

The creation of temporal structures in *Nocturnales*¹

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A criação de
estruturas
temporais em
Nocturnales

Abstract

In this paper I explain some compositional processes and techniques employed in my piece *Nocturnales*, for chamber orchestra, to create different kinds of musical time. The goal was to construct a formal structure governed by the interplay and interweaving of the resulting temporalities. Related to the organization of pitch and rhythm, the procedures involve "Modal Treatments" and two independent techniques of "Limited Serialism": "Motivic Serialization" and "Table of Proportional Durations" (derived from the Fibonacci series). Due to the fact that the mix of temporalities is a common event in dreams, the structure was applied an extra-musical association: an imaginary voyage into the world of dreams. Given the particularities of the work, most of these aspects are examined in the light of different degrees of what I call "Contextual Associations," rather than using a more conventional analytical approach.

Key Words: Musical Time; Limited Serialism; Fibonacci Series

Resumo

Este artigo expõe alguns dos processos e técnicas composicionais utilizados em minha peça *Nocturnales*, para orquestra de câmara, visando a criação de diferentes tipos de tempo musical. O objetivo foi construir uma estrutura formal baseada na interação e nas combinações das temporalidades resultantes. Pertinentes à organização das alturas e do ritmo, os procedimentos envolvem "Tratamentos Modais" e duas técnicas independentes de "Serialismo Limitado": "Serialização Motívica" e "Escala de Durações Proporcionais" (derivadas da série Fibonacci). Considerando o fato de que a fusão de temporalidades é um aspecto comum em sonhos, uma associação extra-musical foi estabelecida: uma viagem imaginária pelo universo dos sonhos. Devido às particularidades da composição, os procedimentos são examinados sob a luz dos diferentes graus do que chamo "Associações Contextuais", em vez de processos analíticos mais convencionais.

Palavras-chave: Tempo Musical; Serialismo Limitado; Série Fibonacci

Introduction

N*octurnales* (for chamber orchestra) is an eclectic composition in which an attempt is made to bring together different stylistic traits and compositional approaches into a coherent whole.

Accordingly, the piece combines temporal structures either by superimposing or alternating linear processes with static music. Although most music exhibits some kind of mix of temporalities, in this piece such an interweaving becomes integral to its formal archetype, as will be seen below.

The musical discourse unfolds mainly as a result of the interplay of different textures, yet there is room for the emergence of motives, and even extended melodic figurations. As a result, the listener is expected to follow the musical identities of the discourse by changing his or her focus of attention between both the textural totality (global dimension), and the note by note or chord by chord relationships (internal dimension). This means that, at times the organization of pitch and rhythm becomes subordinate to aspects of surface phenomena such as texture, density, register, color and dynamics. At other times, pitch and rhythm assume their traditional roles as the structural elements of the discourse.

The discourse also opposes continuums to highly discontinuous music. Found more frequently, discontinuity is on both micro-structural and macro-structural levels of the musical fabric. Within sections, the listener is exposed to suddenly contrasted tempi and paths, dynamics, modes of instrumental articulations, densities and registral designations. On the macro-structural level, meaningful connections are to be found between non-adjacent sections.

The application of an extra-musical model governs the architectonic structure of the work. This model makes associations with the various stages of human sleep and dreams (from the Latin, *Nocturnales*, meaning 'of the night,' is a word used in reference to dream images). The mix of temporalities, and the continuity/discontinuity dialectics, are common elements in a dream. These are two basic factors in determining the large scale structure of the piece—or order and placement of contents. The interplay of such elements results in music which, on the surface, seems to be filled with unrelated images—apparently accidental events and passages whose placement in the stream of time follows no immediate logic. This music, considered as a process *in* time, attempts to create a state of dreaming, or a fiction of the mind. At the same time, however, the combination of the same elements also contributes to a larger design which may be perceived by the listener as an architectonic object *out* of time. As Lutoslawski has pointed out, this is possible due to "the ability of the listener to remember the music he has heard and to integrate its individual sections while he listens so that after he has heard the composition (no matter how many times) he is [capable] of perceiving it as an idea that, like a painting, or sculpture, exists outside the limits of time..." (1970, 132-4).

In this regard, it is important to note that the overall form of the piece is open to more than one interpretation; and despite the fact that there is an extended use of nonlinear passages, the ultimate reading of the music reveals that it is, in various respects, an example of the closed form.

To organize pitch and rhythm, two independent systems have been constructed which make use of some serial processes, yet are flexible enough to permit micro- and macro-level decisions based on intuitive considerations. It is important to observe that such techniques of "limited serialism" do not work as an end in themselves, but as a means—for they are not conceived or used conceptually. In fact, as determinants of the aural shape of the music, they are very practical solutions found to accomplish determined audible strata and specific textures, as required by the musical discourse and form.

In the pitch domain, the method I call “motivic serialization” relies on serial procedures to insure that, among other things, a constant rotation of the total chromatic occurs. Pitch-material is derived from a 1-2-1 tetrachordal set to which principles of permutation are applied. While this specific type of set articulates pitch-relationships on the local level, extended moments of music are built according to the permutations of second and third-level sets formed by the diverse arrangements in time of transposed 1-2-1 tetrachordal sets.

Besides serial procedures, the system allows a modal treatment of pitch. An example of such treatment is the use of the 1-2-1 tetrachordal set as a generating device for motives, ostinatos and scales (as in Messiaen's third mode of limited transpositions).

The pitch organization is intended to ensure the piece an overall sense of intervallic coherence, while at the same time allowing the coexistence of less identifiable pitch structures (serial/atonal pitch framework) with more identifiable structures and contrasting units (modal framework).

In general, the modal treatment is linked to a regular metrical time frame—a perceivable pulse—while the serial procedures are associated with complex, discontinuous rhythms, and an asymmetrical pulse. To create the latter structures a method in which predetermined numerical rows provide the durational values for the time spans between event attacks was used. These rows are derived from the Fibonacci series, which is the arithmetical representation of the golden mean. This ratio ($1 = 0,618 + 0,382$) has been known from ancient times, and used by many artists.

In addition to defining local level rhythms, the Fibonacci series—in conjunction with other numerical collections derived from it—also determines length and proportions of parts and sections in the piece.

The Fibonacci series proved to be an invaluable aid in creating the rhythmic structures. In spite of some practical concerns, it has properties which, on a theoretical plane, are congruent with some ideas about temporal matters that are expressed in the music. The mix of temporalities emerges from the series, as on one hand, due to its proportional property, it expresses metaphorically a sense of time which lacks an on-going character (as in a “circle” of time). On the other hand, it also represents a linear temporality which depends on an orderly rhythmic growth pattern found in its additive, arithmetic property (time as a “straight” line).

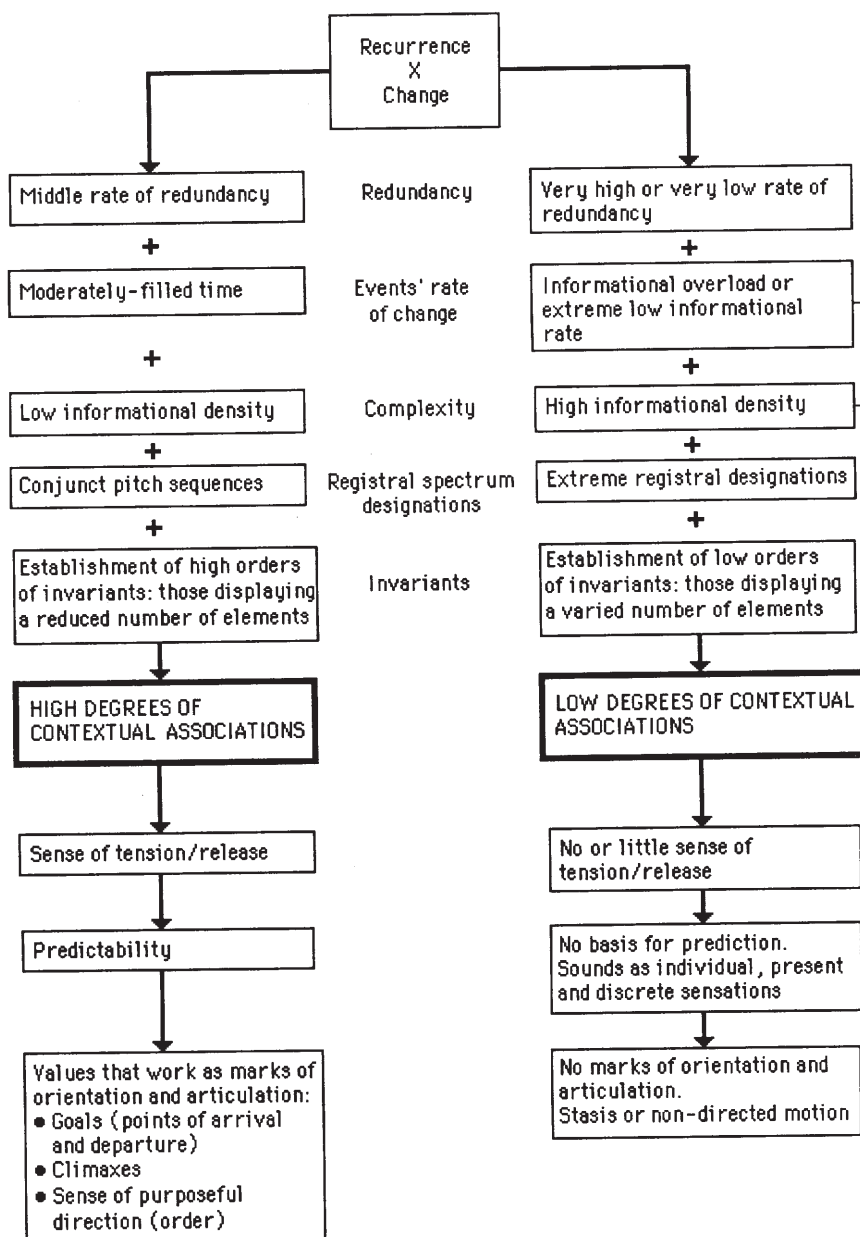
In the explanation that follows, I examine the musical aspects cited above in the light of different degrees of what I call “contextual associations.” These associations refer to the capacity of any confluent and/or successive musical events to establish among themselves (or, more appropriately, in the listener’s mind) diverse levels of syntactical connections, relationships and interactions. This capacity can be explained by gestalt psychology studies which show that it is a characteristic of both our visual and auditory perception to impose pattern, even upon apparently unconnected sense data (Rowell 1983, 245).

In the chart in Ex. 1, some basic determinants of such inter-related events are listed. First, it is important to consider that the cognitive act of relating events needs some *recurrence* and some *change* to happen among the various constructional levels of the music. Consequently, depending on the predominance of one of these actions, a certain rate of *redundancy* will be found throughout. Broadly speaking, both very high and very low rates of redundancy will generally result in very low degrees of contextual associations, while middle rates of redundancy will result in higher degrees. Besides recurrence, change and the resulting rate of redundancy, other related factors may have an influence on the degree of contextual associations:

- *Events’ rate of change* is determined by the limit of the amount of information which the listener’s mind can absorb and process in a certain amount of time.
- *Complexity* refers to the listener’s capacity to remember what has already passed according to a determined degree of informational density.
- *Registral spectrum designations* refers to the contradiction or confirmation of one of the gestalt laws of pattern/perception—the law of proximity.
- *Invariants* refers to a determined number of selected events and procedures which, by statistically controlled recurrence, serve as musical raw material or basis for further structural and/or systemic formations. Some examples are selected pitch classes forming scales and, by extension, characteristic adjacent intervals; determined intervals forming consistent chord types; and some durational proportions establishing fixed ratios.

The chart’s left column lists those factors which lead to high degrees of contextual associations. In the right column are those which lead to low degrees.

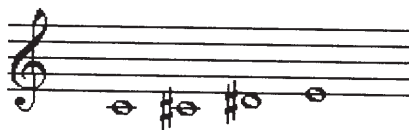
The chart also shows the respective results of applying either high or low degrees of contextual associations. The results concern factors such as sense of tension/release, predictability, and values that may work as marks of orientation and articulation.



Ex. 1) Contextual Associations

Motivic serialization and modal treatments of pitch

A 1-2-1 tetrachordal set is the basic unit of the system I call "Motivic Serialization" (Ex. 2).



Ex. 2) 1-2-1 tetrachordal set

In order to articulate pitch-relationships on the local level, there was a systematic use of the twenty-four possible permutations of its four elements ($4! = 4 \times 3 \times 2 \times 1 = 24$), so that a repetition of any of the permutations occurs only after the presentation of all 24. The pitch content of these first-level sets is defined according to second and third-level ones, as shown below.

Ex. 3 shows these twenty-four permutations. In order to simplify the exposition, they are applied to only one pitch content.



(The permutations yield m2, M2, m3 and M3, or their equivalent compound intervals)

Ex. 3) 24 possible permutations of the first-level set

A second-level set is formed by joining three different transpositions of the first-level set, so that a note is repeated once, and another is omitted. This new set is then submitted to the six possible permutations of its components ($3! = 3 \times 2 \times 1 = 6$), according to Ex. 4.¹

A B C

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

↓

A C B

B A C

B C A

C A B

C B A

(Any interval-class may link the units of this set)

Ex. 4) Second-Level Set

The twelve transpositions of the first-level set serve as origins for 4 different second-level sets (Ix, Iix, IIIx and IVx). These four sets form the third-level set X, which articulates larger spans of music through similar permutation (Ex. 5).

A B C

Ix Iix IIIx IVx

Ix Iix IVx IIIx

Iix Ix IIIx IVx

II Ix IVx IIIx

Etc....

Ex. 5) Third-Level Set X

Ex. 7 shows the application of the principles of motivic serialization to a passage from the music (mm. 1-18). Here, pitch-events are applied in succession: 12 permutations of the first-level set (numbers 23, 3, 16, 7, 20, 9, 22, 1, 6, 13, 24 and 8); 4 permutations of the second-level set (C B A, B C A, A C B and C A B); and then the addition of a complete third-level set X ({IIx, Ix, IVx, IIIx}). The low degree of contextual associations found in the passage is reinforced by the eventual employment of extreme registral designations.

The musical score for Example 7 is divided into four systems, each with two staves (treble and bass clef) and a series of pitch events and permutations below the staves.

- System 1:**
 - Pitch events: $X: \{IIx, C23, B7, 8\}$, $B3$, $A16$
 - Permutations: 2 1 4 3, 3 4 1 2, 3 1 2 4
- System 2:**
 - Pitch events: $Ix, B7, 8$, $C20$, $A9, 8$, b , $\#$, 8
 - Permutations: 3 4 2 1, 1 4 2 3, 1 3 2 4
- System 3:**
 - Pitch events: $IVx, A22$, $C1, \#$, b , $B6, 8$, b
 - Permutations: 3 2 1 4, 1 2 3 4, 1 3 4 2
- System 4:**
 - Pitch events: $IIIx, C13, \#$, $A24, 15$, $B8, 8$
 - Permutations: 1 2 4 3, 1 4 3 2, 4 2 1 3

Ex. 7) Reduced version of mm. 1-18 (without notation of rhythm, dynamics and articulation)

The flexibility of the system becomes still more evident when writing vertical formations, as the order of the elements of the lower-level sets may not be relevant. Ex. 8 shows a reduced version of mm. 19-28, as an instance of this type of writing.

The image displays two systems of musical notation, each consisting of a treble and bass staff. The notation is abstract, featuring various chords and melodic lines. Above the first system, there are labels: $X: \{IVx$, Cn^* , Bn , An , $IIIx$, Bn , Am^{**} , and Cn . A bracket groups the Cn^* and Bn labels. The second system has labels: IX , An , $(B+C)n$, IIx , Cn , An , and Bn . A bracket groups the IIx , Cn , An , and Bn labels. Below the notation, there are two footnotes:
* n = vertical formations
** m = six basic order-forms or variants (see below)

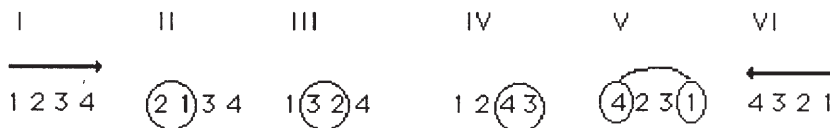
Ex. 8) Mm. 19-28, vertical formations

In order to convey passages with more identifiable pitch structures and contrasting units, determinants are applied of high degrees of contextual associations—such as middle rate of redundancy, low informational density, moderately-filled time, conjunct pitch sequences, and pitch-invariants which form identifiable scales. These are the passages in which the pitch-material undergoes a "modal treatment."

Below, are instances of modal treatment to which the 1-2-1 tetrachordal set is submitted, in accordance with some of these determinants.

OSTINATOS

If one takes the permutations of the 1-2-1 tetrachordal set, and makes a loop with each of them (pitch/order recurrence), it will be seen that there are only “six basic order-forms” within the twenty-four permutations ($n! \div n = 24 \div 4 = 6$) (Ex. 9).



Ex. 9) Basic order-forms

These six basic order-forms were used to compose ostinatos which appear throughout the piece. Apart from the originals, variants are created by anticipating or delaying pitch recurrence. In Ex. 10., the parts of marimba, tubular chimes and piano are instances of basic order-forms V, I and III respectively; and those of clarinet, vibraphone and double bass are instances of the variants.

Ex. 10) M. 55, ostinatos

MOTIVES

Segments of such variants are also employed in the construction of isolated melodic fragments (motives), like the one in mm. 39-40 (Ex. 11).



Ex. 11) Mm. 39-40, melodic fragment

SCALES

Not taking into account the repeated notes, one observes that the second-level sets Iy, IIy, IIIy and IVy correspond to the four possible transpositions of Messiaen's third mode of limited transpositions (2-1-1-2-1-1-2-1-1) (Ex. 12).



Ex. 12) Transpositions of Messiaen's third mode

This scale is employed as an *invariant* to compose either specific kinds of textures, or passages in which long melodic figurations are needed. An example of the first kind of passage is found at m. 177. Here, all the instruments play the third transposition of Messiaen's mode (Ex. 13).

The image displays a musical score for seven instruments: Flute (Fl), Oboe (Ob), Clarinet (Cl), Bassoon (Bn), Trumpet (Tpt), Violin (Vln), and Viola (Vlc). Each staff contains a melodic line composed of eighth and sixteenth notes, with several triplet markings (indicated by a '3' over a bracket) and slurs. The key signature has three sharps (F#, C#, G#), and the time signature is 3/4. The notation is arranged in a standard orchestral format, with woodwinds and brass in the upper staves and strings in the lower staves.

Ex. 13) M. 177, scales employed in the construction of a specific texture

Measures 194-226 exhibit an instance of the second kind of passage. In Ex. 14., the beginning presents the first transposition of the mode.



Ex. 14) From m. 194, scales used to create long melodic figurations

Table of proportional durations and conventional metric divisions

A simple description of the golden section ratio is $(a/b) = b/(a + b)$, $0 = a < b$. That is, two quantities are in the golden mean relationship when the ratio between the larger and the whole is equivalent to the ratio between the smaller and the larger. Summation series in which two adjacent numbers are added together to produce the next number are remarkably good approximations of a series of golden means, since one may assert that for any three consecutive terms of such a summation sequence, the largest is to the middle, as the middle is to the smallest. The specific summation series called the Fibonacci sequence (0, 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, ...) is the one which most rapidly approximates the golden section ratio.

In *Nocturnales*, some serial procedures are applied to rhythm in order to determine the time span between event attacks within a section. The initial step is

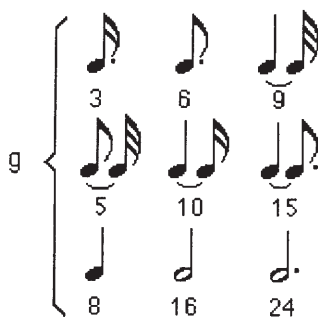
If, for instance, one chooses the thirty-second note (1/8), the resulting table is as in Ex. 17, as each term of it is multiplied by the basic unit.

1	2	3	5	8	13
2	4	6	10	16	26
3	6	9	15	24	39
5	10	15	25	40	65
8	16	24	40	64	104
13	26	39	65	104	169

Ex. 17) Table of durations with the thirty-second note as the basic unit

To use the table, one needs to apply to a specific section of the music a segment extracted from it (group g) that is formed by any of its adjacent terms. The groups in Ex. 18 are some possibilities.

The applicability of a specific group is conditioned by two obvious factors—the number of terms, and the number of basic units. If, for example, one chooses a 9-term group as the one shown in the Ex. 19—with a total number (t) of 96 basic units ($3+6+9+5+10+15+8+16+24 = 96$), it means that its elements can be used for a section whose total number of basic units (T) is also 96, distributed among 9 events (or event attacks) according to approximate golden section ratios.



Ex. 19) 9-term group

Repetition of the same group within a section is possible. A number of 6 groups such as this would be used for a passage containing 54 event attacks, and comprising 576 basic units ($T = 6.t = 576$).

Besides adaptability, the preference for a specific group is also dependent on factors such as the musical need for relative short or long durations, simple or complex proportions, and the desired number of different ratios acting within a passage (one may note, for example, that groups chosen from the lower and right side of the table present more complex ratios than those from the higher and left side).

In order to give absolute durations to such terms, it is necessary to establish a value (v) for the basic unit. Varying according to the change of referential metronome numbers ($M = 60 = 1$ second), the unit value may be described as $v = (60 \div M) u$.

As an example, a passage with metronome number of 75, and a thirty-second note ($1/8$) as the table's basic unit, presents a unit value of $1/10$, which means that each second is filled by 10 basic units ($v = 0,1$ of a second).

$$v = (60 \div 75) \cdot \frac{1}{8} = \frac{1}{10}$$

Another simple operation may supply the total number of basic units needed to fill up a section whose duration in seconds is signified by s : $T = s/u$ (consequently, $s = T \cdot u$, and $u = s/T$). Accordingly, the passage just cited would comprise 80 basic units, if it lasted for 8 seconds. The group shown in Ex. 20 could be an option for a passage such as this.

$$(t = 6 + 10 + 16 + 9 + 15 + 24 = 80)$$

Ex. 20) A 6-term group comprising 80 basic units

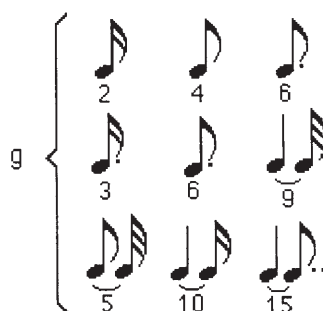
Despite the fact that there is a limited number of groups within a table (and consequently a limited number of choices for the variable t), one may find a considerable variety of possibilities in arranging rhythm according to these procedures, since the final rhythmic structuring depends on variables other than t , and these provide a wide range of options.

As with pitch, the process of organizing rhythm depends on a certain amount of the composer's freedom to take decisions at the local level. Basically, these aspects include the order in which the table's terms are to be distributed within a section, and the duration of individual events, since the length of any of them may overlap the attack of another according to musical needs. Although some other aspects, such as specific rhythmic subdivision and underlying meter, emerge as by-products of the process, they are also closely related to the amount of intuitive choice.

The use of such a method is preconditioned by pragmatic considerations. The system's numerical collections are a result of their intrinsic qualities and application. The desired result is the emergence of passages whose selected rhythms are statistically distributed and related to a number of common proportions. Another objective is the achievement of asymmetrical/irregular rhythmic divisions, and a metrically uneven pulse²—in spite of the use of simple rhythms on the surface level (irrational duration values are comparatively infrequent). Such an achievement is possible due to the fact that the Fibonacci

series "avoids periodicity and regularity, yet it is well ordered and it has properties that accomplish similar results to the arithmetic and geometric properties of (...) series [that are traditionally applied to music]" (Kramer 1973, 114).

The use of this technique is connected with the aim of implementing a relatively low rate of redundancy and high informational density (complexity), in order to create passages exhibiting low degrees of contextual associations. An example from the music is the passage comprising mm. 29-38. Lasting 37.5 seconds, with a metronome number of 60, and a thirty-second note as the basic unit, this section presents a unit value of $1/8$, and a total number of 300 basic units. The elements of five groups such as the one in Ex. 21 are freely distributed to fill up the rhythmic divisions for the attacks of the 45 events of the passage (Ex. 22).



$$t = 2+4+6+3+6+9+5+10+15 = 60$$

$$T = 5.t = 5.60 = 300$$

Ex. 21) Group for passage comprising mm. 29-38

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Parallel to the modal treatment of pitch, the employment of this technique is alternated with the use of the conventional metric divisions of 2 and 3: i. e. proportions from the geometric (1, 2, 4, 8, 16,...) and arithmetic (1, 2, 3, 4, 5,...) series.³ In this regard, it is important to note that the Fibonacci series does not exclude the possibility of employing such proportions. Note, for example, that the first three rows from the table of durations are expressions of these ratios. In addition, some characteristics of the Fibonacci series make it compatible with these series—namely, the additive and proportional properties. As Kramer observes, “the Fibonacci series is not an arithmetic series (...), but it does have an additive property, since it is a summation series” (1973, 114). On the other hand, one can see that just as in a geometric series (in which the ratio of any term to its predecessor is constant), the series of golden means (of which the Fibonacci series is a very good approximation) has a constant multiplier of

$$\frac{R^n}{\sqrt{5}}, \text{ where the golden ratio } R = \frac{\sqrt{5} + 1}{2} = 1.618.$$

The employment of such constant proportions (showing middle rate of redundancy and low informational density) are necessary to convey passages with high degrees of contextual associations, as at mm. 39-40 and 194-226 (see Exs. 11 and 14).

The superposition of these simple proportions is used in order to convey more complex rhythmic outputs, as presented in the passage comprising mm. 172-173 (Ex. 23).

Ex. 23) Mm. 172-173, superposition of simple proportions

The use of either asymmetrical rhythmic divisions from the Fibonacci rows, or conventional metric divisions, in connection with the employment of more or less identifiable pitch structures, are determined by the requirements of the form.

Temporal structures and related factors

Nocturnales was conceived as an imaginary voyage into the world of dreams. More than a precompositional tool, the association with dreams was a justification to write a piece in which the criteria for segmentation were determined by the interplay of different temporal structures, and correlated continuity/discontinuity factors. The intention is that the formal plan of the music emerge from the coexistence and interaction of different temporalities that are metaphors for time in the world of dreams. The dream archetype is ideal for such an association because some factors that are characteristic of certain temporal structures also pertain to the syntax of dream imagery. These include the absence of linear causality, the occurrence of events in unpredictable/illogical sequence, an overwhelming aura of presentness (past, present, and future telescoped together), discontinuity, episodic/disjointed content, in concomitance with vivid images from waking life (implying causality), and normal sequence of text and continuity. A complete understanding of the ideas behind the formal plan requires a discussion about the temporal structures present in the piece. First, there is a tentative conceptual basis that may serve as reference and support to the examination of temporal concerns in music in general. Then, applying this concept to *Nocturnales* in particular, one can discuss the relationship between ideas and music by pointing out how each segment of the piece is related to the given propositions.

In the attempt to conceptualize time, man has produced throughout centuries many different views which reveal contradictions and cross references among areas such as philosophy, psychology, physics, and others. Although arriving at clear-cut conclusions on the issue is an impossible task, some general and common directions are identifiable. Two ontological viewpoints that present some of these common lines are those which approach time either objectively (as external reality) or subjectively (as idealization). Examples of the first view are the undifferentiated "continuum" of the theoretical physicist or Newton's

mathematical, absolute time which "flows equably without relation to anything else" (qtd. in Fraser 1990, 33), and is independent of, and ontologically prior to events (thus, existing even before the creation of the world). Among examples of the second viewpoint are those which imply that time is somehow a human creation, a property of mind. The common idea linking the latter postulates that "events, not time are in flux" (Kramer 1988, 5). Consequently, says Clifton, "it is events, as lived through by people, which define time" (qtd. in Kramer 1988, 5). Such a deduction is made possible by the sense of repetitiveness (and alternation) provided by the continuous recurrence of alternately identifiable similar events at regular time intervals. According to this idea, one could possibly say that without any recurrence, or if the occurring events were eternally different and unidentifiable, time would not exist for man, and the world would be chaotic.

If one were to elaborate or examine the ontic status of music, it would become apparent that it shares some common fundamental propositions with the second conception of time. Indeed, the view regarding time as a human abstraction, based on perception and experience of events, touches some points which are also identifiable in music. For example:

- music is a series of events;
- music needs, in different degrees and at some constructional levels, some kind of recurrence in order to be meaningful;
- despite the fact that nature provides all conditions to support its existence, music is ultimately a human creation, and thus it depends on some sort of human ability to think in abstract terms, as well as to have awareness;
- congruence with the biological and cultural processes of human perception is fundamental for music to exist.

These coincidences have led some authors to consider time and music as correlative, or two-fold concepts—as different expressions of the same phenomenon. There are also those who, perceiving such correlations, regard music itself as time, or as a form of time. Their ideas are reinforced by the arguments that music is in reality something inherently temporal,⁴ and that when listening to music in an involved way, external time and external rhythms are superseded by its projected temporalities and rhythms.

Indeed, music is a kind of time, but one with a very special content, for musical events are not neutral. Rather, they are qualitative in a way that makes time

susceptible to *manipulation*.. The special qualities of these events can give specific forms to the passage of time. As Tenney points out, "a piece of music does not consist merely of an inarticulate stream of elementary sounds, but a hierarchically ordered network of sounds, motives, phrases, passages, sections, movements, etc.—i.e., time-spans whose *perceptual* boundaries are largely determined by the nature of the sounds and sound-configurations occurring within them" (1980, 205). In this way, it is interesting to observe that music may become a kind of symbolic mediation for man as *incorporated time*—the mediation between cosmic and "lived" time (see Appendix A for an explanation of this issue).

It is through *controlled* contextual associations (in accordance with intended resulting scales of tension/release, and consequent degrees of predictability), that musical events can be perceived and understood in a variety of time-related structures.

Such structures are categories of two broad conceptual bases traditionally related to temporal arts—music in particular. One is that of linearity, associated with the philosophical principle of *becoming*, and the other is that of nonlinearity, which is related to the principle of *being*. The first concerns change, process and function, while the second emphasizes the priority of substance over function, and of permanence.⁵ Below are described some factors one may find in linear music, as opposed to those found in nonlinear music.⁶

Linear Music	Nonlinear Music
Directed motion	Stasis or non-directed motion
Aim at a future goal (teleology, irreversibility)	No goal to move toward; no climax or points of culmination (non-teleology, reversibility)
Display of cumulative continuity	Discontinuity
A hierarchical scale of beats and periodicities	No temporal articulation or division; lack of phrases; total consistency
Beginning in a clear and decisive manner, proceeding through related parts, and ending with a sense of finality and fulfillment	No exhibition of large scale closures (simply starts and stops)
A single time line that gradually passes from our future, through our present, into our past	Two or more simultaneous times; timelessness; or one moment in time after another
An ideal structure suggesting a narrative interpretation of the dynamics of human life	Unexpectedness/nonfulfillment (delay/bypassed expectation)
The allowance for the listener to feel expectation, and to perceive by means of prediction and retrodiction	Severance of the moment of perception from both its past and its future, resulting in no basis for prediction; no degree of connectedness within or between events, no syntactical relationships. Sounds appear as individual, discrete sensations (sound <i>qua</i> sound)
Properties including causality, syntactical relationships, and connotations that invite and reward cross references between musical events that are separate in time	Reiteration, juxtaposition, and accumulation, rather than logical progression

Based on the proposed idea that music can give shape to the passage of time, and that time can be manipulated as far as it *is* music, *Nocturnales* attempts to create a structure which leads the listener through different/contrasting temporal experiences. Accordingly, the formal plan of the piece was conceived as the result of interplaying segments that incorporate a predominantly linear temporality and passages that create a predominantly nonlinear experience. Both modes coexist in different proportions in all music. But in *Nocturnales* the intention was that this mix of temporalities become integral to its formal archetype, and that such interweaving work in a structural way. In addition, in accordance with the eclectic character of the work, the aim was to permit a multiplicity of interpretations concerning the relationship between the various parts and sections of the piece.

With three principal divisions played without pause, *Nocturnales* is segmented as shown in Ex. 24.

	Sections	Measures	Duration
Part 1	1	1-18	60"
	2	19-28	34"
	3	29-38	37"
	4	39-60	73" (1'13")
	5	61-93	89" (1'29")
	6	94-110	45"
Part 2	7	111-192	199" (3'19")
	8	193-226	123" (2'03")
Part 3	9 (Ref 1)	227-238	28"
	10 (Epis 1)	239-242	12"
	11 (Ref 2)	243-254	28"
	12 (Epis 2)	255-270	36"
	13 (Ref 3)	271-278	18"
	14 (Epis 3)	279-285	21"
	15 (Ref 4)	286-292	13"

Ex. 24) Principal divisions of *Nocturnales*

In part 1, similar musical content and correspondent temporalities are designed to fill non-adjacent sections. Accordingly, sections 1 and 3 share one nonlinear temporal structure that presents some motion. However, due to the fact that the direction is not goal-oriented, they are static. This structure is freely associated with a situation of stability, at the same time being accompanied by diffused or non-dream images.

Numbers 2 and 5 are also *related* sections, displaying a single nonlinear temporality whose main characteristic is non-directed motion. They differ from the former sections in terms of superficial musical content. In sections 1 and 3 short notes played along with sustained notes are the internal elements of the musical fabric; while in sections 2 and 5 the main elements are sound blocks of different thicknesses. In addition, the paths of sections 1 and 3 are comparatively faster than that of section 2, while section 5 presents a series of contrasting paths, each related to one of the 8 internal sub-sections of the passage (shown in the Ex. 25). Sections 2 and 5 are freely associated with a situation of stability, accompanied by vivid dream visualization.

	Sub-sections	Measures	Duration
Section 5	1	61-62	5"
	2	63-67	13"
	3	68-71	13"
	4	72-74	8"
	5	75-78	13"
	6	79-89	21"
	7	90-91	8"
	8	92-93	8"

Ex. 25) Sub-sections of Section 5

The attainment of specific kinds of temporal structures depends on relative degrees of contextual associations. In the case of the related sections 1 and 3, and 2 and 5, the stasis (associated with non-directed motion) which the listener may perceive is the result of applying determinants of low degrees to the passages. Such determinants are already implicit in the techniques of "limited serialism" used to organize pitch and rhythm in these sections. A statistically controlled distribution of the 12 pitch classes, in addition to the use of extreme/contrasting registers, are procedures that in combination with the application of asymmetrical/irregular rhythmic divisions and a metrically uneven pulse produce both a low rate of redundancy and a high rate of informational density (complexity).

The lower the degree of contextual associations, the more one's attention is directed primarily toward the textural totality, the global dimension. Actually, according to Rowell, "the mind attempts instinctively to reduce perceived complexity (...) by fusing the data into a unified surface" (1983, 158-159). Gestalt psychology corroborates the point arguing that "the perceiving mind seeks the simplest available grouping, looking for basic, complete shapes—or continuous wholes" (Bent 1980, 354). In musical terms, this means that a hierarchical change in the traditional role of the diverse musical parameters tends to occur when, unable to relate and process micro-level events of pitch and rhythm (i.e., the individual constituents of the texture), the listener perceives factors such as relations of density, distribution of registers and variations in color and dynamics (i.e., the texture itself), as the constituting elements of the structure of music.

This phenomenon is seen in the sections of *Nocturnales*, where the listener, exposed to complex pitch/rhythm structures and comparatively less identifiable internal complexes, is unable to recall something that may resemble a melody, a

theme or a harmonic progression (usually of primary concern in a piece of traditional music). As a result, the agents of the musical discourse are found at a higher structural level and are better identified as *textural units* (although some spans of music within these sections present an ambiguity between local event connections and textural totality).

Passages built up according to these procedures present no points of culmination, as well as no basis for prediction and have in general a static character. Since their continuation does not depend on internal syntactical relationships, but on unfolding textures of various densities and colors, they arouse in the listener few expectations other than their own imminent extension. The internal movement one perceives is due to the natural association made between change, in music, to motion. As Berry explains, "the succession of a sound event by another *of different quality or qualities* (say, two events of different degrees of loudness) conveys an analogical impression of motion—of a 'distance' between disparate qualitative states having been 'traversed'" (1987, 8). As such, motion becomes not goal-oriented, and is experienced by the listener as stasis. In this context, stasis may evoke a nonlinear temporality that emphasizes the present, more than the past and the future.

A linear structure is introduced for the first time in section 4. It is subtle at first, but becomes more evident as the passage gradually reveals factors such as directed motion, cumulative continuity, expectedness, and seems to aim at a future goal by means of what may be called an increasing level of energy. In its related section, number 6, there are also traces of linearity that lead the passage to an ending by means of a decreasing level of energy. The free association here is respectively the increasing and decreasing tension/instability provoked by vivid dream images.

Six sub-sections divide section 4, and two others divide section 6, shown in the graphic below (Ex. 26):

	Sub-sections	Measures	Duration
Section 4	1	39-40	6"
	2	41-43	11"
	3	44-45	5"
	4	46-51	17"
	5	52-53	6"
	6	54-60	28"
Section 6	1	94-100	17"
	2	100-110	28"

Ex. 26) Sub-sections in sections 4 and 6

Here, determinants of high degrees of contextual associations (such as middle rate of redundancy, low informational density, moderately-filled time, and conjunct pitch sequences) are used in order to convey passages with more identifiable and contrasting internal pitch structures.

Accordingly, in section 4, the first division presents a passage which is both a modal treatment of pitch, and a consistent application of conventional metric divisions. The melodic fragment played by the viola that starts this passage (Ex. 11) not only marks the beginning of a predominantly linear structure (signaling to the listener that something different is going to happen), but also serves as the first point of reference for the establishment of syntactical relationships with forthcoming similar events. Indeed, after sub-section 2, which presents a reminiscent textural unit from the preceding section, another fragment (this time played by the cello) appears in sub-section 3. In sub-section 4, again a textural unit is the identifiable agent of the musical discourse. Then, in the fifth division, a new melodic fragment played by the oboe emerges, and introduces in sub-section 6 a moving layer formed by the superposition of 6 melodic ostinatos.

These recurrent units—all derived from the "six basic order-forms"—function as points of reference, since by means of their defined characteristics, design can be easily identified, understood and remembered. The comparison and relation of current units to earlier ones can induce the listener to associate them contextually, and thus not perceive them as discrete sensations, but as points of orientation and articulation of a higher hierarchic level of musical structure. As such, they can predict later events, or confirm earlier ones, leading the listener to feel expectation, and to perceive direction and goals. In this context, the listener starts *hearing*, more than the musical events themselves, the relationships between them. As a result, musical events begin to have meaning, in that they point to other musical events.

Other contextual factors reinforce the accumulation of momentum in section 4. One is the cumulative continuity associated with the increasing textural density occurring in sub-sections 1, 3, 5 and 6. Another is the increase of tension/instability in sub-section 6, provoked by the displacement in register of its constituting layer (the layer is split in two strands that lead the music to high and low registers respectively). Such displacement creates a deviation from the referential norm established by the previous segments, when there was permanence in one register.

In contrast with section 4, section 6 at first seems to be an example of a nonlinear

temporality, for it starts displaying a *sound mass*—a textural unit—as the identifiable agent of the discourse. This sound mass is formed by the superposition of various sustained notes and ostinatos. Although the ostinatos are recognizable elements of the linearity referred to, the fact that there are six of them played simultaneously makes the individual parts not clearly discernible, and the intervals within them without identity. In other words, an informational overload and a high informational density cause a very low degree of contextual associations between micro-level events, and lead the listener's perception to be focused on the complex field of musical stimuli, rather than on individual melodic and rhythmic patterns. In this way, the determinants of low degrees of contextual associations, in defining sound mass shaping, also produce conditions for the emergence of a temporality which evokes *musical space* and stasis.

Traces of linearity become evident when, in the second division of this section (from m. 100), the static sound mass is transformed into a propelling, moving force that leads the music to an articulating point, at the beginning of part 2 (m. 111). Three motion-related factors, connected with high degrees of contextual associations, produce the linear aspects. First, a gradual displacement in register, achieved by means of descending scales played by all the instruments during the passage, gives a sense of orientation and direction to the sound mass. The scales, examples of high orders of invariants, are the four possible transpositions of Messiaen's third mode of limited transpositions, and arise as the result of submitting the second-level sets Iy, Ily, Illy and IVy (from my "motivic serialization") to a modal treatment. Second, there is a *ritardando* process, achieved by means of decreasing frequency of attack points and a gradual prolongation of note values, which is related to the restoration of a simpler state. This gives the listener an increasing feeling of relaxation following tension. Third, and most important for the listener, at this point in the music, this textural unit may sound as the continuation (recurrence) and resolution (fulfillment of expectation) of the passage found in Sec 4-Sub 6, creating a process of implication-resolution between events separate in time.

Part 2 of *Nocturnales* comprises two adjacent and large sections (7 and 8) which are not related in terms of musical content. While section 8 is formed by just one musical segment, fifteen sub-sections fill section 7, as shown in the table in Ex. 27.

	Sub-sections	Measures	Duration
Section 7	1	111-128	47"
	2	129-146	47"
	3	147-157	29"
	4	158-163	18"
	5	164-168	11"
	6	169-171	7"
	7	172-173	4"
	8	174-175	4"
	9	176	3"
	10	177	3"
	11	178-179	4"
	12	180-181	4"
	13	182-183	4"
	14	184-186	3"
	15	187-192	11"

Ex. 27) Sub-sections in Section 7

The temporal mode to be reflected in section 7 is one with linear characteristics. The idea here is that factors such as directed-motion, gathering of expectation/tension, and accumulation of momentum may lead the music (at least apparently) to a culminating point, a climax. This section is associated with a condition of increasing instability and tension, in which distorted dream images succeed one another as in a kaleidoscope.

In musical terms, such images are the textural units that comprise each of the fifteen sub-sections, and provide the listener with the perceptual experience of hearing moving masses of sounds. Accordingly, the construction of the sub-sections involves determinants of low degrees of contextual associations such as:

- low rate of redundancy: application of both motivic serialization and the table of durations.
- informational overload: layering of various ostinatos or scales at a fast path.
- extreme low informational rate: superposition of various sustained and long notes.
- high informational density: layering of various ostinatos or scales (at a fast or slow path), superposition of individual lines written according to different basic unit values.

The use of such determinants make the sound masses essentially nonlinear and static. Thus, some of them are applied to movement-related procedures, so that they can display, to different degrees, a goal-oriented motion. The procedures are the following: (1) gross variances in register, in order to convey gradual expansion or contraction, and gradual displacement from low to high, or from high to low spectrum; (2) cumulative continuity derived from increasing textural density; (3) speed change determined by the increase or decrease of internal activity; (4) the use of 2-1-1-2-1-1-2-1-1 scales for rapid changes of register.

Besides these procedures, some large scale factors involving recurrence and change reinforce the implementation of motion, and other linear characteristics, to the section. This includes the dialectical interplay of sound masses according to techniques such as superposition, juxtaposition, alternation, overlapping, fusion, and varied repetition. In this way, after making the sound masses identifiable and *moving* musical units, an attempt is made to create a kind of textural *polyphony*, or a higher structural level of texture formed by the distribution in time of sound masses as discrete musical identities. The textural organization of this level, using determinants of *high* degrees of contextual associations, creates a musical discourse whose events predict later ones or confirm earlier ones—leading the listener to sense tension/release, to make some predictions, and to perceive direction and goals. The textural organization of the lower level, using determinants of *low* degrees of contextual associations, gives shape to the sound masses.

Another factor reinforces the accumulation of momentum necessary to produce the gathering of expectation in this section. This is a kind of *accelerando* in which new sound masses succeed each other at closer and closer intervals, establishing a condition of instability and deviation from the norm (modification of the regularity of interval of attacks), as well as of complexity (informational overload). The lengths of the sub-sections are progressively reduced (from 47 to 3 seconds) as they approach what seems to be a climatic point. The process is ultimately intensified in the final sub-section (longer than its immediate predecessors), in which a textural unit formed by superimposed ascending scales drives the music from a very low to a very high register at a rapid pace.

However, a point of arrival, or the resolution for the prepared climax is not achieved in the music, for section 8 (m. 193) interrupts the process by initiating a long, and an almost out-of-context melodic figuration, played by the strings (see

Ex. 14). As this new section unfolds, it reveals itself to be a new and more effective attempt to build to the climatic point, this time by means of a modal treatment of pitch, the use of an even metrical framework, and the use of simple homophony and polyphony. Here, the identifiable units of the discourse are the traditional single lines of a melody which is accompanied by simple chords, and at a later point (from m. 214 on), enriched by a contrapuntal device. Although these are elements traditionally associated with high degrees of contextual associations and linear music, they are organized in such a way that a directed-motion emerges, but one which is very slow and produces a very dilated sense of time. This is due to the application of a high rate of redundancy (insistent recurrence of similar chords, melodic designs and ever equal rhythmic divisions) which gives the music a cyclic and static character. The accumulation of momentum is only gradually perceived, by means of cumulative listening, and tonal ambiguity that creates instability (as the recognizable melodic designs start being reiterated in different tonal areas). As the music progresses, a gradual registral displacement driving both the harmony (and the secondary melodic lines) to a very low register, and the main melodic line to a very high spectrum, gives the passage a definite purposeful direction and a gathering of tension, and leads the music to a culminating point. This section is associated with an increasingly unstable condition, accompanied by a clear dream image.

Following the increasing level of energy and the gathering of expectation, there arrives in section 9 (the beginning of part 3, at m. 227), a huge and static sound mass, which, due to its assertive character (it is played *tutti* and very forte), and its role as representing the return to the norm (a sound mass as unit of the discourse), functions as the definite climatic point for the piece. Interestingly, the latter aspect may lead the listener to find in this passage the appropriate resolution—though displaced in time—for the climatic building up of section 7. At the same time, the passage also works as the appropriate climatic point for the preceding gathering of tension (in section 8), due to its character and immediate proximity. In this way, the passage may be said to incorporate a kind of “double climax” as it is shared by section 8 (adjacently) and by section 7 (in terms of content).

Having driven the music to a climax, the intention was to create at this point a kind of a very nonlinear “suspended time” by prolonging or *freezing* the climatic aura to the end of the music.

To achieve this, part 3 is organized as a *rondeau*, in which the recurrent ritornellos (the odd sections) comprise segments of the sound mass, while the contrasting episodes (the even sections), comprise different textural units (reminiscent of parts 1 and 2) which succeed and superpose each other (the graphic in Appendix C shows the origin and organization of materials in Part 3).

The cyclic character of the *rondeau*, the motionless sound mass of the ritornellos,⁷ and the *spatial* aspects of the episodes' superposed textural units, are all strong contributors to the stasis found in this part of the music.

Summing up the above, part 3 is on a large scale, related to the sum of parts 1 and 2. This passage is associated with a stable dreaming condition characterized by vivid, yet most illogical scenes.

A formal structure conceived in this way allows for a multiplicity of interpretations. First, the lack of goal-directed development within the initial sections of the piece, makes it impossible for the listener to have a basis for prediction. For the listener, these sections, without a large scale context, merely "happen," and sound like individual, current and discrete extended moments. In this way, the listener experiences one moment in time after another. The situation is not different when the first linear passage arrives (at section 4), for it is followed by another static moment (section 5), making the listener initially perceive just an isolated moment of linear music. In an attenuated way, the situation is also similar in section 7, where one instant of music does not progress from one to another, but each just follows one another. Another level of meaning becomes evident when the listener gets a clearer view of the emerging whole. It is then that he perceives, through cumulative experience, a subcutaneous large scale gathering of momentum and expectation, leading the music to a point of culmination, a climax, in part 3.

While in traditional music the moment of climax is usually ephemeral, here it is crystallized, and a "suspended time" is created. An ambiguous temporal situation is at work: being nonlinear, part 3 stops the music with no definitive sense of ending. At the same time the piece possesses a quality of closing the cycle as its musical content refers to the former parts.

The ultimate intention in *Nocturnales* is that more than one time may be at work simultaneously. While each prolonged instance of music provides a kind of temporality (nonlinear in most cases), at the same time it contributes to the definition of a totality, known completely only at the end, which is linear in essence.

As far as the dialectic of continuity/discontinuity is concerned, one can ascertain

that, apart from some continuous segments found in the linear passages, within most sections of part 1 (i.e. at the micro-structural level), the superficial strata of the music presents discontinuity through different/contrasting dynamics, modes of instrumental articulations, densities, and registral designations. In parallel, on the macro-structural level (formed by sections), the discontinuity factor is apparent in the form of sudden interruptions of progressions, expectations that are not immediately fulfilled, and *related* sections that are interposed with contrasting ones.

In contrast with part 1, the micro-structures of part 2 provide continuity most of the time by means of continuous sound masses. Discontinuity is found on the structural level which presents sub-sections and sections as the units of the discourse—in the first case, among textural units of section 7; and in the second case, in the major interruption of section 8 that separates the climax building in section 7 from its possible resolution, in section 9.

A similar situation occurs in part 3, where sections are highly segmented, while their internal structures are constituted in most cases by uniform and consistent textural units.

Besides giving the piece an emotional and musical climate, the continuity/discontinuity dialectic is also an element in suggesting the different levels of meaning referred to above. On one hand, discontinuity reinforces the nonlinearity that is found mainly in the lower structural levels of the first part of the piece. On the other hand, based on the paradox that “a sense of extreme discontinuity can lead to alienation; and alienation, to a search for perspective and reunion with others—a search for continuity” (Perry-Camp 1979, 166-7), the idea behind the use of discontinuity is to arouse in the listener a desire for continuity (or order and unity), which is provided at times by the music itself, and at times only by the memory of the listener. Such a “virtual” continuity may reinforce the linearity found in higher structural levels of the music (see graphic in Appendix B for a summary of the whole temporal design of the piece).

A final consideration is that, due to the lack of goal-directed development and of a regular metric hierarchy of time spans within various sections, their lengths tend not to be internally predictable. As a consequence, most sections and sub-sections do not exhibit closure. Because of the requirements of linear construction, it is necessary to create a coherent context for the organization of the duration and proportion of the large spans of music. Interestingly, in the absence of internal

processes leading to closures, such a context has to be based on simple clock-time durations. So, the solution to defining the length and proportion of sections and sub-sections, was to rely on three numerical collections derived from the Fibonacci series, in addition to the Fibonacci series itself.

These collections are generated by changing the second term in the progression. As each term is the sum of the previous two, the following numbers result:

Collection I: 1 2 3 5 8 13 21 34 55 89 144 233 377
(Fibonacci's)

Collection II: 1 3 4 7 11 18 29 47 76 123 199 322 521

Collection III: 1 4 5 9 14 23 37 60 97 157 254 411 665

Collection IV: 1 5 6 11 17 28 45 73 118 191 309 500 809

In part 1, the identification between the *related* sections is reinforced by applying to their total lengths, numbers of the same collection. Therefore, sections 1 and 3 are allotted adjacent terms from collection III—namely 60 and 37 seconds respectively. The adjacent terms 73 and 45 from collection IV determine the respective durations of sections 4 and 6. Sections 2 and 5 last 34 and 89 seconds respectively—which are non-adjacent numbers from collection I (Fibonacci's).

The sub-sections dividing sections 4, 5 and 6 also have durations determined by numbers taken from these collections. In sections 4 and 6, the sub-sections' durations are taken from collection IV, and the ones in section 5, are from collection I.

In the second part of the music, two adjacent sections (7 and 8), which are not related in terms of musical content, have their durations determined by adjacent numbers from the same collection (199 and 123 from II, respectively). Numbers from the second collection also define the durations of sub-sections in section 7.

Considering the larger scale, one sees that part 1 is related neither proportionally nor in terms of musical content to part 2. Their respective total durations are 338" (5'38") and 322" (5'22"). Looking at a still larger scale, however, it is seen that part 3 is related both numerically and in terms of content to parts 1 and 2, taken as a whole.

These two parts sum up 660 seconds (11 minutes), a number from a collection (V) whose terms are the result of multiplying the Fibonacci numbers by 12: 12, 12, 24, 36, 60, 96, 156, 252, 408, 660... The number assigned to part 3 is 156,

also a term from this collection. Thus part 3's total duration is 2'36", and the piece's total length is 13'36". As part 3 is a kind of summing up of what has passed, the durations of its 7 internal sections (episodes and refrains) are determined by numbers freely distributed from collections I, II, III, IV, and V.

One may also see in these relationships a way of expressing discontinuity (as parts not proportionally related), and continuity (as the relationship of parts 1 and 2, taken as whole, to part 3). The graphic in Appendix D provides a complete breakdown of the large scale structure of the piece, and points out the related sections and parts.

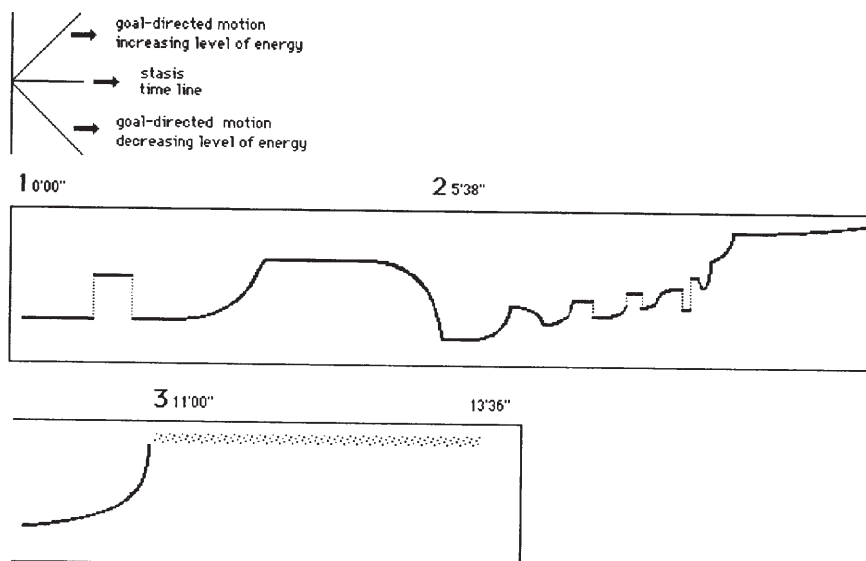
Appendix

A) Music: symbolic mediation as *incorporated time*

The relationship between time and music, and the assertion that *when music is time, time can be controlled* are not incidental for man, but highly significant. According to Paul Ricoeur's theory of "lived paradox," we are aware of two extreme perspectives of time: (i) the anguishing experience of the briefness of life (qualitative time, "a time with present"); and (ii) the immensity of cosmic time (quantitative time, "a time without present"), which returns indefatigably through the cycles of years, seasons and days. The 'lived paradox' results from the human perception that the fundamental experience of lived time (the human present) will always lack both remote past and remote future, for it does not pertain to the representation of quantitative time. According to Ricoeur, man attempts to overcome such disproportion (between cosmic and lived time) through *symbolic mediations*—such symbolic structures constitute what for him is ultimately *human time*. These are manifested through mythic, epic and literary accounts, as well as in chronologies, calendars and histories. This idea drives him to the conclusion that "human time is always a *reported time*" (1991, 5-8). One can postulate that music *is* also among these symbolic mediations. It follows that if the above mentioned accounts reach the mediatory condition as "related time," music, at

a deeper level, becomes a symbolic mediation as *incorporated time*. While in myths, chronologies and histories, man creates a form to control and reach the immeasurable by cognitive means, in music he finds a way to manipulate and live it through a structure which can incorporate the immeasurable itself. Put another way, the idea is that since man cannot actually reach cosmic time, then, *in* music, he conceives a profound mimesis of it, which is susceptible to manipulation, and under his control, works as symbolic mediation. (From the article referred as Moura, Eli-Eri 1993)

B) Temporal design of *nocturnales*



References

WORKS CITED

- Bent, Ian D. 1980. "Analysis." *The New Grove Dictionary of Music and Musicians*. Ed. Stanley Sadie. London: Macmillan.
- Berry, Wallace. 1987. *Structural Functions in Music*. 1976. New York: Dover Publications.
- Fraser, J. T. 1990. *Of Time, Passion, and Knowledge*. 2nd ed. Princeton: Princeton University Press.
- Kramer, Jonathan. 1973. "The Fibonacci Series in Twentieth-Century Music." *Journal of Music Theory* 17 (1973): 110-148.
- _____. 1988. *The Time of Music*. New York and London: Schirmer Books.
- Lutoslawski, Witold. 1970. [On the Second Symphony]. *The Orchestral Composer's Point of View: Essays on Twentieth-Century Music by Those Who Wrote It*. Ed. Robert Stephan Hines. Norman: University of Oklahoma Press. 128-51.
- Moura, Eli-Eri. 1993. "Manipulations of Time in Music." Unpublished paper.
- Perry-Camp, Jane. 1979. "Time and Temporal Proportion: the Golden Section Metaphor in Mozart, Music, and History." *Journal of Musicological Research* 3 (1979): 133-176.
- Ricoeur, Paul. 1991. "O Tempo Relatado." *O Correio da UNESCO* June 1991: 5-9.
- Rowell, Lewis. 1983. *Thinking About Music*. Amherst: The University of Massachusetts Press.
- Tenney, James. 1980. "Temporal Gestalt Perception in Music," *Journal of Music Theory* 24/2 (Fall 1980): 205-241.

OTHER SOURCES

- Barry, Barbara R. *Musical Time: The Sense of Order*. Stuyvesant: Pendragon Press, 1990.
- Bernard, Jonathan W. "Inaudible Structures, Audible Music: Ligeti's Problem, and His Solution." *Music Analysis* 6 (1987): 207-36.
- de Selincourt, Basil. "Music and Duration." *Reflections on Art*. Ed. Susanne K. Langer. Baltimore: The John Hopkins Press, 1958. 152-60.
- Deutsch, Diana. "Organizational Processes in Music." *Music, Mind, and Brain*. Ed. Manfred Clynes. New York: Plenum Press, 1982. 119-35.
- Drew, James. "Information, Space and a New Time-Dialectic." *Journal of Music Theory* 12 (1968): 86-103.
- Dürr, Walther. "Rhythm in Music: A Formal Scaffolding of Time." *The Voices of Time*. Ed. J. T. Fraser. London: Penguin Books, 1968. 180-200.
- Karkoschka, Erhard. "Composing Musical Time: Some Aspects and Possibilities." *Ex Tempore* 7/1 (1994): 70-109.
- Krumhansl, Carol L. *Cognitive Foundations of Musical Pitch*. New York: Oxford University Press, 1990.
- Langer, Susanne K. *Philosophy in a New Key*. 1942. New York: Mentor-New American Library, 1948.
- _____. *Feeling and Form*. New York: Charles Scribner's Sons, 1953.

- Ligeti, György. "Metamorphoses of Musical Form." *Die Reihe* 7 (1965): 5-19.
- Lutoslawski, Witold. "Rhythm and the Organization of Pitch in Composing Techniques Employing a Limited Element of Chance." *Polish Musicological Studies* 2 (1986): 37-53.
- _____. Interview. *Trackinks*. By Richard Dufallo. New York: Oxford University Press, 1989.
- Messiaen, Olivier. *The Technique of my Musical Language*. Trans. by John Satterfield. Paris: Alphonse Leduc, 1944.
- Meyer, Leonard. *Emotion and Meaning in Music*. Chicago: The University of Chicago Press, 1956.
- _____. *Music, the Arts and Ideas*. Chicago: The University of Chicago Press, 1967.
- Moura, Eli-Eri. "Sound Masses and Their Pitch Organization in Lutoslawski's *Second Symphony*." Unpublished paper, 1991.
- Rowell, Lewis. "The Subconscious Language of Musical Time." *Music Theory Spectrum* 1 (1979): 96-106.
- Sloboda, John A. *The Musical Mind: The Cognitive Psychology of Music*. Oxford: Clarendon Press, 1985.
- Stockhausen, Karlheinz. "...How Time Passes..." *Die Reihe* 3 (1959): 10-40.
- Varèse, Edgard. "Rhythm, Form and Content." In *Contemporary Composers on Contemporary Music*. Ed. Barney Childs and Elliot Schwartz. New York: Holt Rinehart, 1967. 201-204.
- Xenakis, Iannis. *Formalized Music*. Bloomington and London: Indiana University Press, 1971.

Notes

1 In order to make the explanation simpler, all first-level sets contained in the examples that follow present permutation 1.

2 The use of conventional measures in the notation of the music is only due to the need for synchronization.

3 Kramer points out that "in the duration parameter standard classical measure groupings are according to the geometric series (applied to successive hierarchical levels), with deviations (extensions, elisions, overlaps, etc.) being additions to or subtractions from the geometric norm and hence derivative of the arithmetic series" (1973, 114).

4 "Time is a necessary condition for music, perhaps also a sufficient condition. I am not arguing the existence of music without sound, or without people, but both are imaginable. But I cannot imagine a music without extent of time" (Rowell 1983, 7).

5 In parallel to the two ontological viewpoints outlined above, the attitudes of being and becoming also characterize many approaches throughout the history of thought about time. Views influenced by the principle of becoming are found mostly in the Western philosophies and science—they travel from Heraclitus to Bergson, passing by Aristotle, St. Augustine, St. Thomas Aquinas and many others. On the other hand, the idea of being has received its strongest statement in the philosophies of Eastern Zen Buddhism.

6 These assumptions are based on a list given by Rowell in his book *Thinking About Music* (1983, 242-3).

7 This textural unit sounds static in spite of the multitude of individual pitch changes occurring within it, for, as Rowell explains, "too much mobility in music may cause us to lose our bearing and perceive this music as stasis" (Rowell, 1983, 172).