrangement n°2 for jazz rhythm section
12. All the Things You Are, *Isorhythm*ic arrangement n°2 for jazz rhythm section + soloist
13. All the Things You Are, *Isorhythm*ic arrangement n°2 for jazz rhythm section with harmonic variation 1
14. All the Things You Are, *Isorhythm*ic arrangement n°2 for jazz rhythm section with harmonic variation 2
15. All the Things You Are, *Isorhythm*ic arrangement n°2 for jazz rhythm section with 3 different *Talea*e
16. All the Things You Are, *Isorhythm*ic arrangement n°2 for jazz rhythm section with 3 different *Talea*e + soloist
17. Harmonic *Talea*
18. All the Things You Are, *Isorhythm*ic arrangement complete for jazz quartet, first part
19. Exercise on Messiaen's techniques n°1
20. Steve Lehman, Foster Brothers, for jazz trio
21. Andrea Coppini, (Parallel) Lines (Meet) at Infinity, for piano solo
22. Andrea Coppini, Song,, for soprano and piano
23. Andrea Coppini, Softly as in a Morning Sunrise, for string quartet and alto sax
24. Andrea Coppini, Images of Sardinia, for woodwind quintet
25. Andrea Coppini, Just Friends, for jazz combo
26. Andrea Coppini, Loopology, for jazz big band

O.. = longa
P. = brevis

CD track 1

Score 1

1. Quant en moy/Amour et biauté/Amara valde

MS A ff. 414v-415r

Triplum

Quant en moy vint pre-mie-re-ment A-mours, si tres doucet-te-ment Me vost mon cuer en-a-mou-

Motetus

A - mour et biau te

Tenor

Amara valde

Ut, la

rer Que d'un re-gart me fist pre-sent, Et tres a-mou-reus sen-te-ment

par fai - te

Me don-na a-vec dous pen-ser, Es-poir d'a-voir Mercy sans re-fu-ser, Mais

Doub-ter, Ce-ler Me font

IIb

on - ques en tout mon vi-vant Har-de-ment ne me volt don-ner;

par - fai - te - ment;

Et si me fait en de-si-rant Pen-ser si a-mou-reu-se-ment Que par for-ce de de-si-

Et vrais De - sirs,

IIa

rer Ma joi - e con-vient en tour-ment Mu-er, se je n'ay har-de-ment

qui m'a - fai - - - te

Las, et je n'en puis re-cou-vrer, Qu'A-mours se-cours Ne me vuel mul pres-

De vous, Cuers dous, A-mer

IIb

ter, Qui en ses las si du-re-ment Me tient que n'en puis es-cha-per;

sans fi - ne - ment;

Ne je ne vueil, qu'en a-ten-dant Sa gra-ce je vueil hum-ble-ment Tou - tes ces do-lours en-du-

Et quant j'aim

IIIa

rer, Et s'A-mours loy-al le con-sent Que ma dou-ce dame au corps gent

si fi - ne - ment,

Me vueil-le son a-mi cla-mer, Je sai De vray Que a-vay, sans fi-

Mer-ci Vous pri, Car el - - -

IIIb

ner Joi - e qu'A-mours a fin a-mant Doit pour ses maus guer-re-don-ner.

le me soit fai - te,

Mais elle a-tent trop lon-gue-ment Et j'aim-me si fo-let-te-ment Que je n'o-

Sans vo - stre hon-nour a - men - rir, Car

C2, i a

i b

se mer-cy rou - ver, Car j'aim miex vi-vre en es-pe - rant

j'aim miex ein - si lan-guir Et mo - rir, s'il vous

ii a

D'a-voir mer-cy pro-chain-ne-ment Que Re-fus me vein-gne tu-er Et pour ce di

a - gre - e, Que par moy fust em - pi-re-e Vo - stre

ii b

iii a

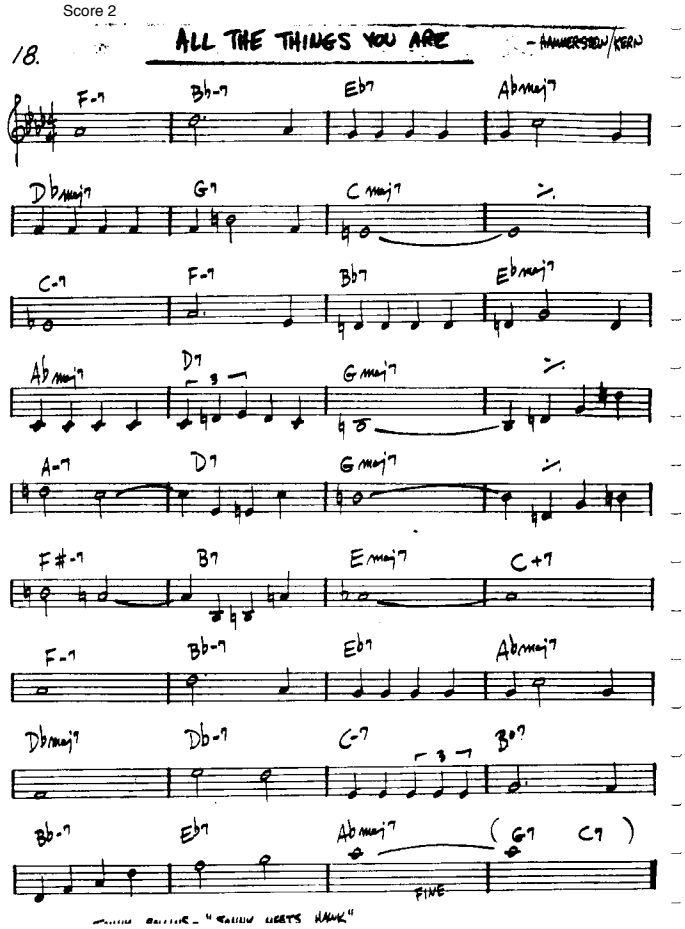
en sou-pi - rant: Grant fo-lie est de tant a-mer Que de son dous face ou a-mer.

hon - nour, que tant de - sir, Ne de fait ne de pen-se - e.

iii b

Original Standard Melody

Score 2



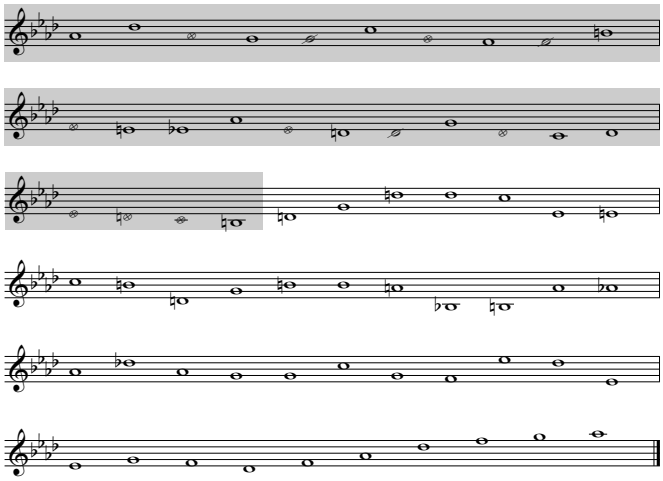
Choice of the Color

Score 3

The grey-highlighted pitches are the first selected tone row from the original: Cp=25

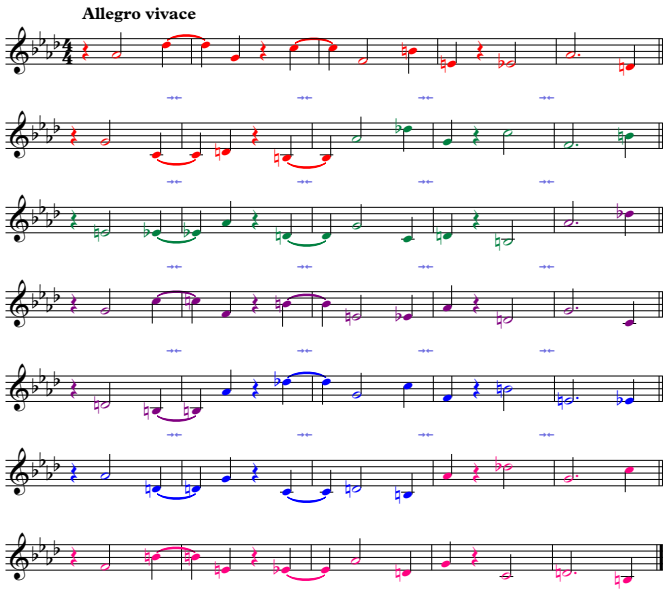
A second tone row is chosen by avoiding the repeated slashed-pitches: Cp=22

A third and definitive tone row is obtained by avoiding the crossed pitches, so you can have the reduction of the melody avoiding any repetition of pitches.: Cp=14



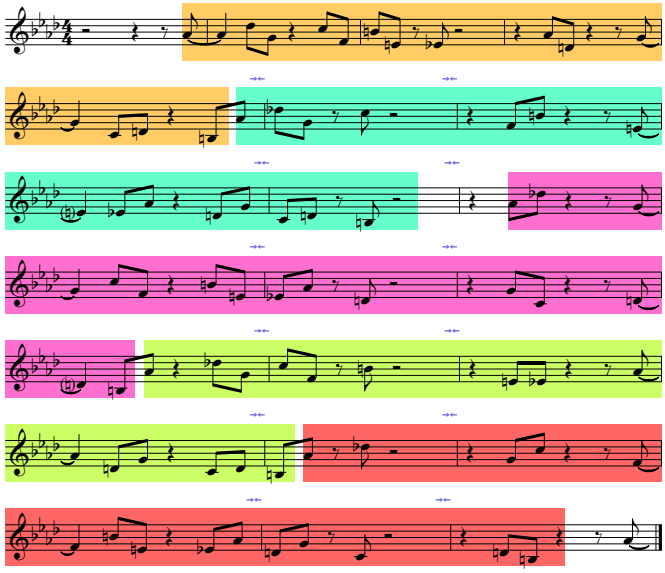
Talea 1

Score 4



Talea 2

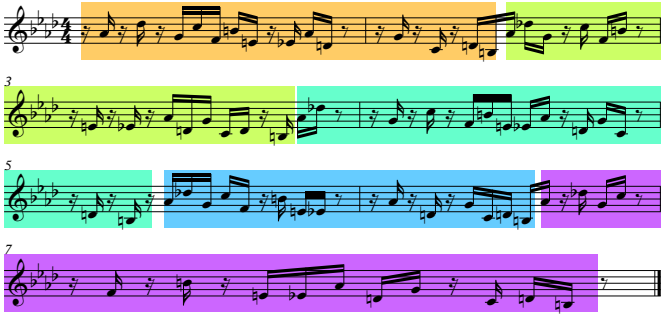
Score 5



Talea 3
Score 6

Cpi=14 Tn=10
Tr=7 Cs=5

CD track 4



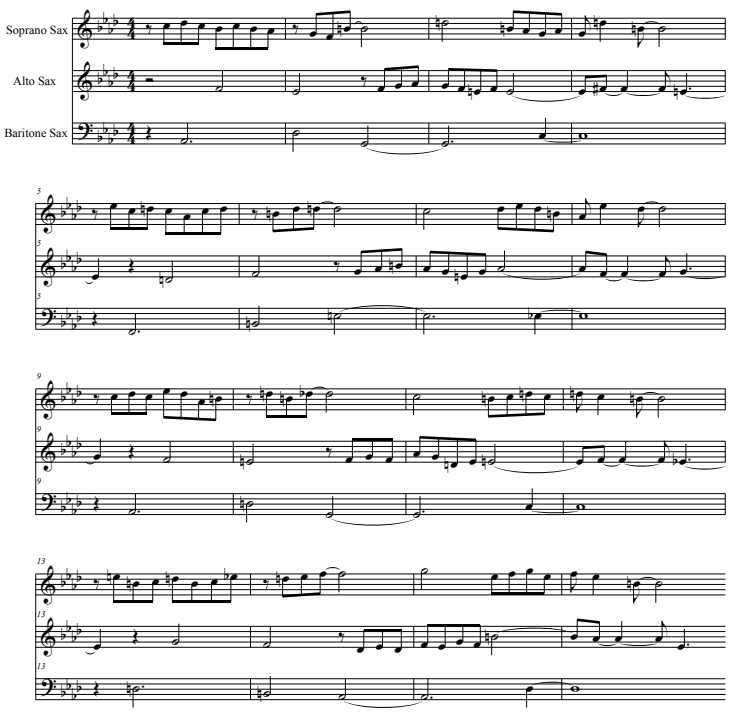
Score 7

Cp=14, Tn=4, Tr=7, Cs=2
Unfinished

CD track

All the things you are ISO1

A. Coppini



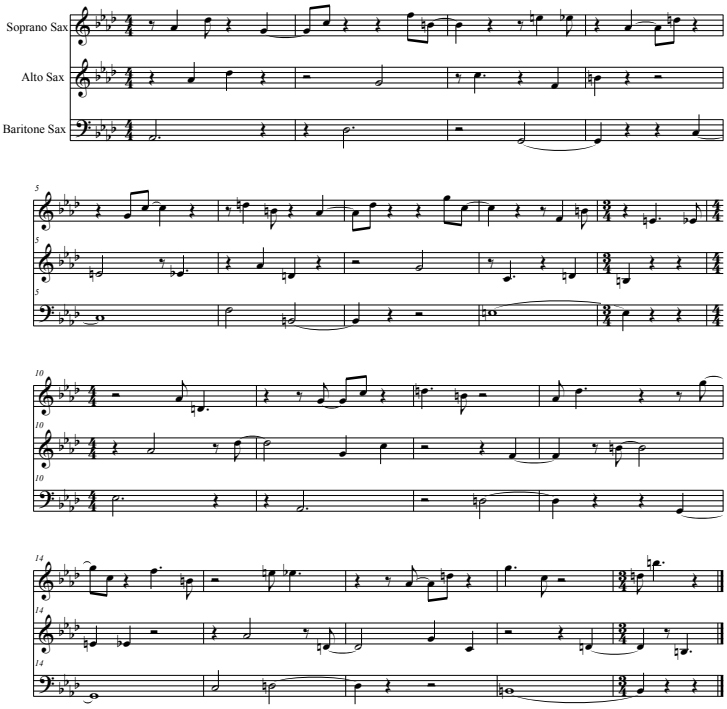
Sop sax: Cp=14, Tn=6, Tr=7, Cs=3 i.e. 42 pitches
Alto sax: Cp=14, Tn=4, Tr=7, Cs=2 i.e. 28 pitches
Baritone sax: Cp=14, Tn=7, Tr=2, Cs=1 i.e. 14 pitches

All the things you are ISO2

Score 8

A. Coppini

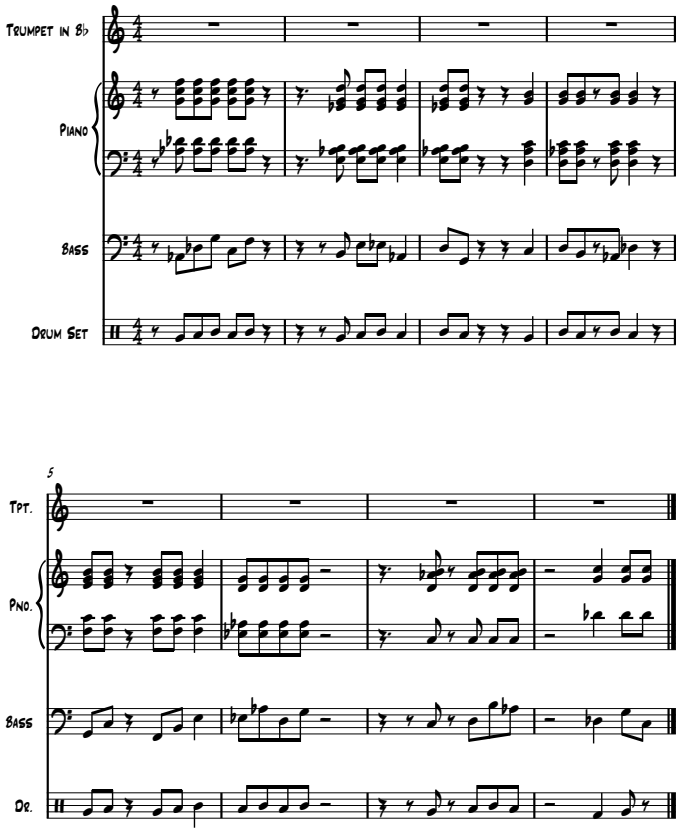
The 3 voices use strictly the arrangement of the 14 pitches-Color creating 3 different cycles in the same number of bars



Score 9

Isorhythm 1 - Rhythm Section

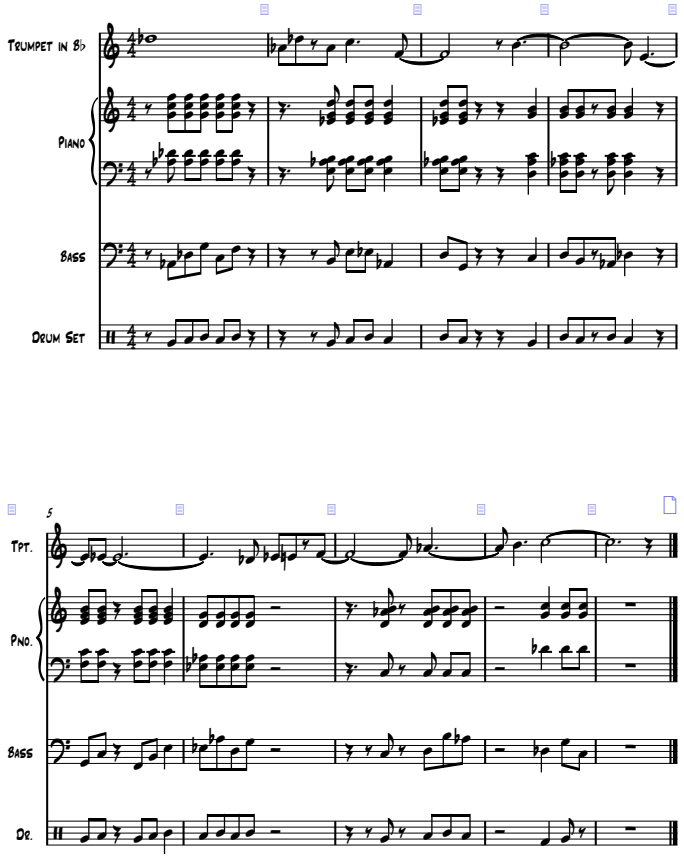
CD track 5



Score 10

CD track 6

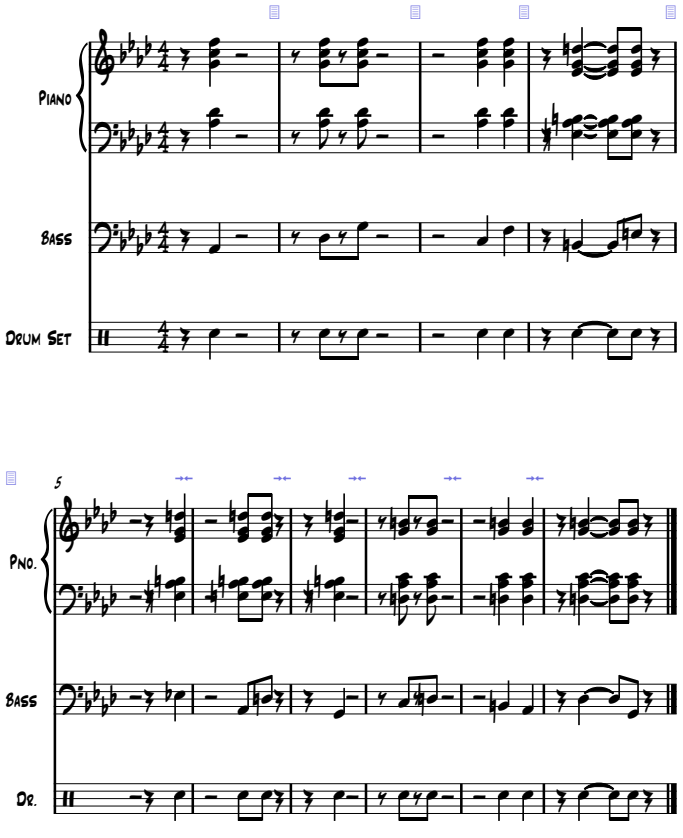
Isorhythm 1 - Rhythm Section + soloist



Score 11

Isorhythm 2 - Rhythm Section

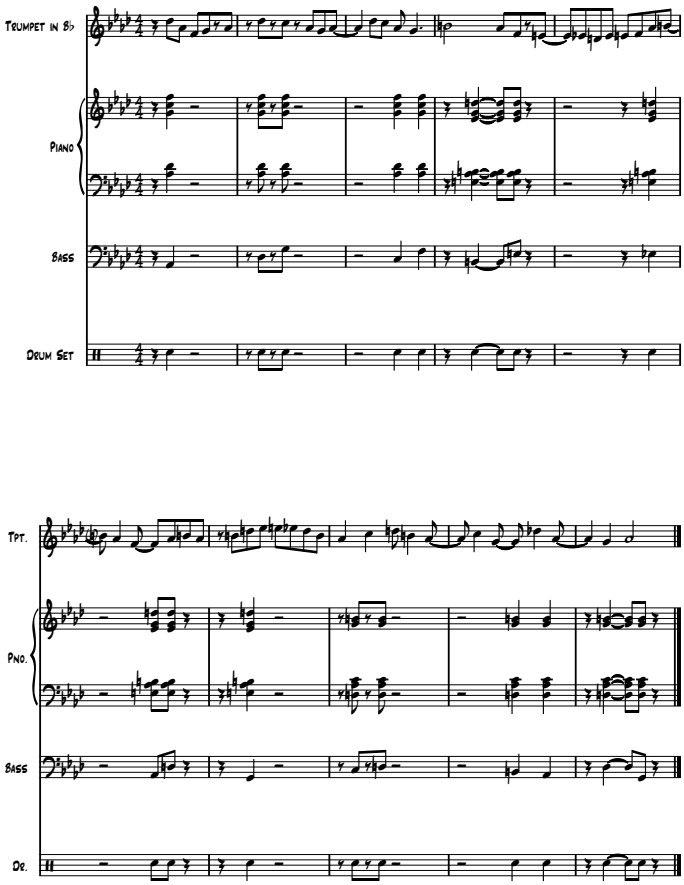
CD track 7



Score 12

Isorhythm 2 - Rhythm Section + soloist

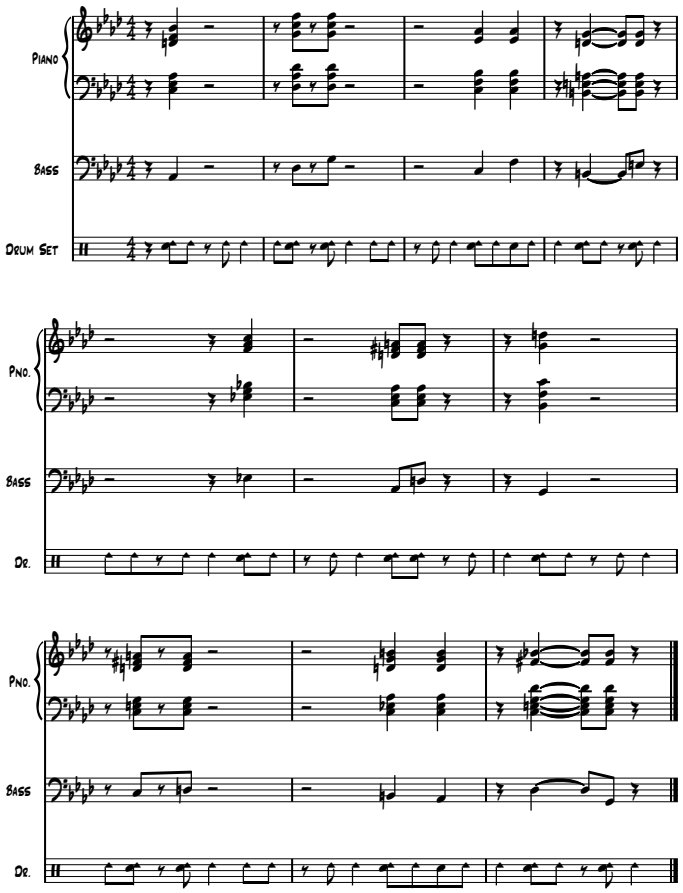
CD track 8



Score 13

Isorhythm 2 - harmony 1

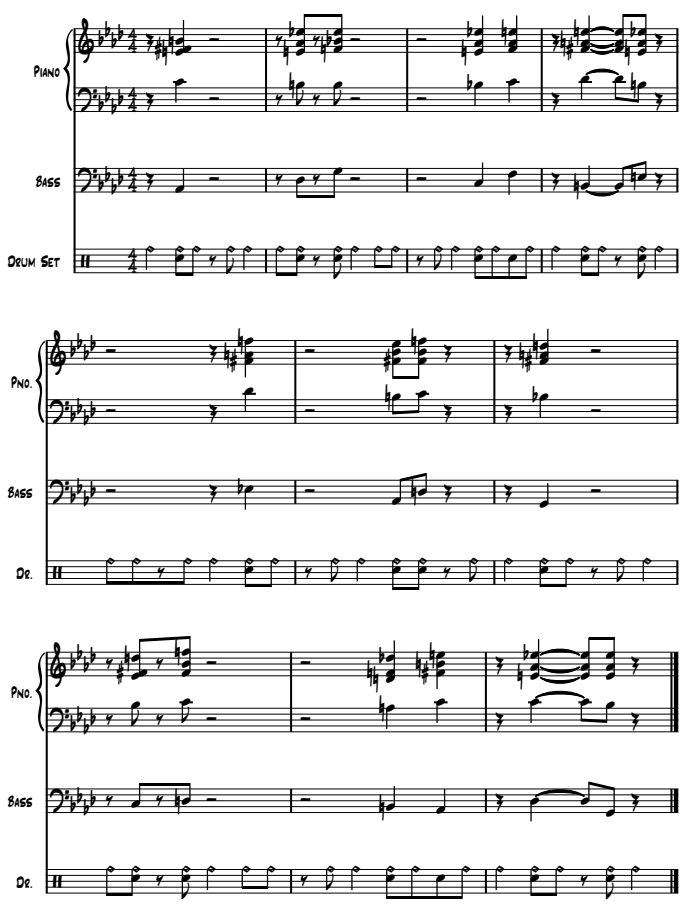
CD track 9



Score 14

Isorhythm 2 - harmony 2

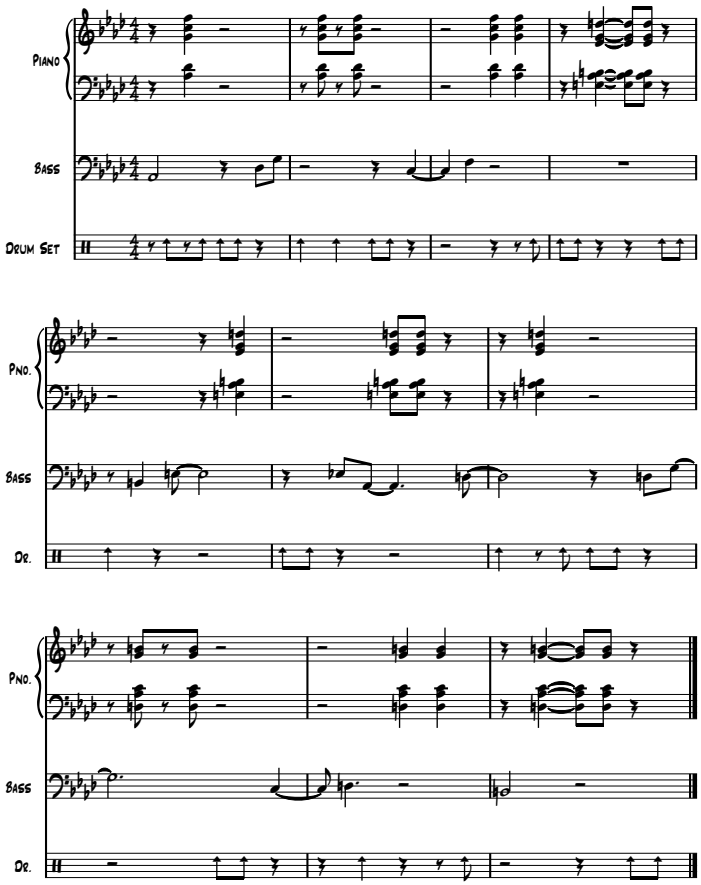
CD track 10



Score 15

Isorhythm 2 - 3 different Taleae

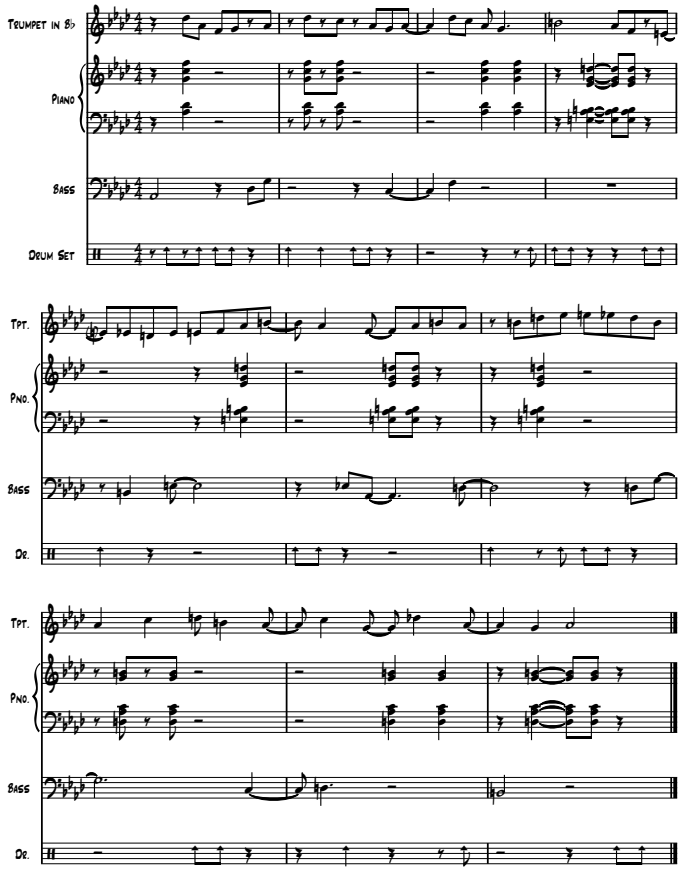
CD track 11



Score 16

Isorhythm 2 - 3 different Taleae + soloist

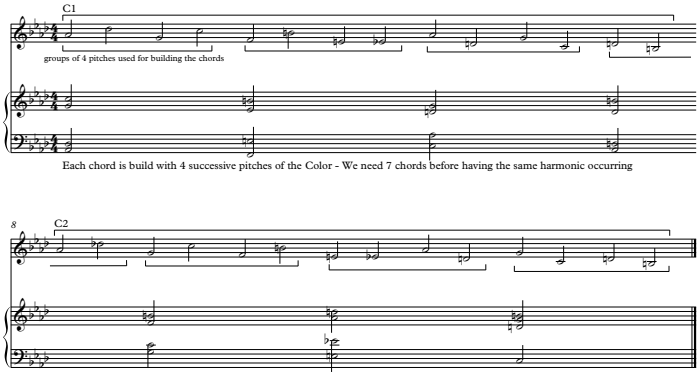
CD track 12



Score 17

Harmonic Talea

Color of 14 pitches extracted by the melody of All the Things You Are

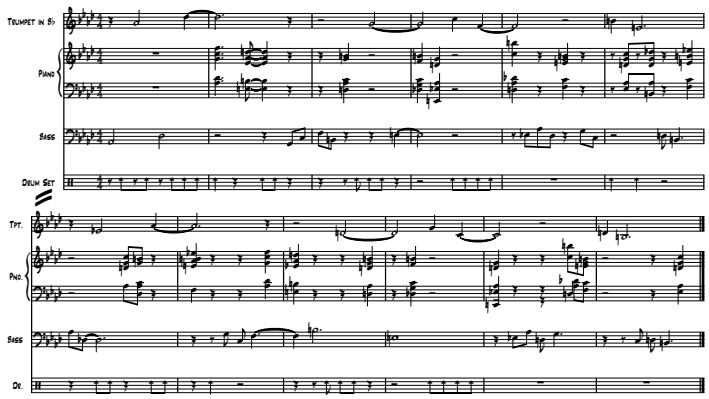


Each chord is build with 4 successive pitches of the Color - We need 7 chords before having the same harmonic occurring

Score 18

CD track 13

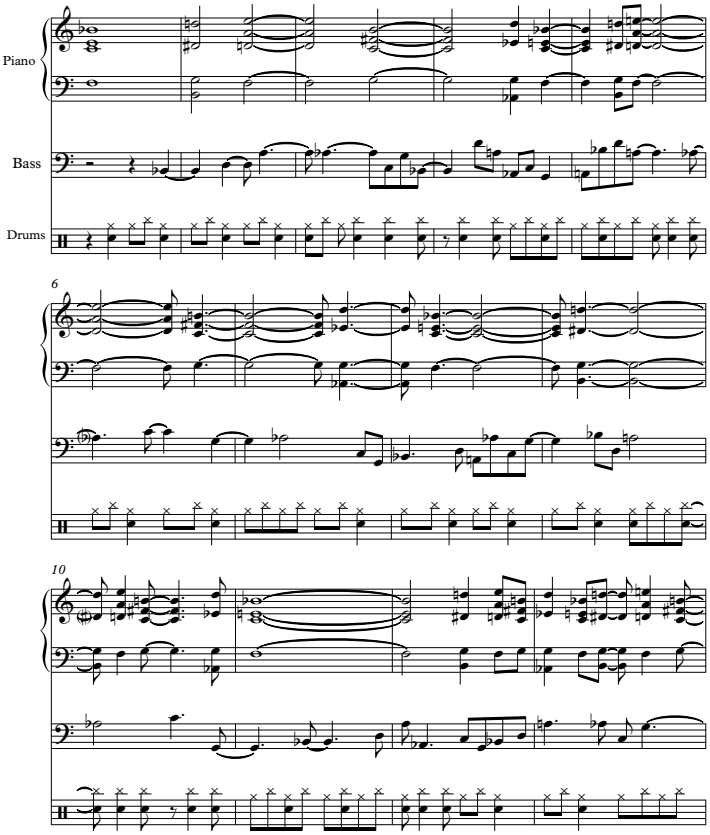
All the Things You Are - Complete isorhythmic arrangement - first part

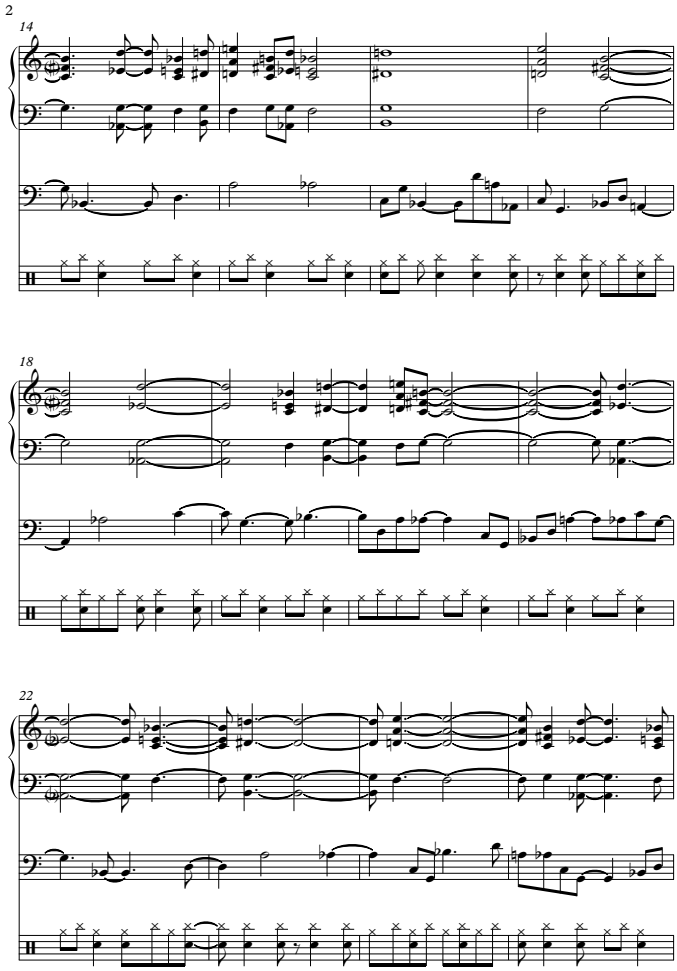


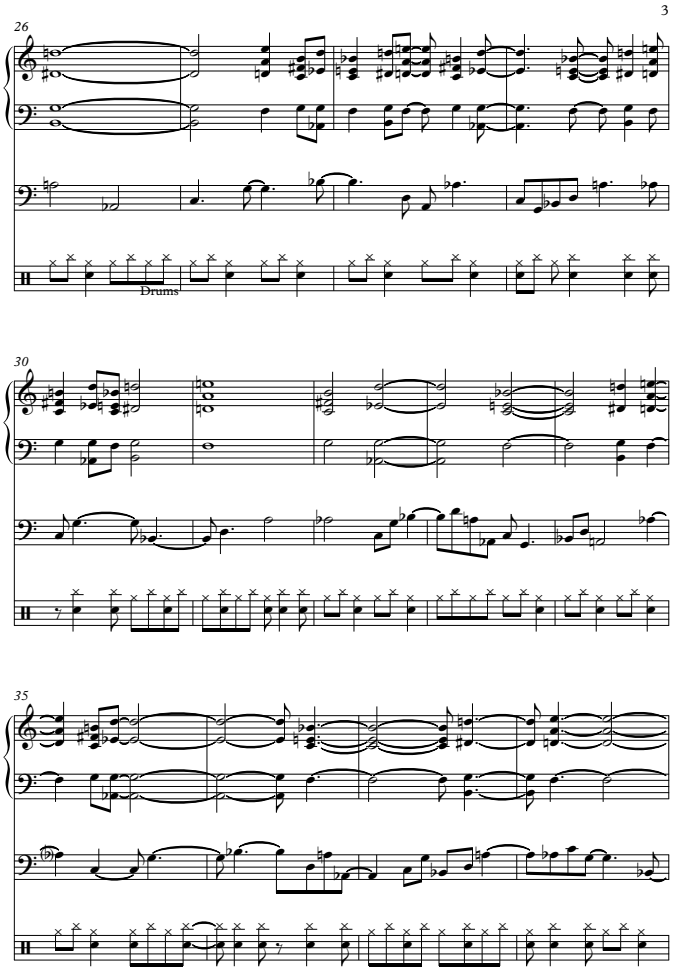
Score 19

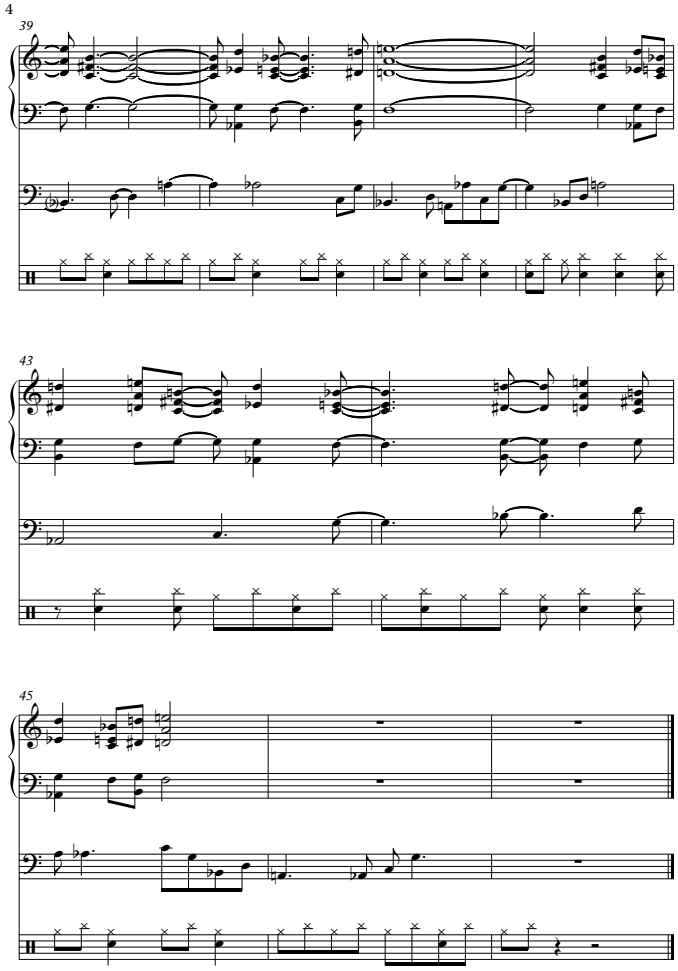
CD track 14

Exercise on Messiaen's techniques 1





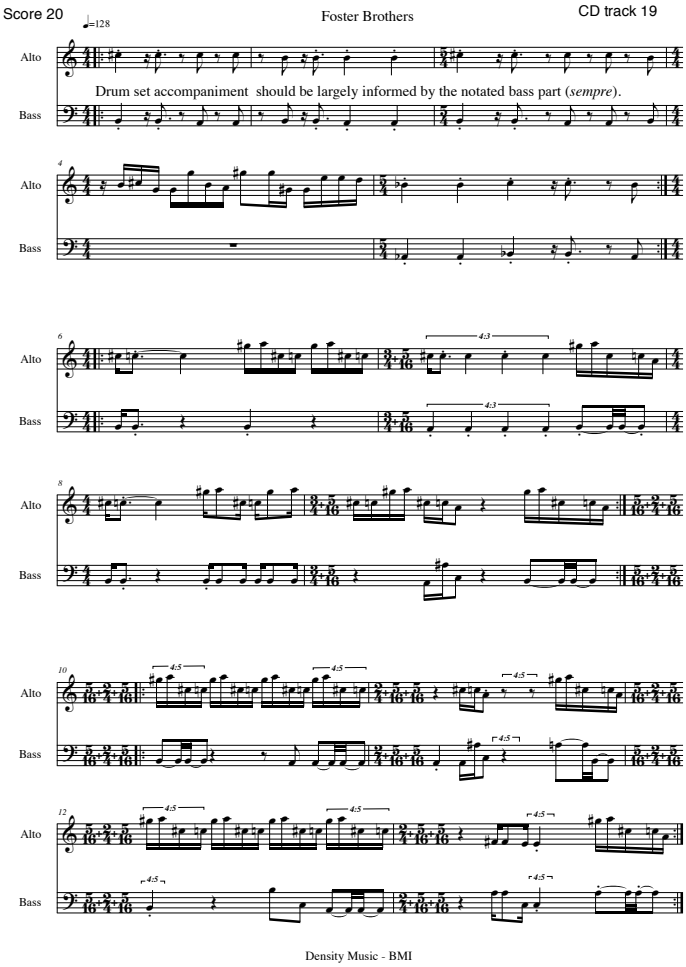


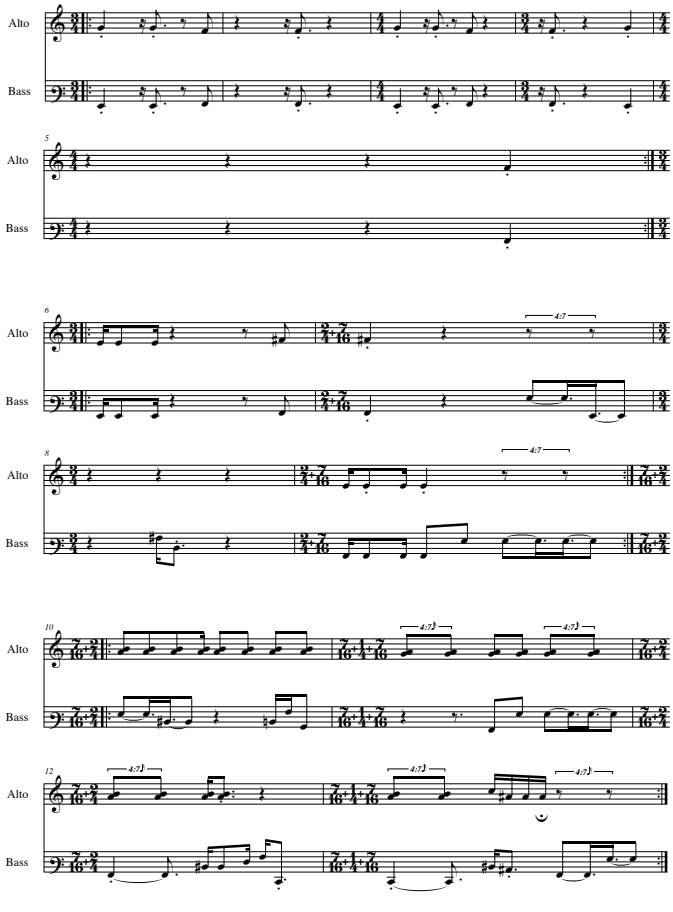


Score 20

CD track 19

Foster Brothers



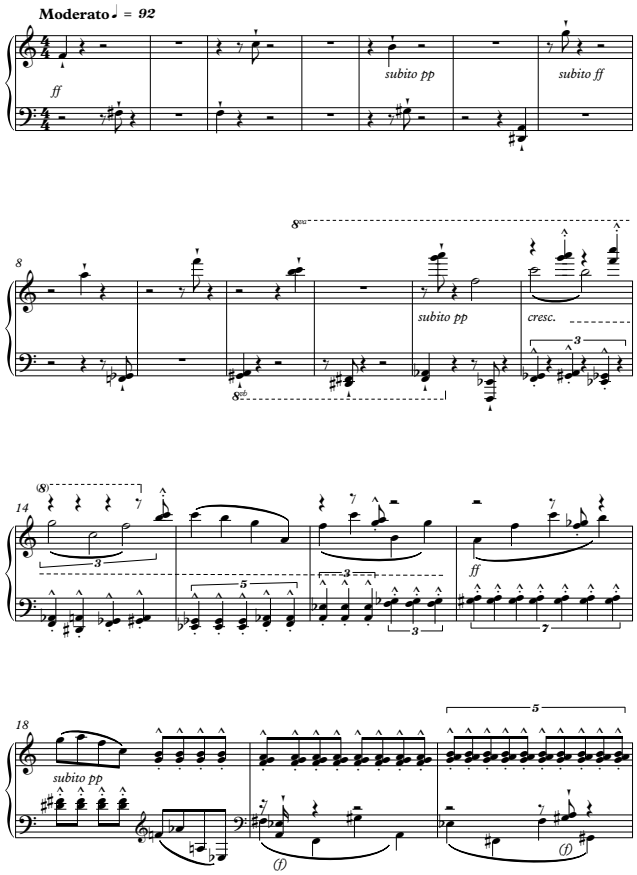


Score 21

CD track 20

(Parallel)Lines (Meet) at Infinity

A.Coppini



21

subito ff *subito pp*

23

25

cresc. a poco a poco

27

(cresc.)

29

(cresc.)

31

f *dim.*

33

p

35

37

subito ff

39

41

dim. a poco a poco

43

(dim.)

45

(dim.)

47

(dim.) *pp*

49

cresc.

(Ped.)

51

f *subito pp*

(Ped.)

53

subito f

(Ped.)

55

mp

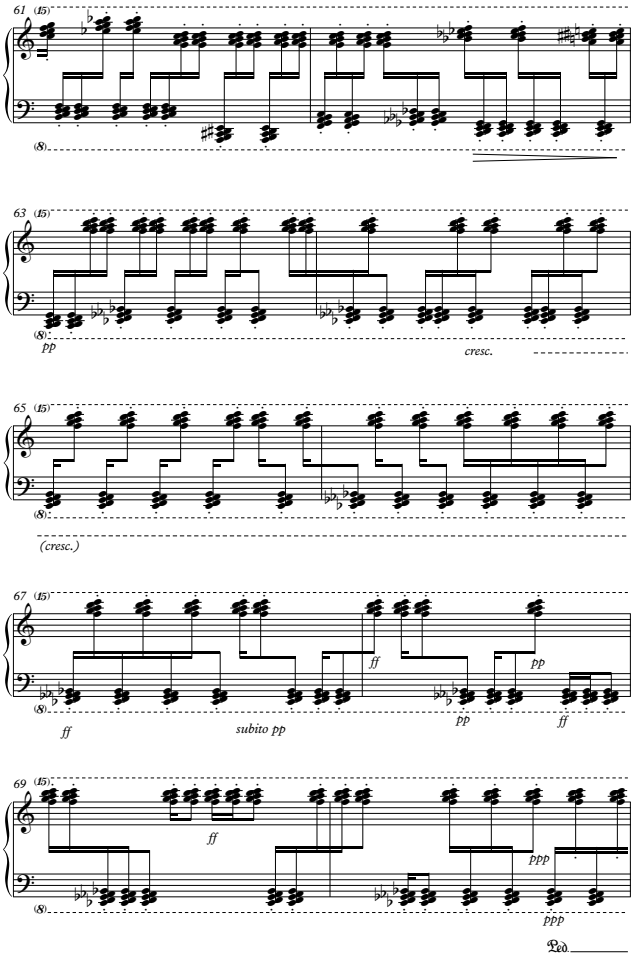
(Ped.)

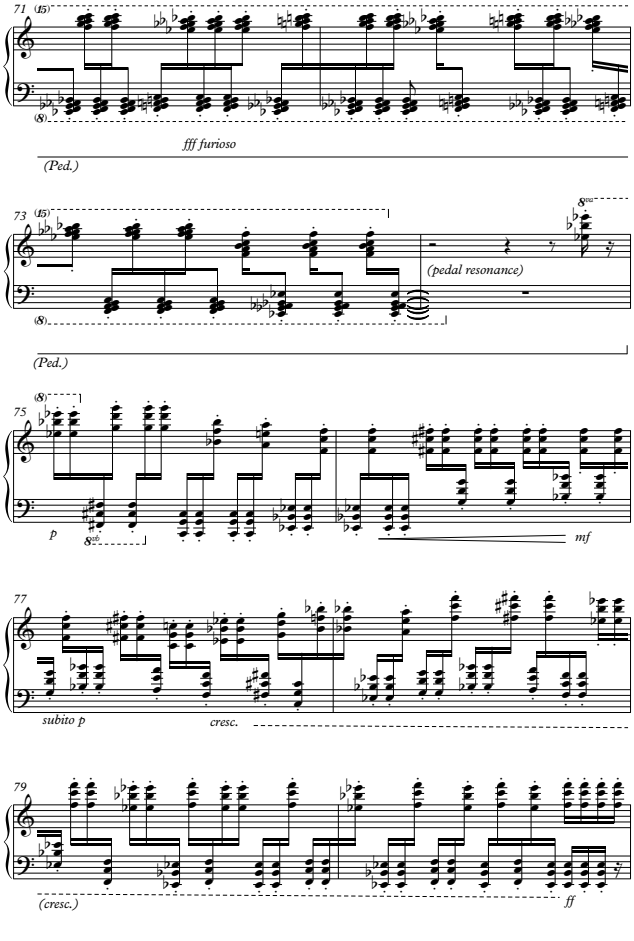
57

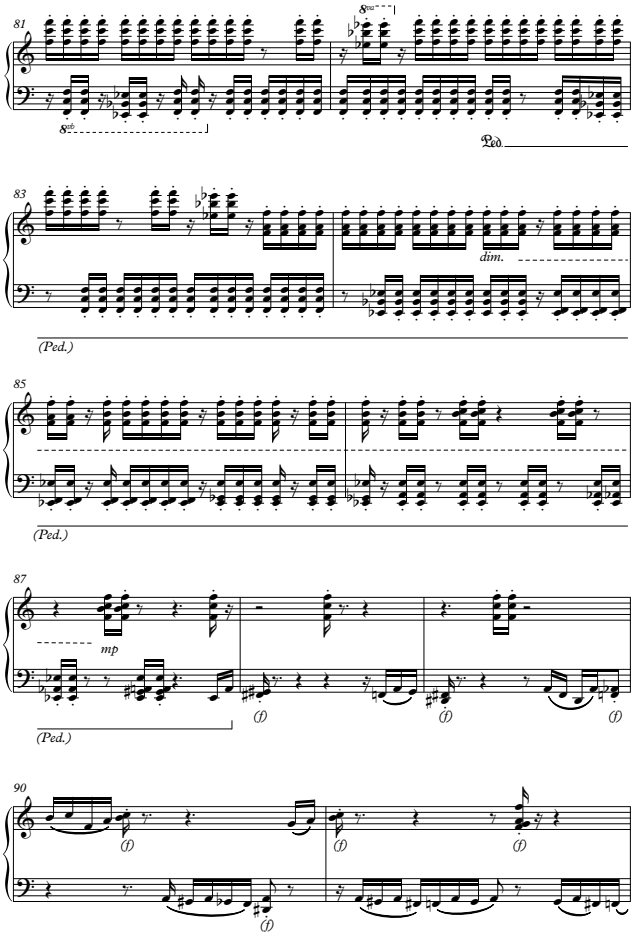
mf

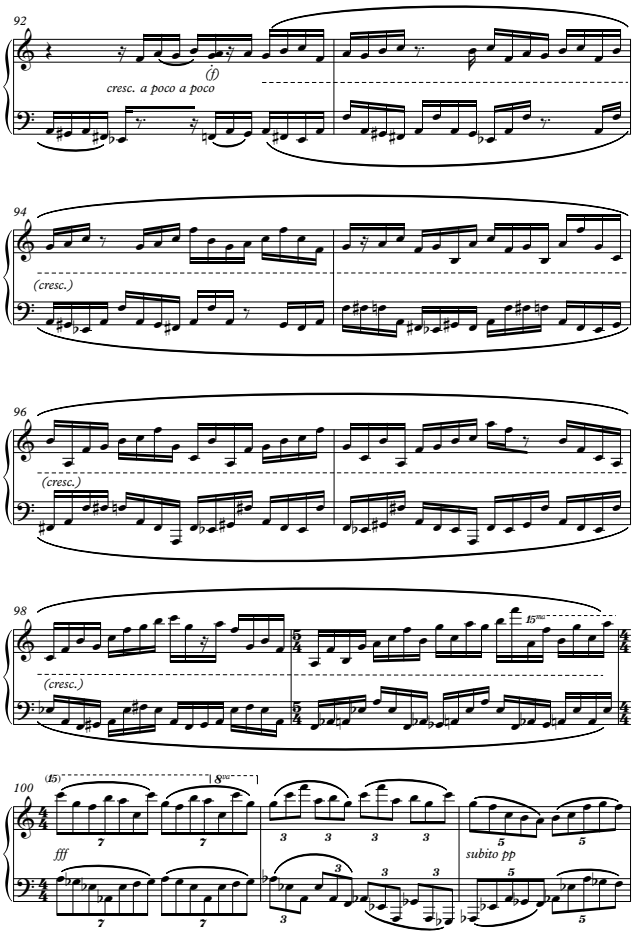
59

subito ff


61
63
pp
cresc.
65
(cresc.)
67
ff
subito pp
pp
ff
69
ff
ppp
ppp


71
fff furioso
(Ped.)
73
(pedal resonance)
(Ped.)
75
p
mf
77
subito p
cresc.
79
(cresc.)
ff


81
83
dim.
(Ped.)
85
(Ped.)
87
mp
(f)
(f)
(f)
(Ped.)
90
(f)
(f)
(f)
(f)

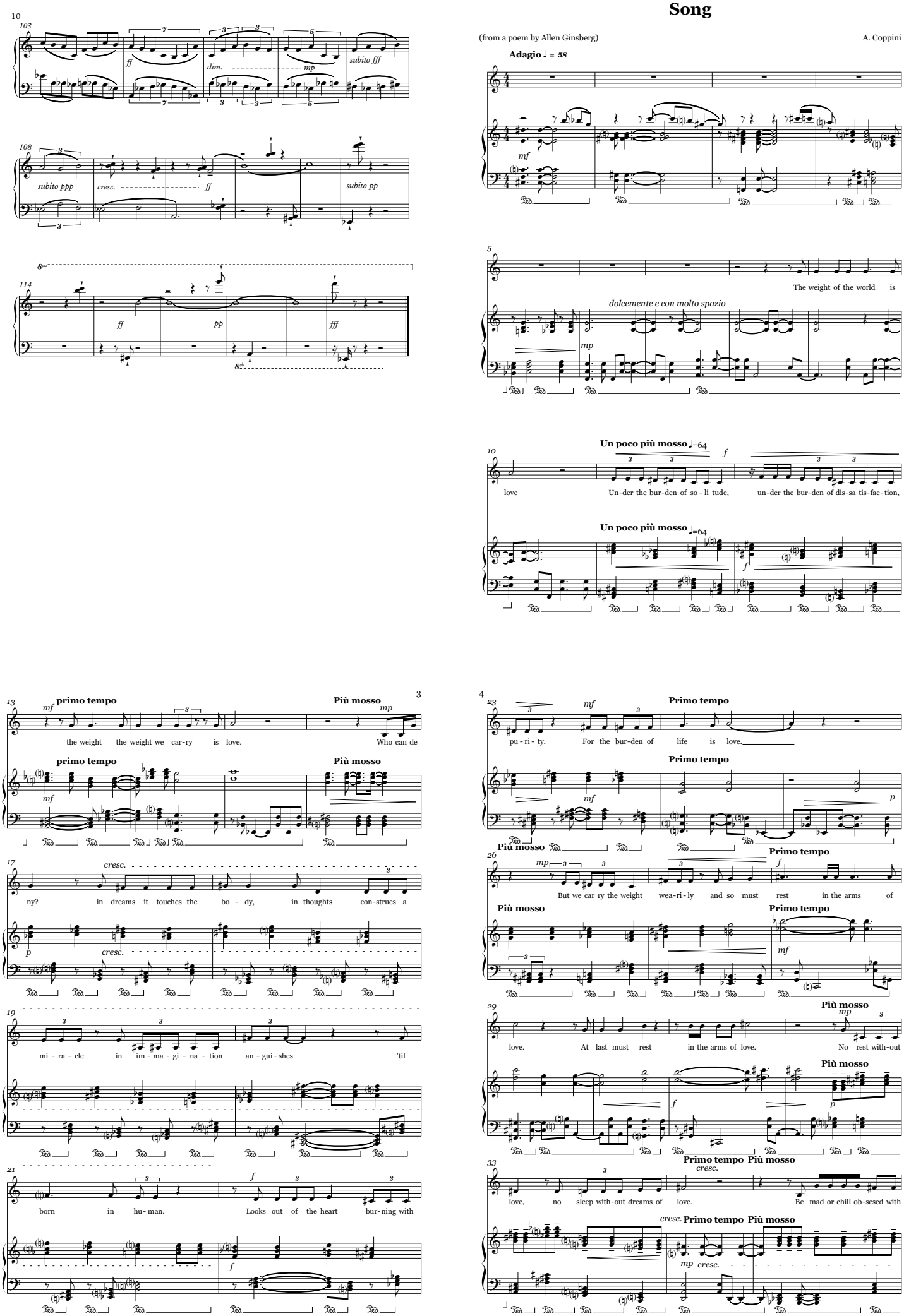

92
(f)
cresc. a poco a poco
94
(cresc.)
96
(cresc.)
98
(cresc.)
100
fff
subito pp

CD track 21

Song

(from a poem by Allen Ginsberg)

A. Coppini



36 *f*

an-gels or ma-chines the fi - nal wish_ is love.__

f

38 *pp*

can-not be bit-ter can-not de- ny, can-not with-hold if de-nied The

mf *f subito ppp*

40 *(almost whispering)* *f* *(with groove and a steady beat)*

weight is too hea-vy. Must give for no re-turn as thought

(with groove) *f*

43 *mp* *mf*

is gi-ven in so-li-tude in all the ex - cel-lence of its ex - cess.

8va *p* *mf*

Primo tempo

46 *mp*

The worm bo-dies shine to - ge - ther in the dark - ness,

Primo tempo

mp *(calmo e maestoso)*

49

the hands move to the cen-ter of the flesh. The

52 *cresc.*

skin trem-bles in hap - pi - ness and the

cresc.

54 *ff*

soul come joy-ful to the eye: Yes, yes, that's all I

ff

Più mosso **Primo tempo**

58 *p* *cresc.*

wan - ted I al - ways wan - ted I al - ways wan - ted to re -

Più mosso **Primo tempo**

subito pp *cresc.*

60 *f*

turn to the bo-dy where I was born.

f

Score 23

CD track 22

Softly as in a morning sunrise

Allegro vivace (♩=152)

Alto Saxophone

Violin I — pizz. — *p*

Violin II — pizz. — *p*

Viola — pizz. — *p*

Violoncello — *p*

8

Alto Sax.

Vln. I — *cresc.*

Vln. II

Vla. — *cresc.*

Vc. — *cresc.*

15

Alto Sax.

Vln. I — pizz. — *mp* — *cresc.*

Vln. II

Vla.

Vc. — arco

21

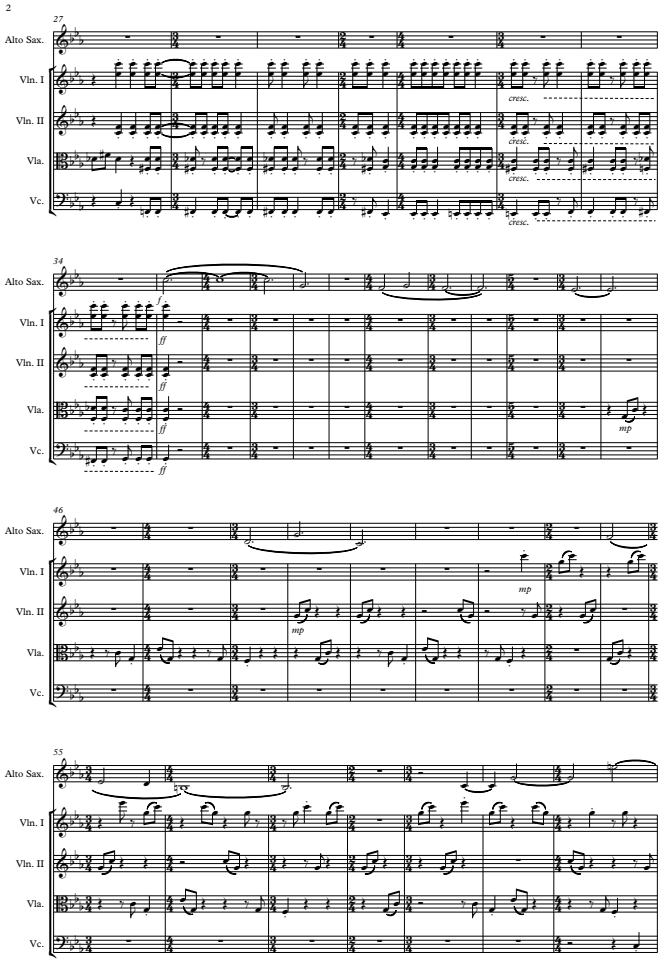
Alto Sax.

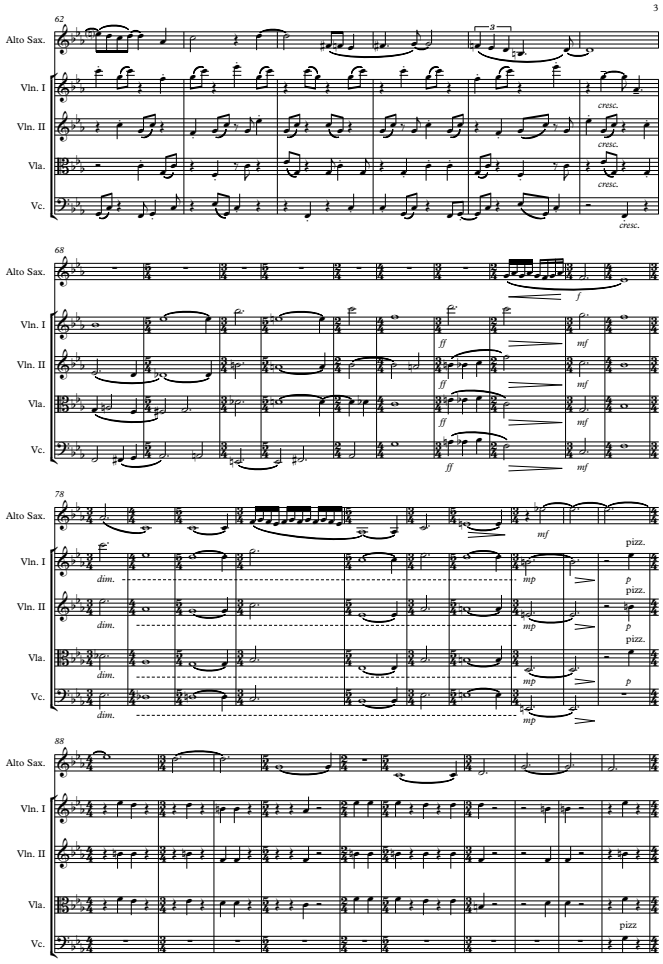
Vln. I — arco — *f*

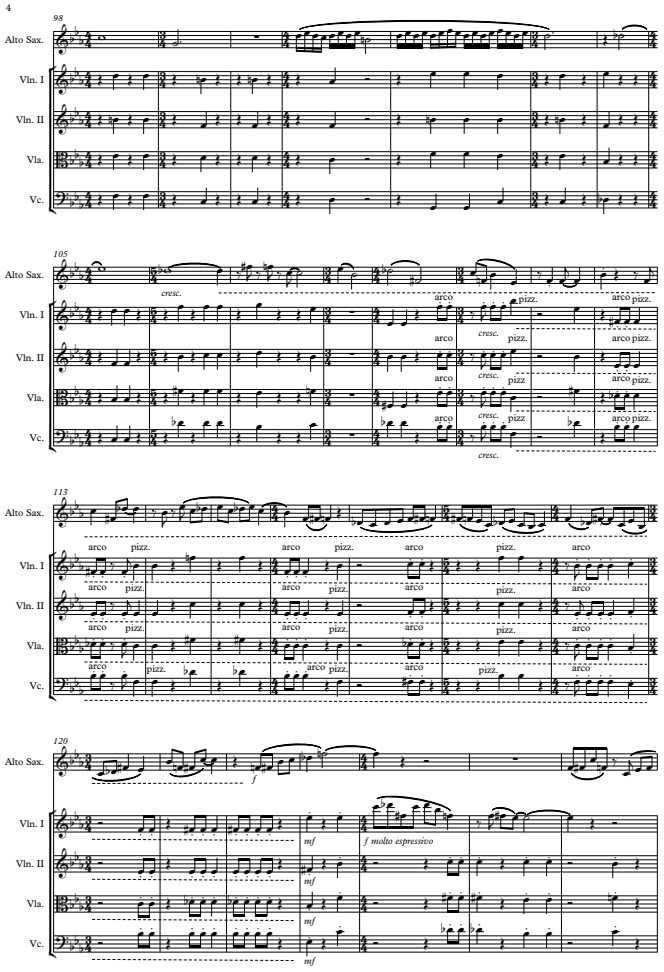
Vln. II — *f*

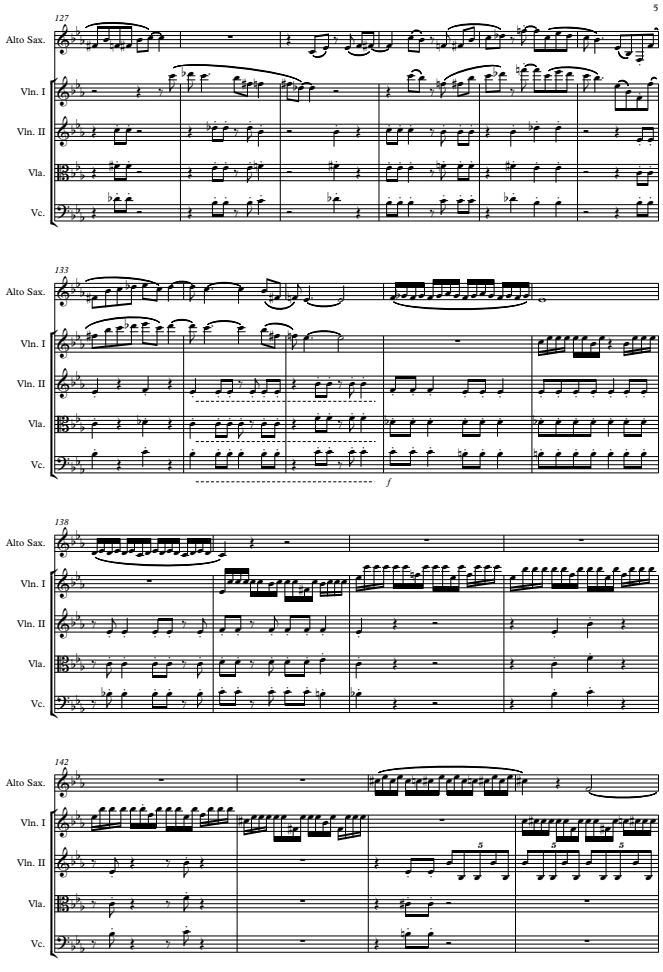
Vla. — arco — *f*

Vc. — *f*


27
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
cresc.
34
f
ff
mp
46
mp
55


62
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
cresc.
68
f
ff
mf
78
mf
dim.
mp
p
pizz.
88
pizz


98
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
105
cresc.
arco
pizz.
arco pizz.
113
arco
pizz.
120
f
mf
f molto espressivo


127
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
133
f
138
142
5

146
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
subito p
subito p
subito p

159
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
subito f
subito f
subito f
f

154
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
subito pp
subito pp
subito pp
subito pp
cresc.
cresc.
cresc.
cresc.

158
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.

162
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
ff
ff
ff
ff
dim.
dim.
dim.
dim.

166
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
mp
mp
mp
cresc.
cresc.
cresc.
cresc.
f
f
f
ff
ff
ff

172
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
pizz.
arco
pizz.
mp
f
p
mp
pizz.
arco
pizz.
mp
f
p
mp
pizz.
arco
pizz.
mp
f
p
mp
pizz.
arco
pizz.
arco
mp
f
p
f

179
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
cresc.
cresc.

186
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
arco

193
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
arco
arco
cresc.
ff

200
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
f
f
f
f

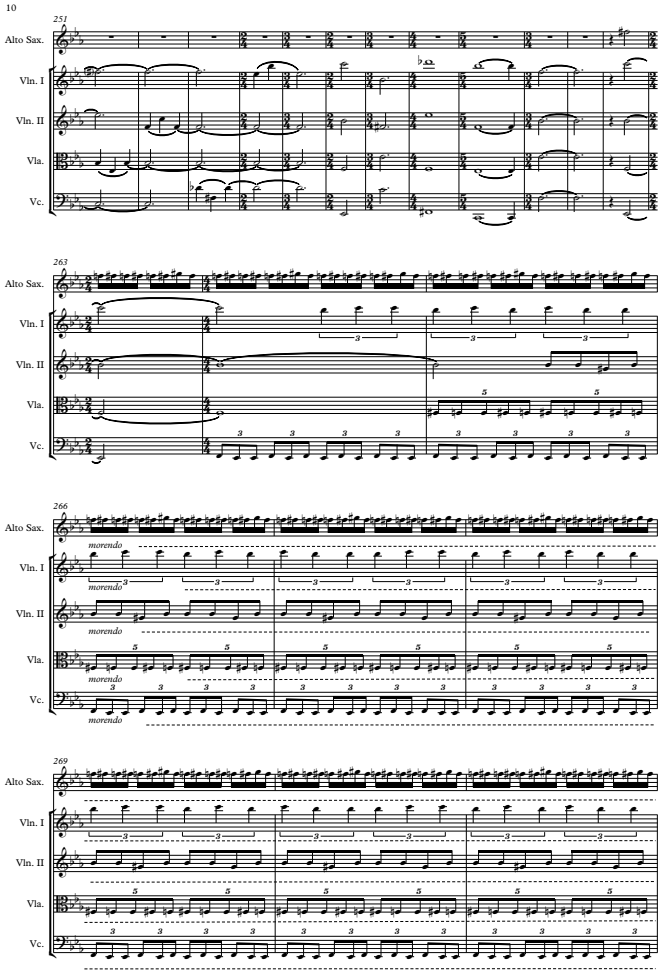
207
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
dim.
dim
dim.
dim.

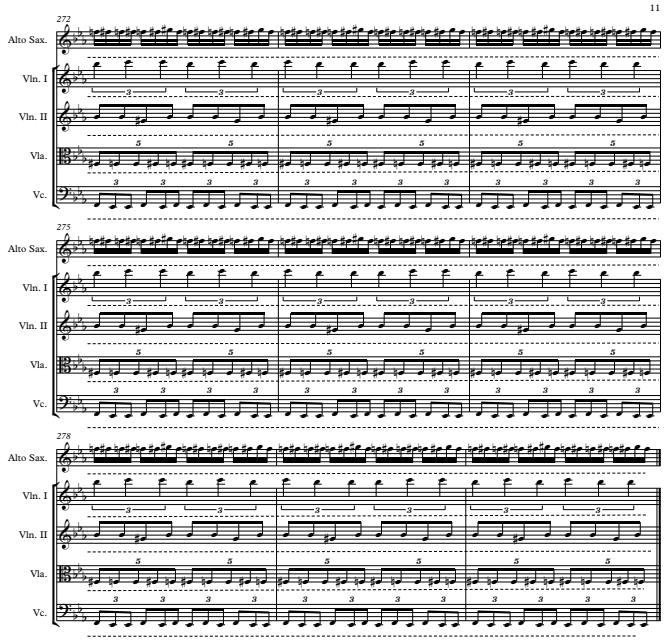
214
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
pp
pp
pp
pp

221
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
subito f
subito p
subito f
subito p
subito f
subito p
subito f
subito p
cresc.
cresc.
cresc.
cresc.

230
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
f
f
f
f

241
Alto Sax.
Vln. I
Vln. II
Vla.
Vc.
mp
subito mp





Score 24

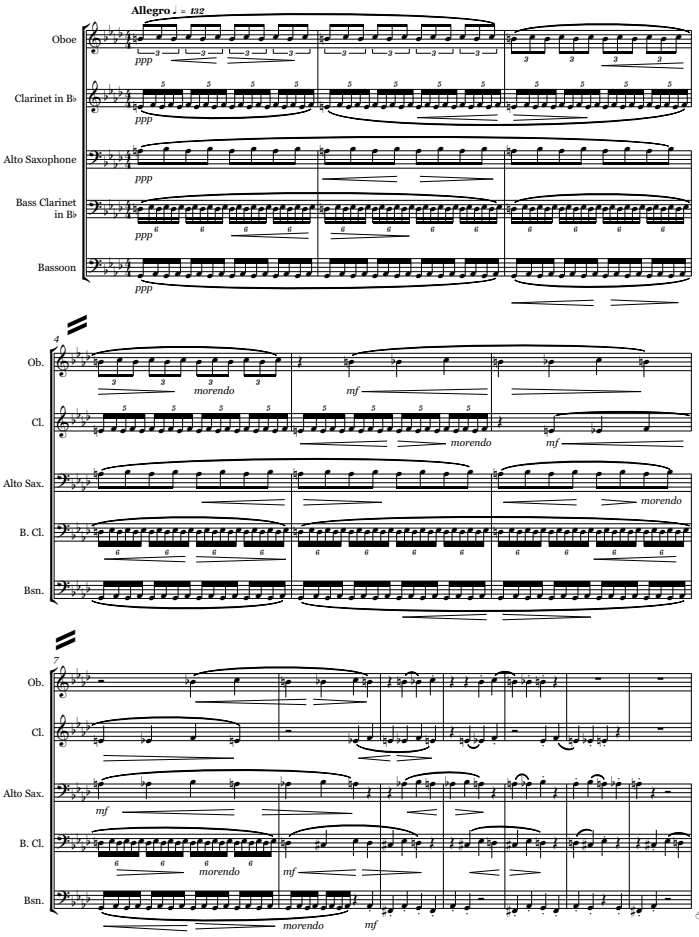
CD track 23

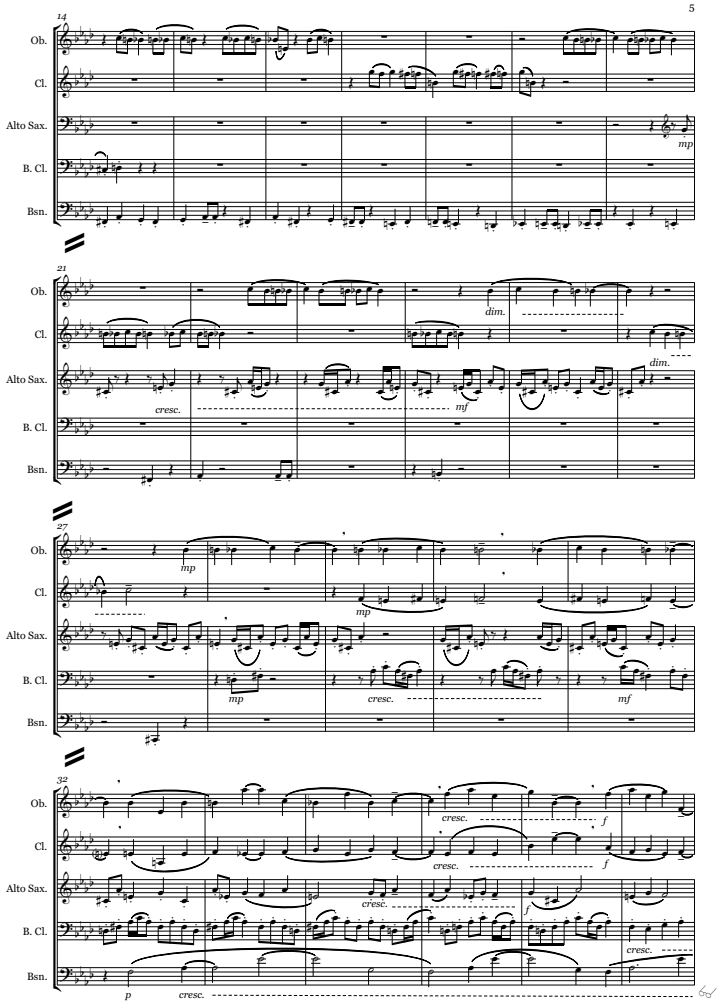
Full Score C concert (not transposed)

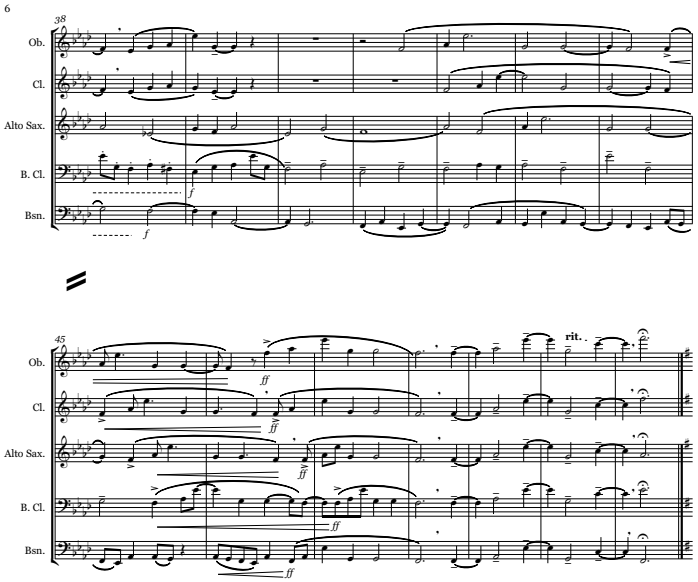
Images of Sharpinia

1. Before

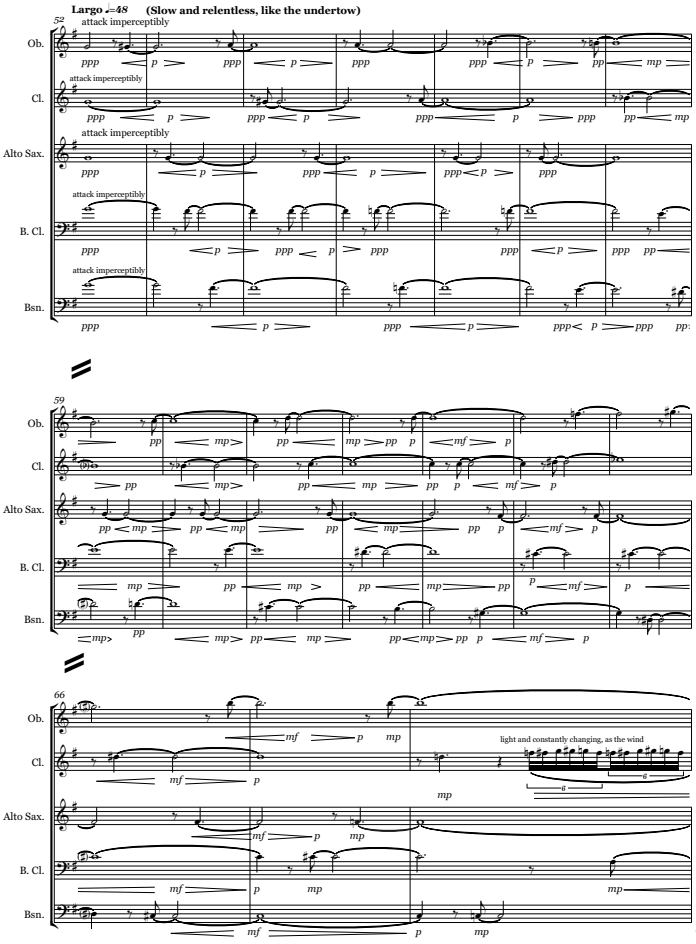
Andrea Coppini

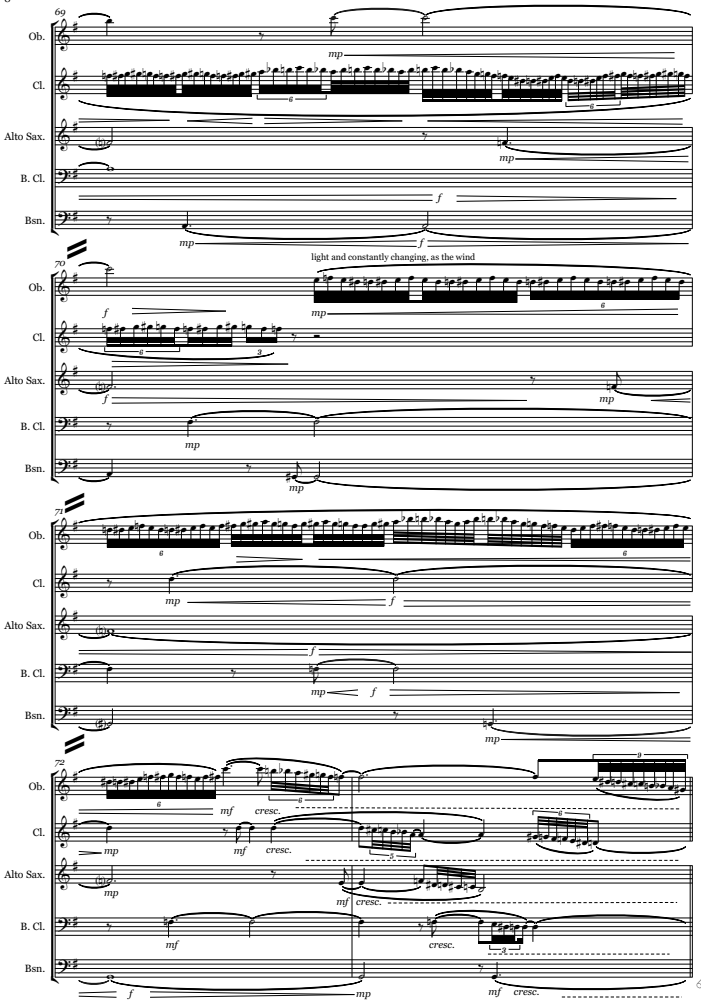


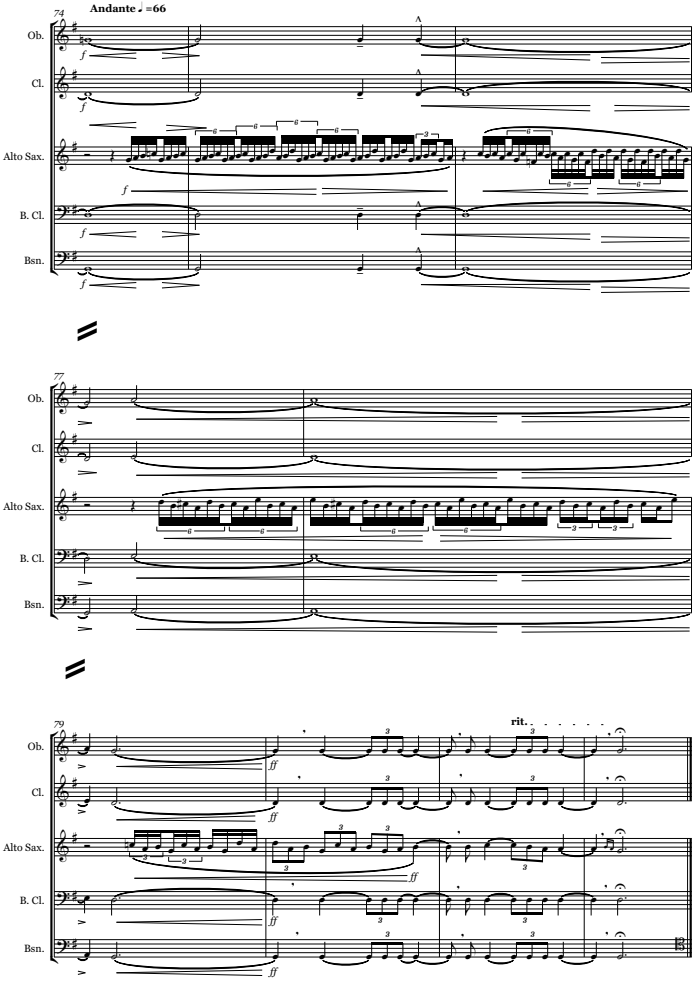




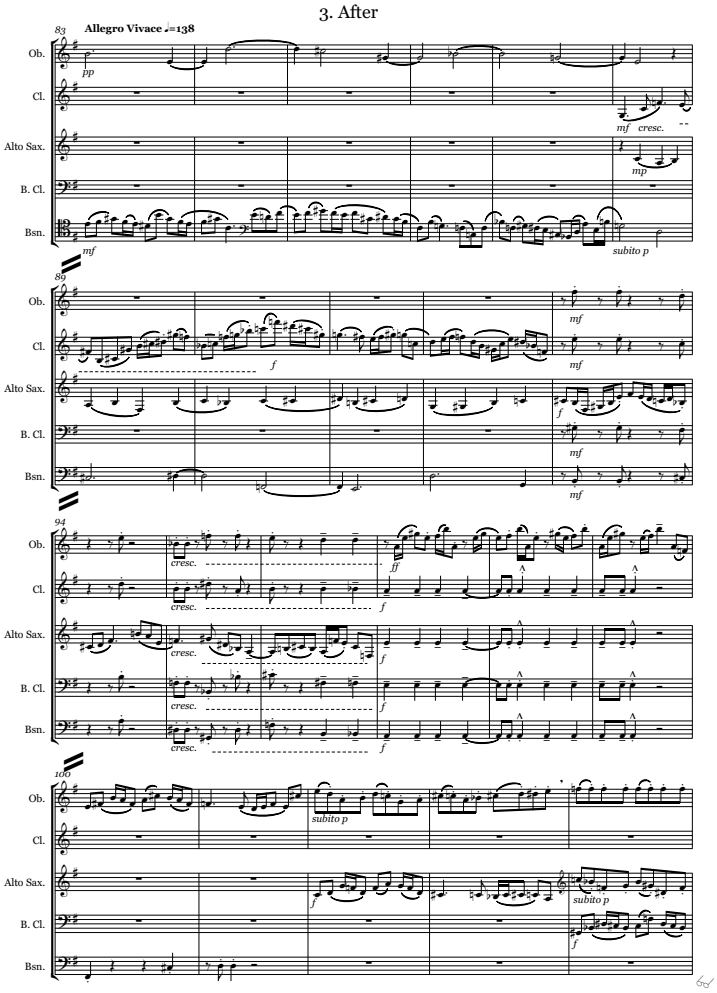
2. The sea, the wind, the land

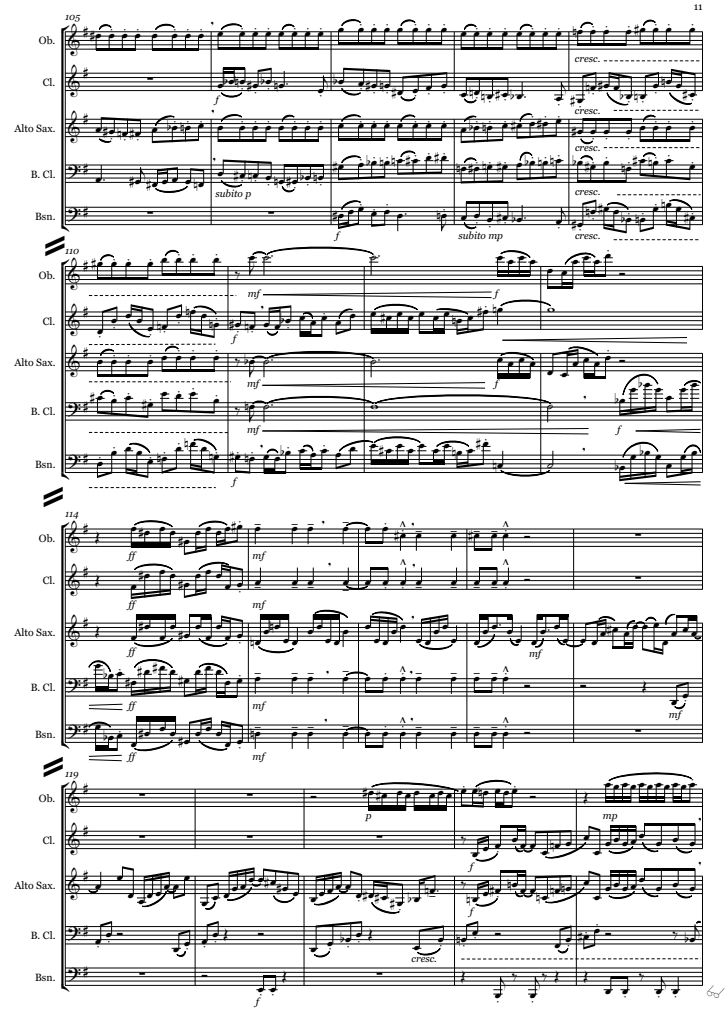


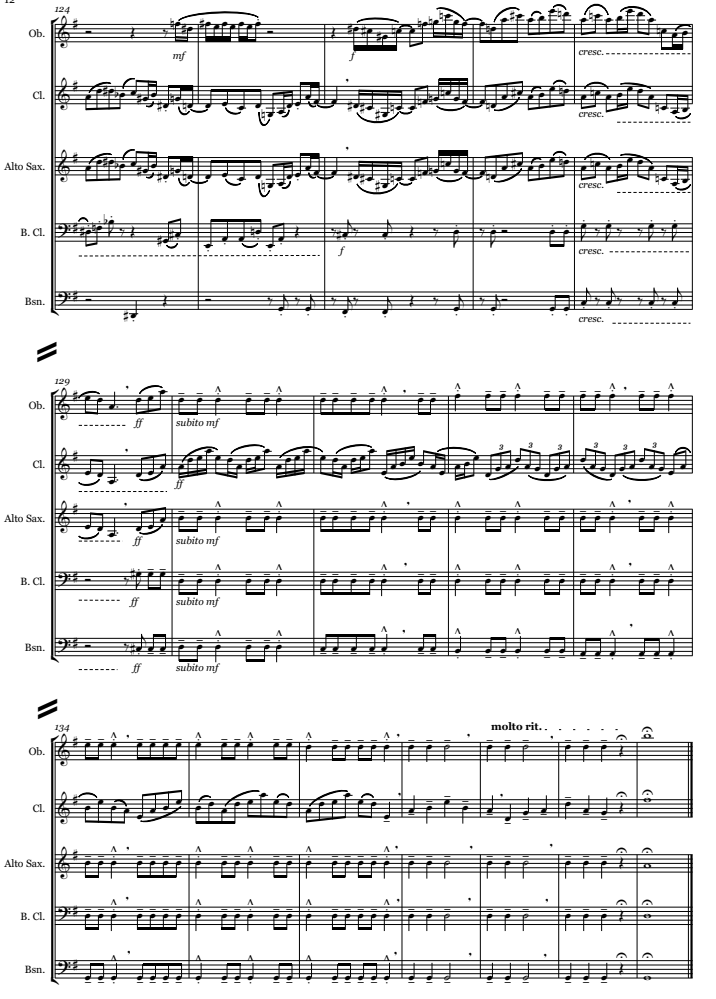




3. After


83
Allegro Vivace ♩=138
Ob.
Cl.
Alto Sax.
B. Cl.
Bsn.
pp
mf
cresc.
mp
subito p
89
f
94
ff
106
subito p

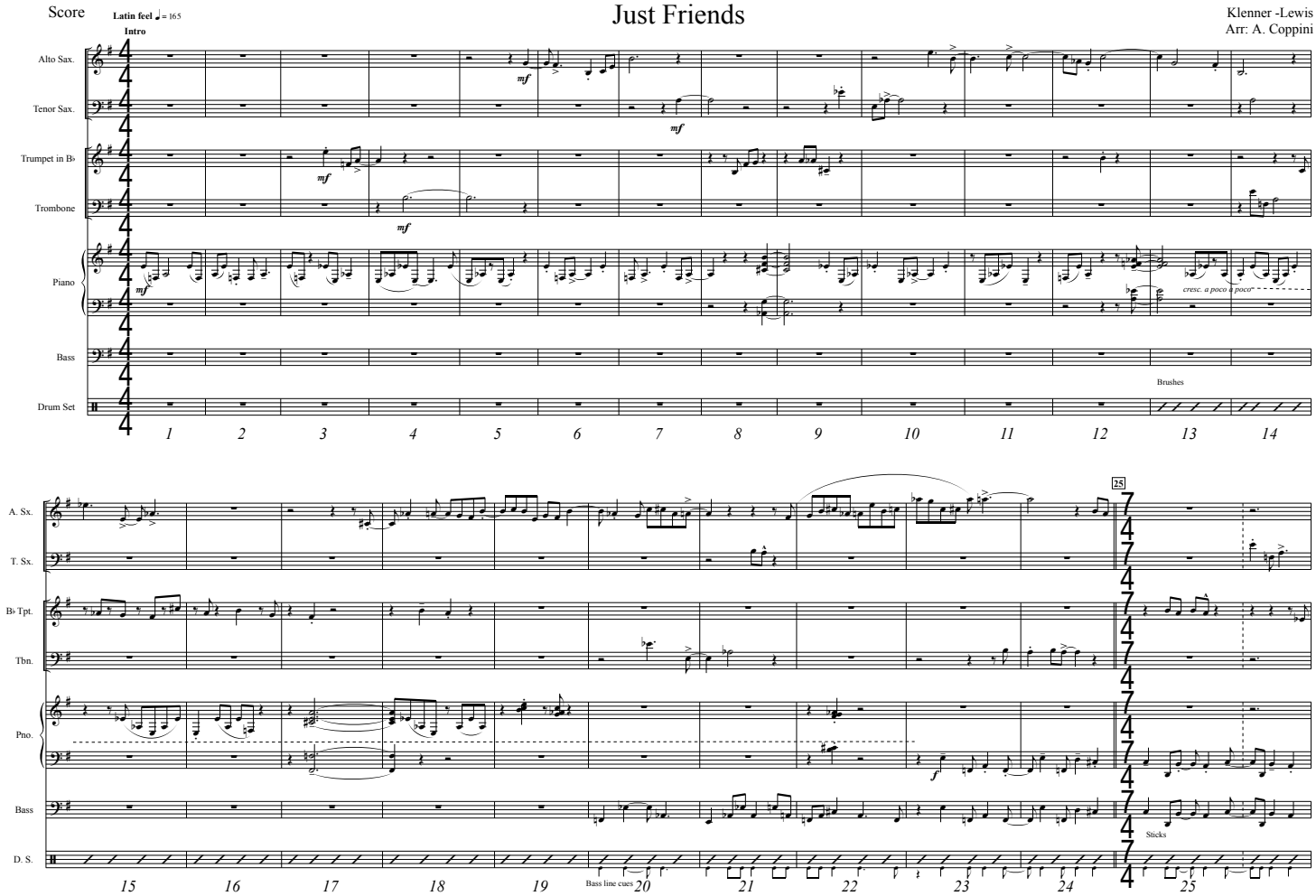

105
Ob.
Cl.
Alto Sax.
B. Cl.
Bsn.
f
cresc.
subito p
subito mp
110
mf
114
ff
119
p
mp


124
Ob.
Cl.
Alto Sax.
B. Cl.
Bsn.
mf
f
cresc.
129
ff
subito mf
134
molto rit.

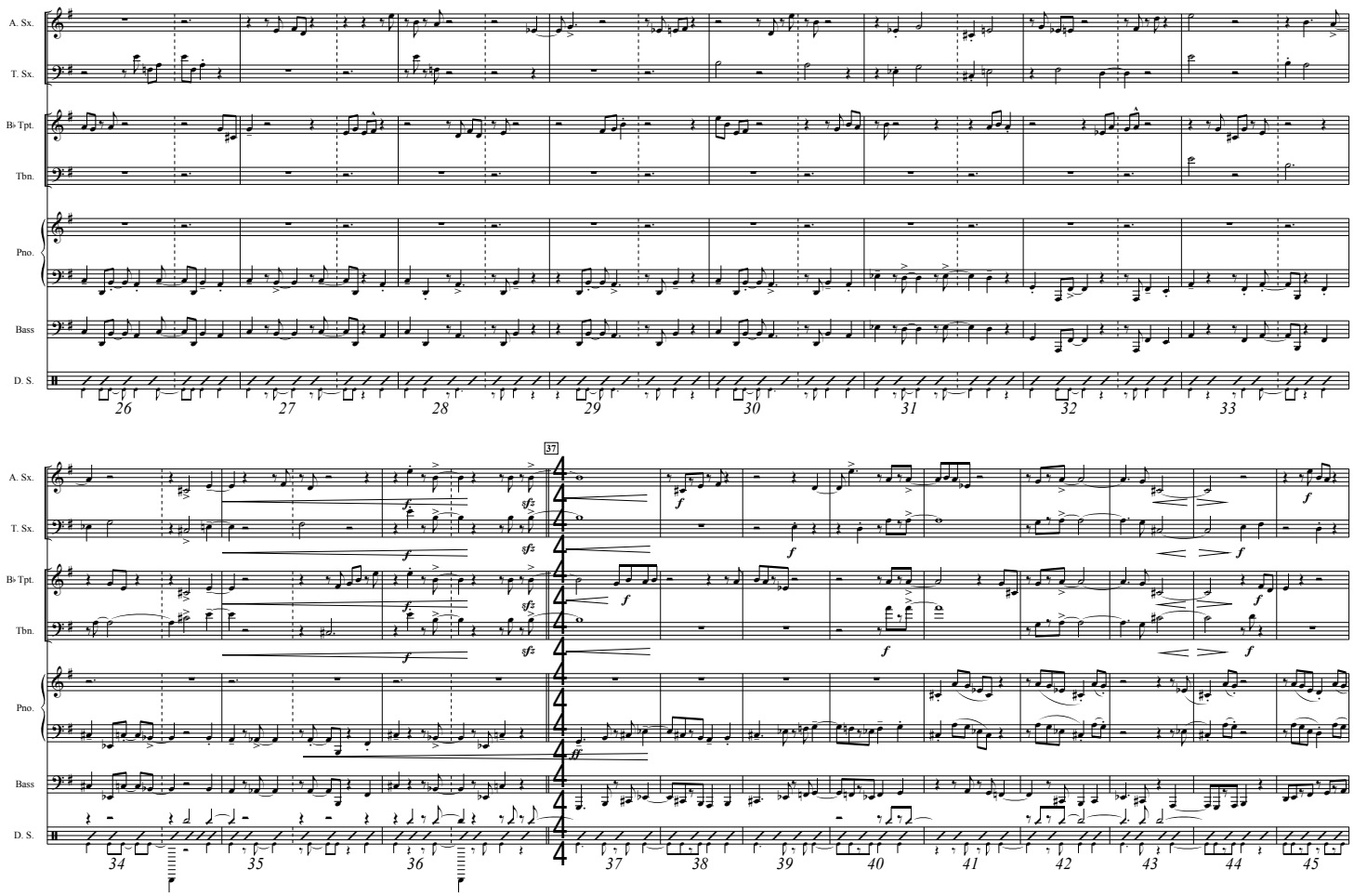
Score

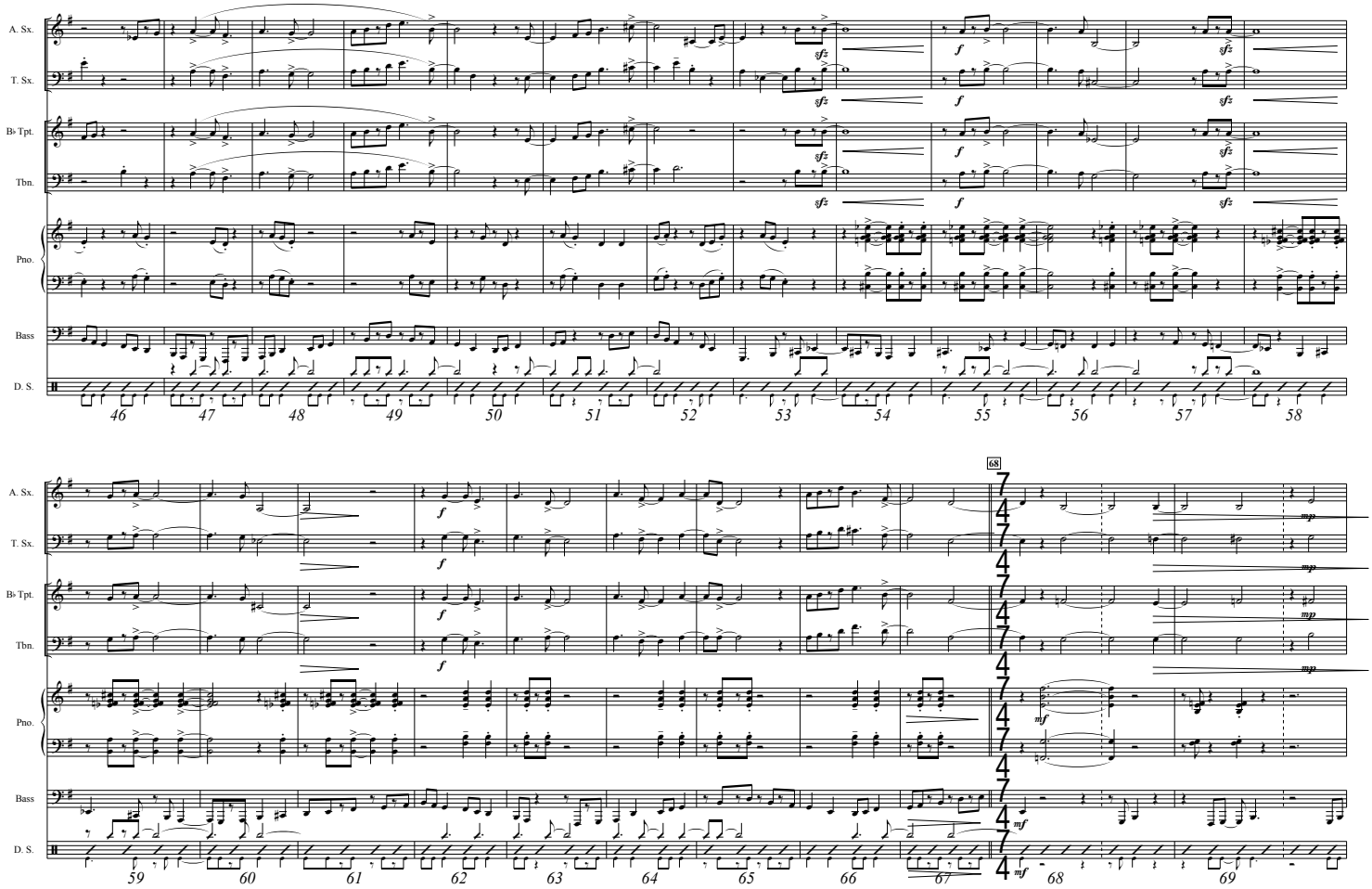
Just Friends

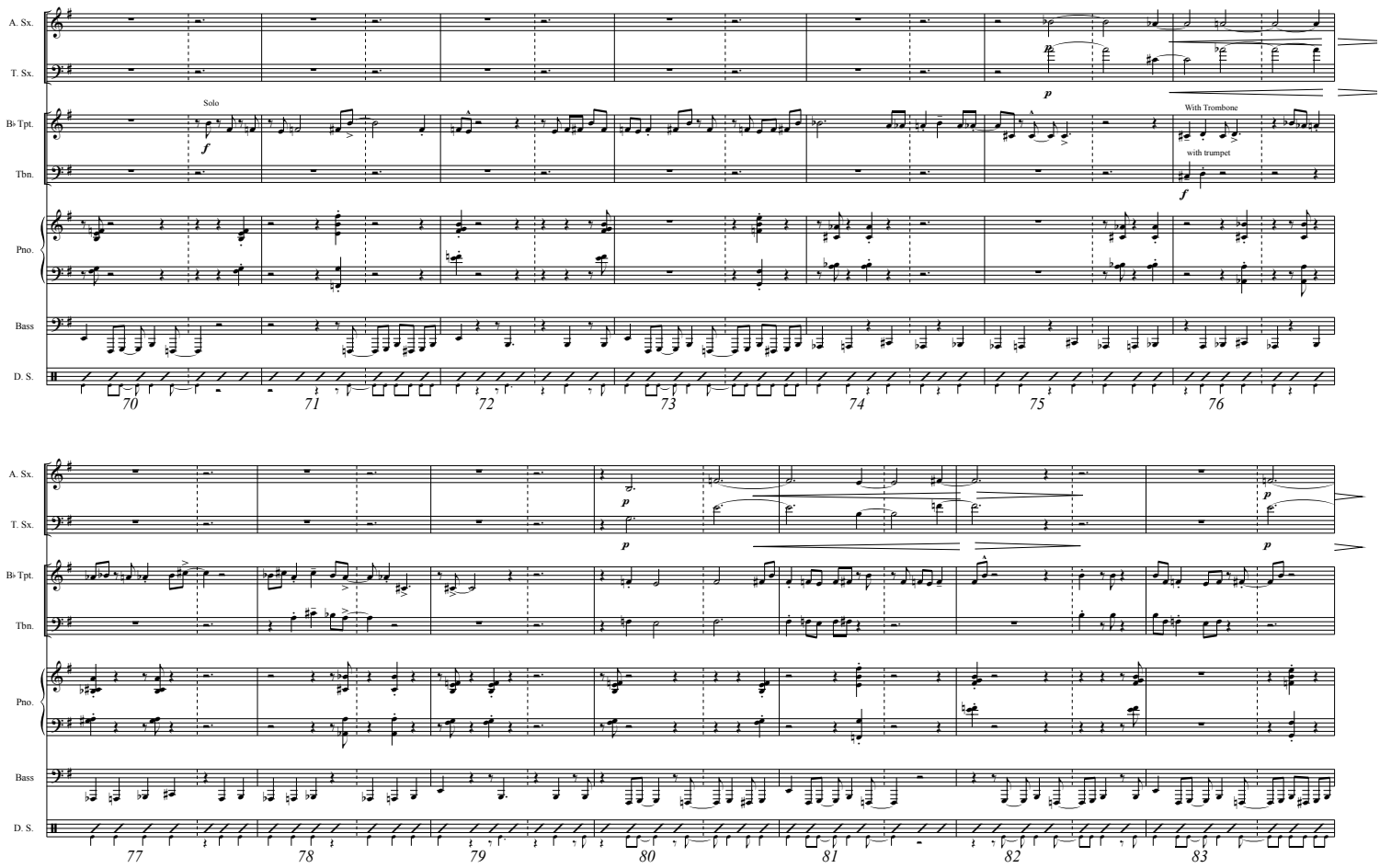
Klenner -Lewis
Arr: A. Coppini



Just Friends




A. Sx.
T. Sx.
B♭ Tpt.
Tbn.
Pno.
Bass
D. S.
46 47 48 49 50 51 52 53 54 55 56 57 58
59 60 61 62 63 64 65 66 67 68 69


A. Sx.
T. Sx.
B♭ Tpt.
Tbn.
Pno.
Bass
D. S.
Solo
With Trombone
with trumpet
70 71 72 73 74 75 76
77 78 79 80 81 82 83

A. Sx.
T. Sx.
B♭ Tpt.
Tbn.
Pno.
Bass
D. S.

cresc. a poco a poco

84 85 86 87 88 89 90 91

94

Solo with tenor sax

Solo with alto sax

Solo with saxes, have a clear "one" feel

92 93 94 95 96 97 98 99

A. Sx.
T. Sx.
B♭ Tpt.
Tbn.
Pno.
Bass
D. S.

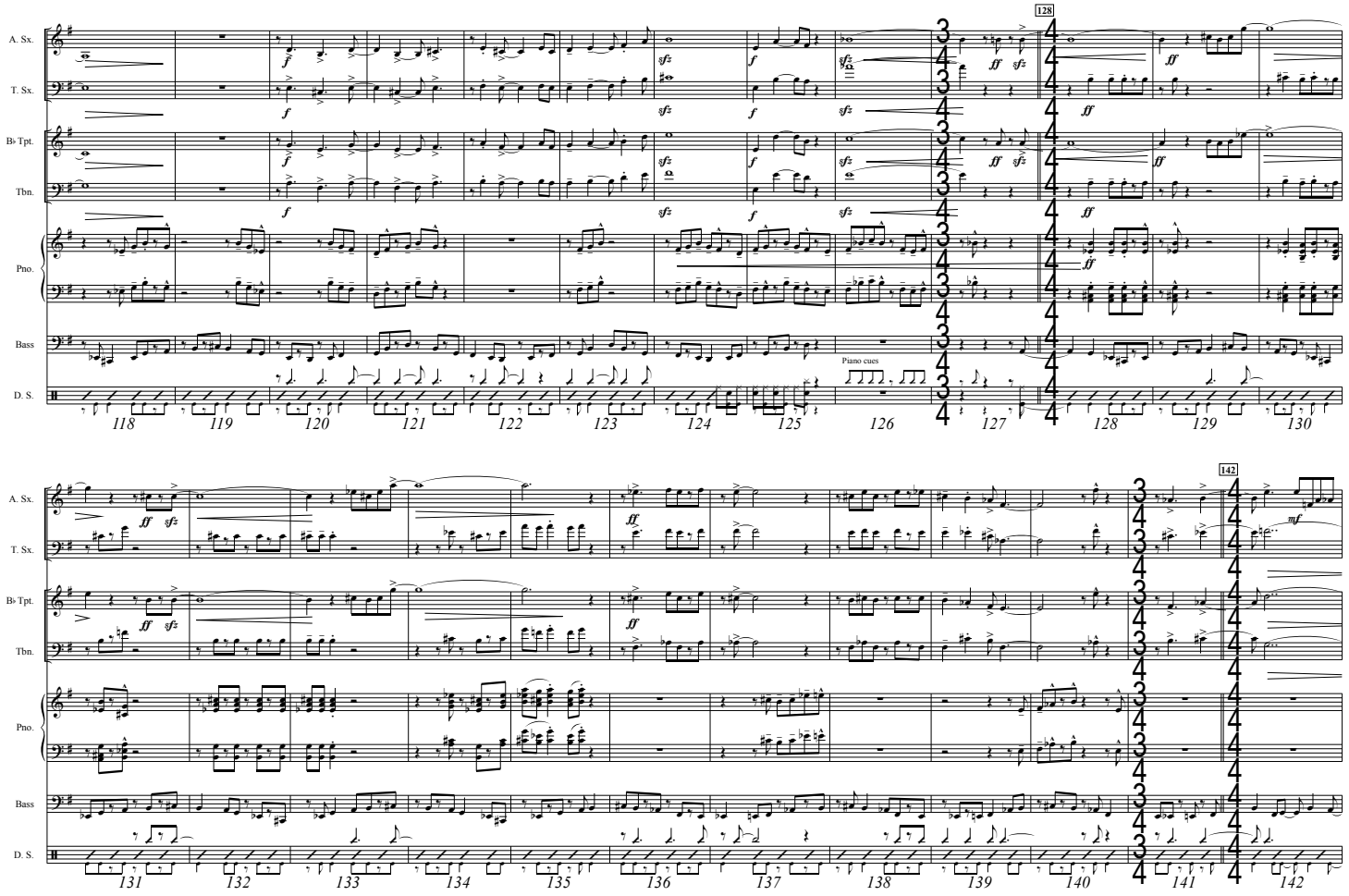
cresc. a poco a poco

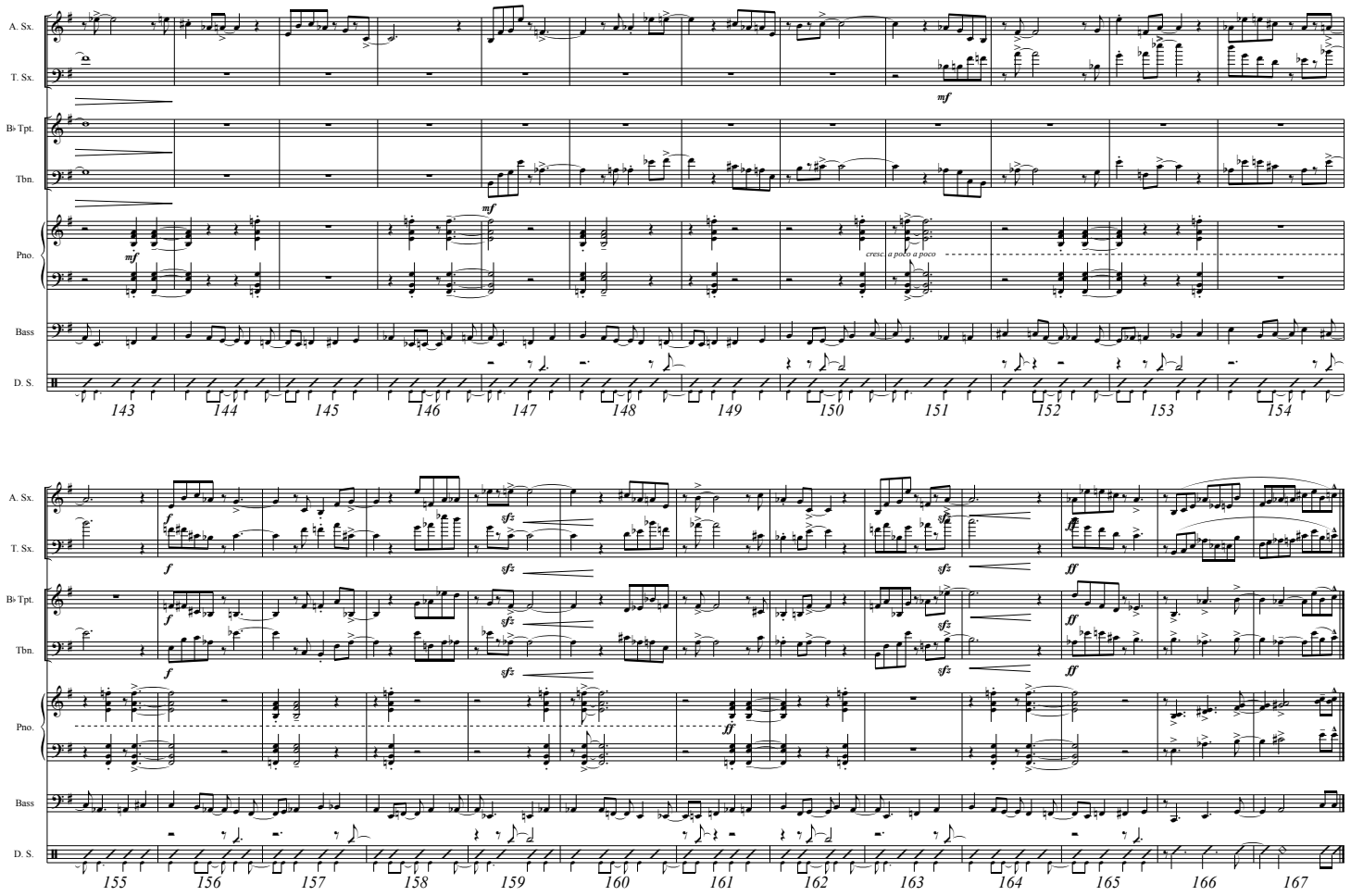
Brass cues

100 101 102 103 104 105 106

110

107 108 109 110 111 112 113 114 115 116 117


A. Sx.
T. Sx.
B♭ Tpt.
Tbn.
Pno.
Bass
D. S.
128
Piano cues
142
118 119 120 121 122 123 124 125 126 127 128 129 130
131 132 133 134 135 136 137 138 139 140 141 142


A. Sx.
T. Sx.
B♭ Tpt.
Tbn.
Pno.
Bass
D. S.
cresc. a poco a poco
143 144 145 146 147 148 149 150 151 152 153 154
155 156 157 158 159 160 161 162 163 164 165 166 167

SCORE

Medium up swing ♩= 190

Loopology

Andrea Coppini

Alto Sax. 1
Alto Sax. 2
Tenor Sax. 1
Tenor Sax. 2
Baritone Sax.
Trumpet in B♭ 1
Trumpet in B♭ 2
Trumpet in B♭ 3
Trumpet in B♭ 4
Trombone 1
Trombone 2
Trombone 3
Bass Trombone
Piano
Bass
Drum Set

(Suggested voicings)

No fill

Play Time

1 2 3 4 5 6 7 8 9 10 11

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Loopology

A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.

No fill

Play Time

(Cymbal)

12 13 14 15 16 17 18 19 20 21 22

29

A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.

G7 C7 F7

Obbligato (no chords)

(floor tom) (floor tom) (floor tom)

No fill Fill Fill

23 24 25 26 27 28 29 30 31 32 33 34

37 45

A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.

B♭maj7(♯11) E7(♯11) B♭maj7(♯11) E7(♯11) B♭maj7(♯11) E7(♯11) B♭△/F C♯△/F F♯△/F B△/F B♭maj7(♯11)

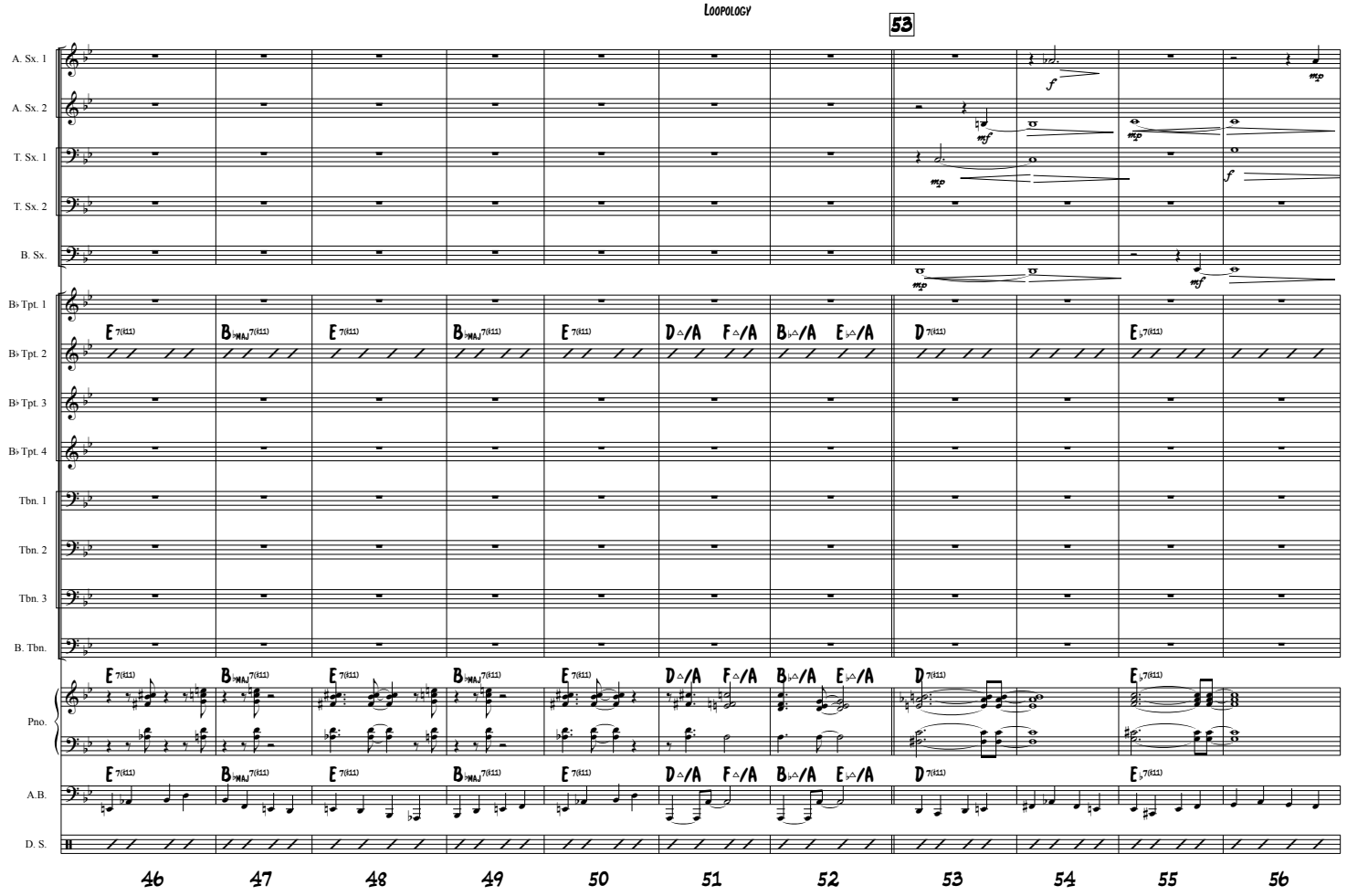
Solo

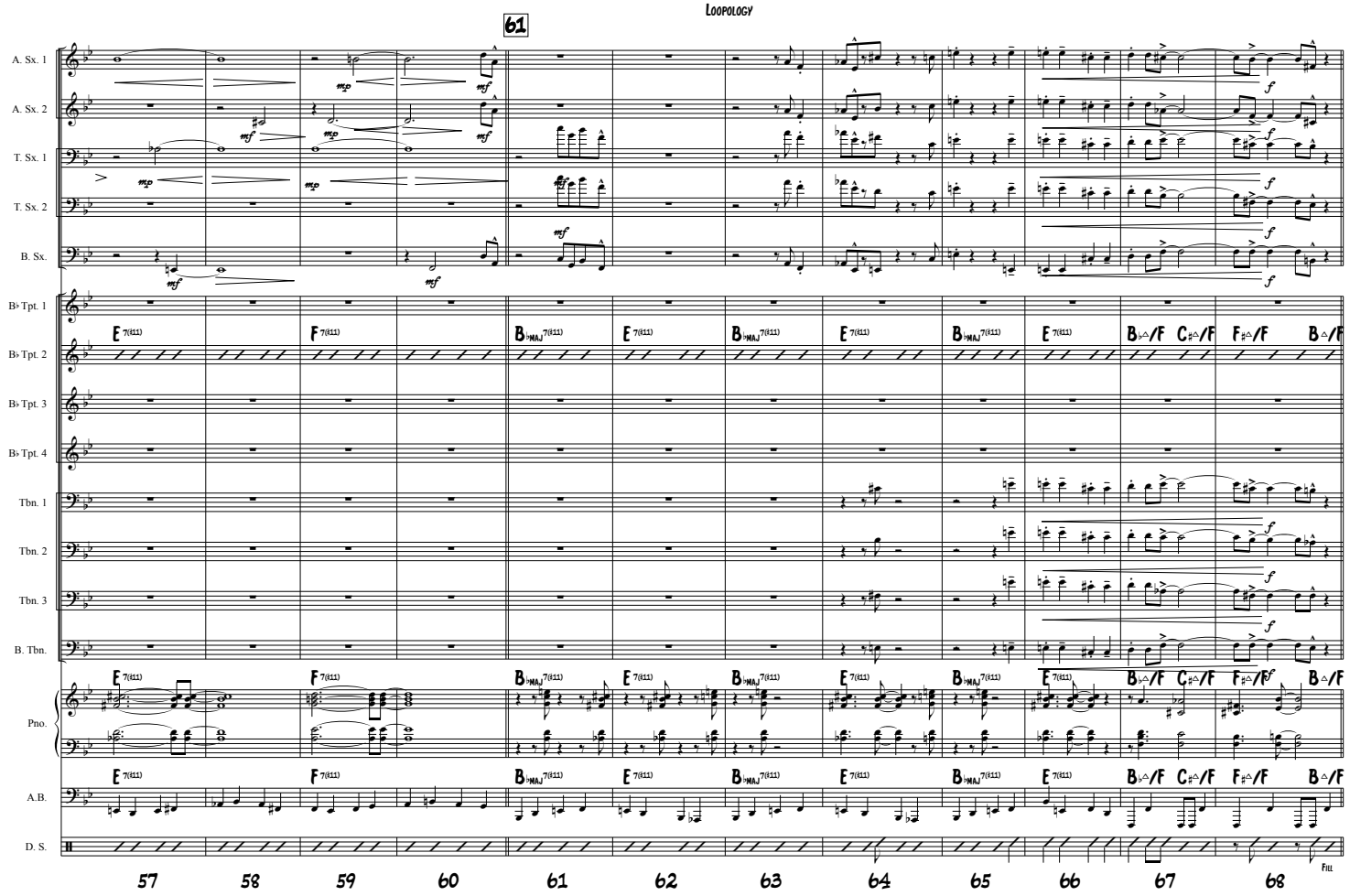
(Trumpet solo) (Suggested voicings)

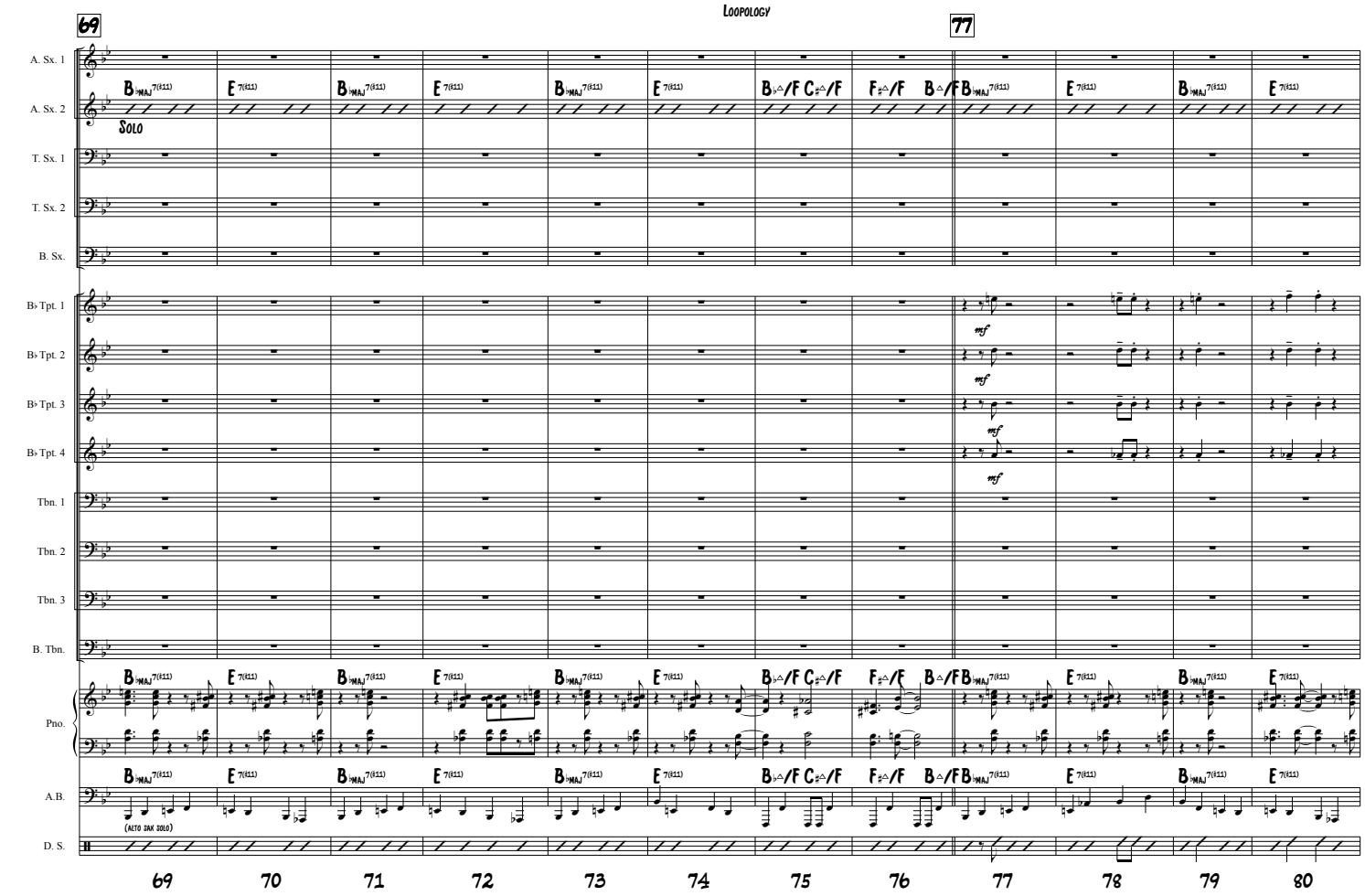
Play time (Cymbal) (Trumpet solo)

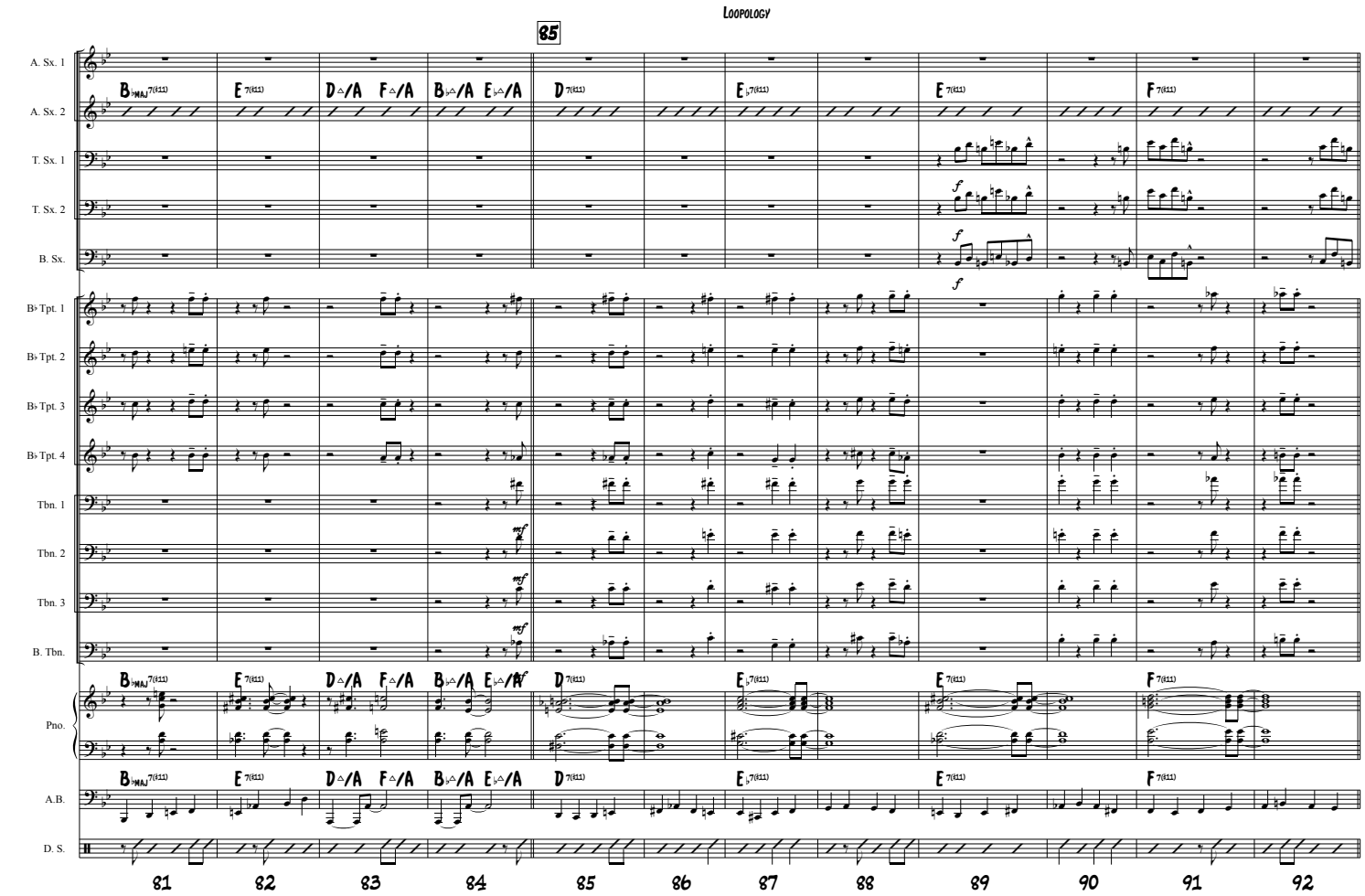
Fill

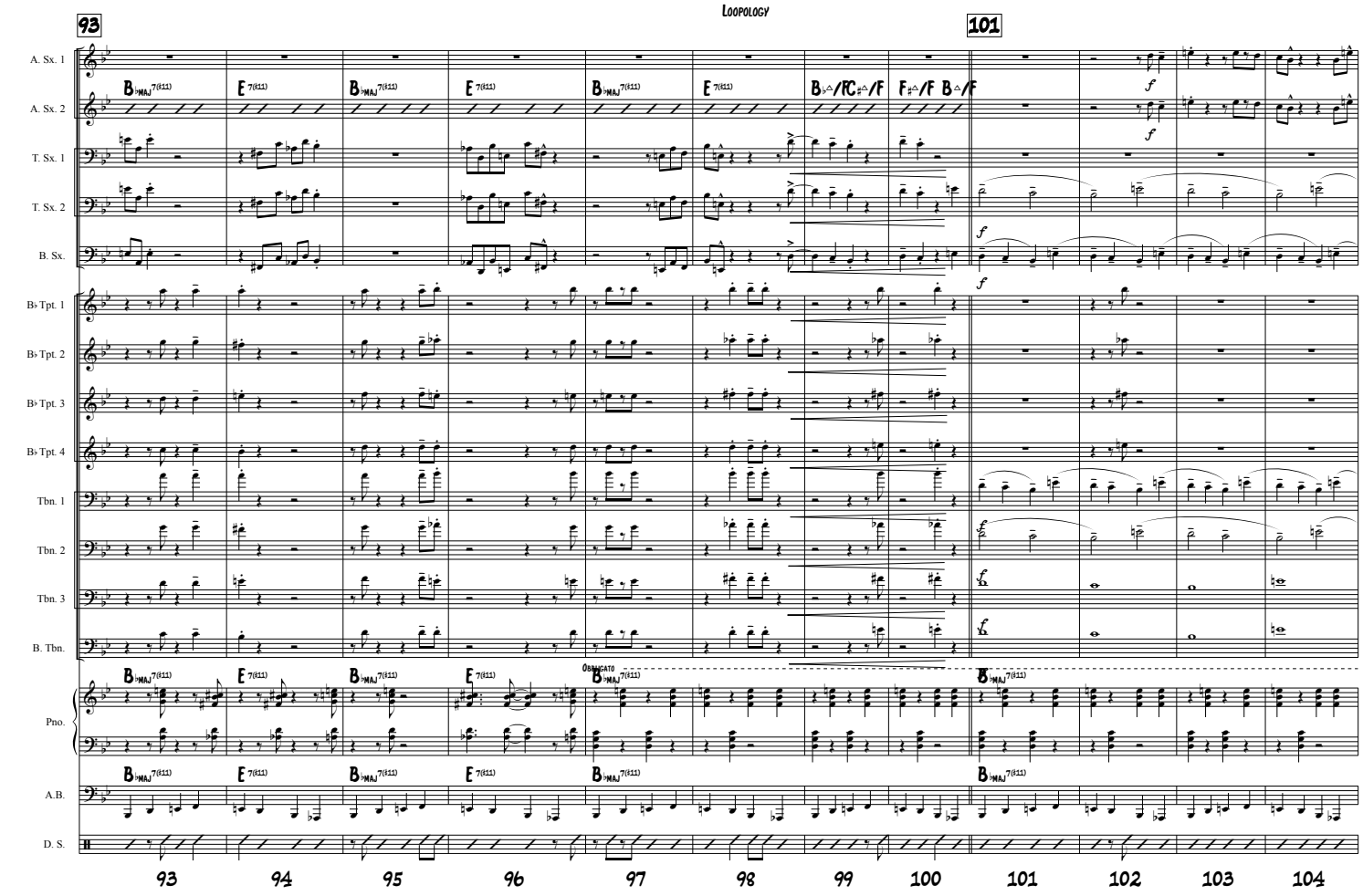
35 36 37 38 39 40 41 42 43 44 45

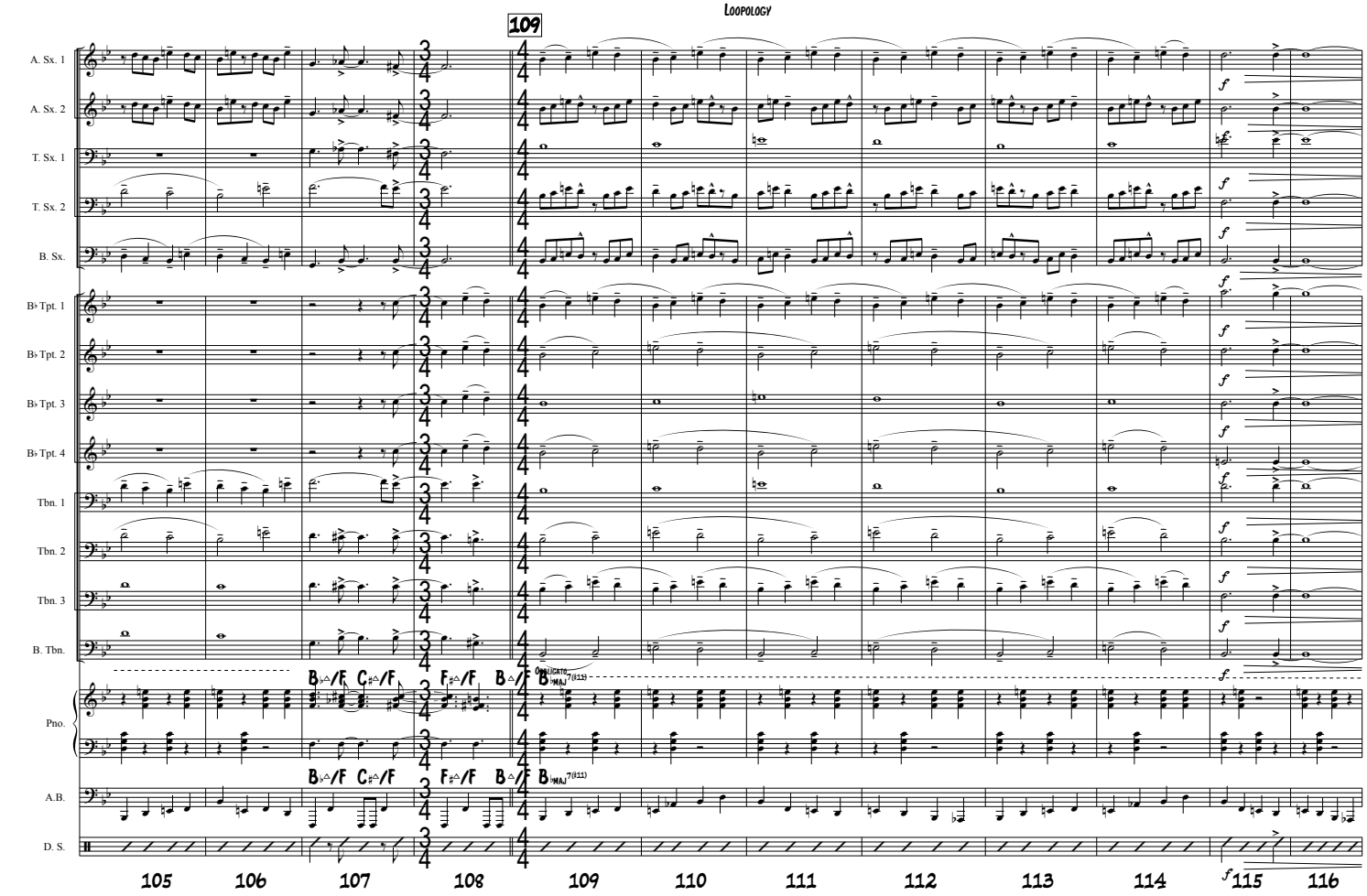

53
A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.
E 7(♯11)
B♭MAJ7(♯11)
D△/A
F△/A
B♭△/A
E♭△/A
D7(♯11)
E♭7(♯11)
46
47
48
49
50
51
52
53
54
55
56

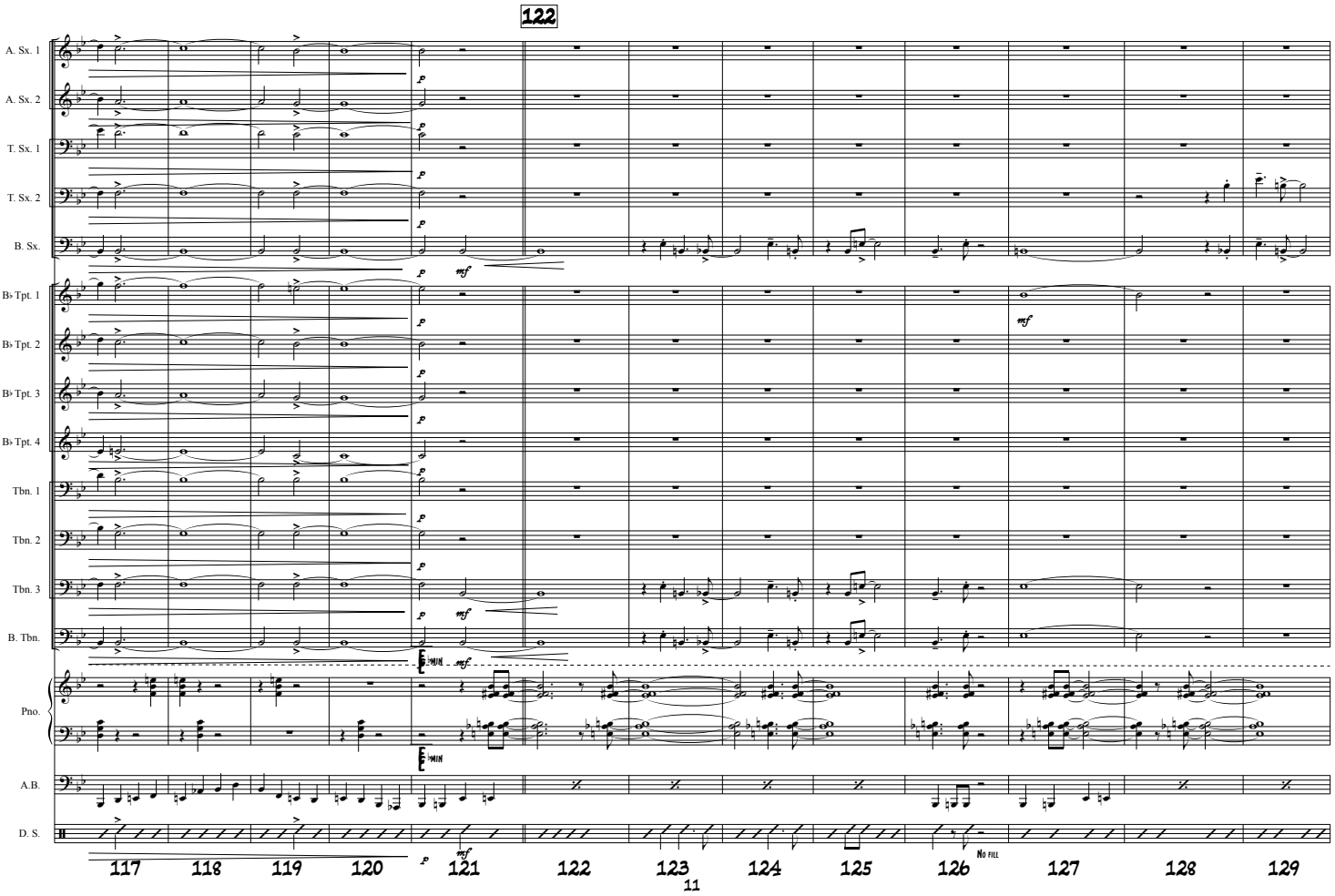

61
A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.
E 7(♯11)
F 7(♯11)
B♭MAJ7(♯11)
B♭△/F
C♯△/F
F♯△/F
B△/F
Fill
57
58
59
60
61
62
63
64
65
66
67
68

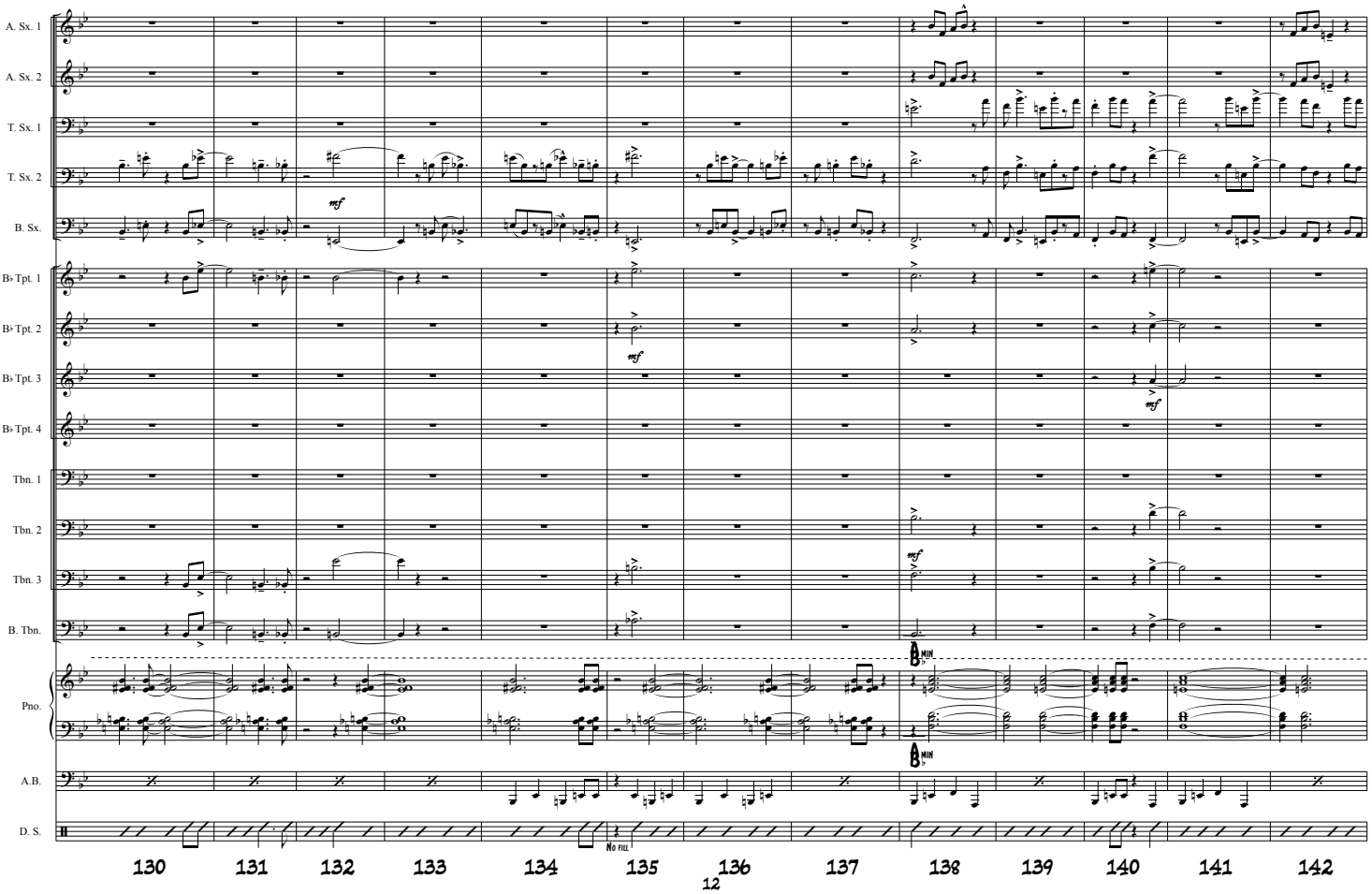

69
77
A. Sx. 1
A. Sx. 2
Solo
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
mf
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
(Alto Sax Solo)
D. S.
69 70 71 72 73 74 75 76 77 78 79 80


85
A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
f
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
mf
Pno.
A.B.
D. S.
81 82 83 84 85 86 87 88 89 90 91 92


93
101
A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.
Obbligato
93 94 95 96 97 98 99 100 101 102 103 104


109
A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.
Obbligato
105 106 107 108 109 110 111 112 113 114 115 116


122
A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.
p
mf
No fill
117
118
119
120
121
122
123
124
125
126
127
128
129


A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.
mf
No fill
130
131
132
133
134
135
136
137
138
139
140
141
142

149

A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.

(floor tom)

Fill

143 144 145 146 147 148 149 150 151 152 153 154 155

A. Sx. 1
A. Sx. 2
T. Sx. 1
T. Sx. 2
B. Sx.
B♭ Tpt. 1
B♭ Tpt. 2
B♭ Tpt. 3
B♭ Tpt. 4
Tbn. 1
Tbn. 2
Tbn. 3
B. Tbn.
Pno.
A.B.
D. S.

Fill

156 157 158 159 160