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Chromatic Interval Group Serialism

The Development of an Atonal, Dissonant, and Amotivic Composition Technique

(Chromatische-intervalgroepserialisme
De ontwikkeling van een atonale, dissonante en amotivische compositietechniek)

SCRIPTIE, als reflectief luik van de masterproef, aangeboden tot het behalen van de graad van Master of Arts in de Muziek, afstudeerrichting Compositie

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Abstract

Dutch

Chromatische-intervalgroepserialisme
De ontwikkeling van een atonale, dissonante en amotivische compositietechniek

In deze scriptie wordt beschreven hoe een artistieke zoektocht naar een systematisch atonaal, dissonant en structureel amotivisch klankidioom resulteerde in de ontwikkeling van de compositietechniek die door de auteur **chromatische-intervalgroepserialisme** (CIG-serialisme) werd genoemd. Het vertrekpunt hierbij wordt gevormd door aan de ene kant de erfenis van Arnold Schoenbergs dodecafonie, en aan de andere kant de opvattingen van Reginald Smith Brindle over atonaliteit en dissonantie binnen de context van de seriële compositie. Het CIG-serialisme gaat niet—zoals dat het geval is in de meeste seriële technieken—uit van reeksen van toonhoogteklassen, maar vertrekt vanuit de idee van intervalklasse. CIG-reeksen zijn dan ook samengesteld aan de hand van chromatische intervalgroepen, en niet van toonhoogteklassen.

Na de muziektheoretische beschrijving van het CIG-serialisme en de manier waarop deze techniek in de praktijk wordt gebracht, wordt ze vervolgens binnen een esthetisch kader geplaatst. De auteur gaat hierbij op zoek naar mogelijke antwoorden op de vraag wat het is om kunstenaar te zijn, wat het voor hem betekent om kunst te maken, en welke drijfveren hem hierbij leiden. Hierbij wordt het begrip van het **esthetisch universum** van de kunstenaar als centraal idee geïntroduceerd. De ontwikkeling van het CIG-serialisme wordt hierbij gezien als de zoektocht van de auteur naar een procedure die het mogelijk maakt om de ideeën uit het idiosyncratische deel van zijn persoonlijk esthetisch universum uit te drukken. Op deze manier wil hij een bijdrage leveren tot het verrijken en verruimen van de esthetische cultuur waar hij deel van uitmaakt.

English

The present thesis provides a description of how an artistic quest for a systematically atonal, dissonant, and structurally amotivic sound idiom resulted in the development of the compositional technique that was named **chromatic interval group serialism** (CIG-serialism) by the author. The starting point in this quest is formed by the legacy of Arnold Schoenberg's dodecaphony on one hand, and by the views of Reginald Smith Brindle on atonality and dissonance within the context of serial composition on the other hand. CIG-serialism is not—as is the case in most serial techniques serial—based on series consisting of pitch classes, but starts from the idea of interval class. CIG-series are constructed on the basis of chromatic interval groups, and not on the basis of pitch classes.

After the music-theoretical description of CIG-serialism and the manner in which it is put into practice, the technique is placed in an aesthetic context. The author is hereby looking for possible answers to the question of what it is to be an artist, what it means for him to create art, and what his incentives might be in the process of artistic creation. The concept of the artist's **aesthetic universe** is introduced as a central idea in this context. The development of CIG-serialism is seen in the light of the author's search for a procedure that allows for the expression of the ideas belonging to the idiosyncratic part of his personal aesthetic universe. This way he wants to contribute to the enrichment and expansion of the aesthetic culture he is part of.

Preface

'Normal' students write their master thesis before they start their doctoral research trajectory. Not so for me in the case of the present master thesis, which is written after the bulk of my doctoral research had been completed. This is why the present text is partly based on elements from my forthcoming doctoral dissertation, as well as on an article published in *Adem* that serves as reflective part of my bachelor exam in composition (Vanhecke, 2011, pp. 12-23), and on chapters I contributed to the forthcoming *ORCiM Sourcebook on experimentation* and to the book on the *Patterns of Intuition* (POINT) project at the Kunst Universität Graz, all written within the context of my doctoral research on 'the systematisation of atonal and dissonant music composition based on chromatic interval group serialism'.

I gladly and proudly express my gratitude to everybody who has contributed to this thesis in one way or another; in the first place to my supervisor for the present master thesis, co-supervisor of my doctoral research, and colleague composer Luc Van Hove; but also to Marc Erkens, the head of the music department of the LUCA School of Arts for his unremitting confidence in me and for giving me the opportunity to accomplish a master trajectory at my not so youthful age; to prof. Dr. Mark Delaere, the supervisor of my doctoral research, for his expert advise on academic as well as artistic topics; to André Laporte, my composition teacher at the Royal Music Conservatory of Brussels, for being one of my artistic fathers; to all my artistic research partners-in-crime at the ORCiM and in the docARTES-programme (Orpheus Institute, Gent), especially to Peter Dejans, director of the Orpheus Institute, and to Dr. Luk Vaes, for being an example to me of how artistic research can be at the same time artistically enthralling and scientifically rigorous; to the many friends and colleagues whose names I forget to mention here; and last but not least to my wife Johanna and my two daughters, Lotte and Stella, for their eternal patience and tolerance while I was physically present in our house, but mentally absent from our home during the time that my energy and full attention were claimed by the research of which the present thesis is the written testimony.

Contents

List of abbreviations and usages

CIG	chromatic interval (class) group
ic	interval class
mod	modulo
pc	pitch class
rev.	revision or revised
RHS	rhythmic-harmonic substructure
s.a.	without year indication (sine anno)

Forte numbers of pc-sets are written between square brackets (e.g. [6-14]).

Pitch class content of pc-sets is written with pitch class numbers between square brackets separated by commas (e.g. [0,1,2]).

Interval class sets are written as a list of digits separated by commas between round brackets (e.g. (1,3)).

Interval vectors are written as a string of 6 un-separated digits between round brackets (e.g. (013458)).

I opted to always quote in English, as is customary in English academic texts, even when the quoted source is originally written in another language. This constitutes a deviation from the LUCA-regulations, but, in my opinion, increases the legibility of the text for readers who do not master the source's original language. Whenever translated quotes occur in the text, the original version is added (in italics) in a footnote, with the exception of canonical quotes such as the one by Goethe in chapter 2.

The text features several neologisms (such as 'amotivic' and 'endophysical') that were necessary for want of existing vocabulary. All neologisms that are used as technical concepts are defined or explained at first occurrence in the text.

Introduction

The present thesis provides a description of my ongoing personal artistic search for an atonal, dissonant, and structurally amotivic sound idiom. The aim of this search is to develop a technique that enables me to compose music in a strictly atonal, dissonant and structurally amotivic idiom, and that would allow for melodic variety whilst preserving the abundant presence of central tones characteristic to my personal style. My initial research question, and the central research question of the present thesis, was to find out whether such a technique is possible. It resulted in the development of the technique I called Chromatic Interval Group Serialism (CIG-serialism) in 1997.

The first chapter of the thesis provides a description of the origin and the constituting elements of the technique of CIG-serialism. It places the technique in a historical (serial and post-serial) context and explains the three basic steps or phases in my compositional process: the construction of (1) the series, (2) the rhythmic harmonic substructure, and finally (3) the surface structure of the piece.

Artistic research unavoidably raises secondary questions on what artistic practice (creation or performance) is, and on what being an artist means. These questions are addressed in the second chapter, which reflects on the aesthetic ideas behind artistic practice in general. It introduces the concept of aesthetic universe of the artist and explains how artistic practice is the expression of ideas belonging to that aesthetic universe.

At first glance, it may appear that the first and second chapter are only vaguely related. There seems to be a gap between the technical explanations of the first chapter and the aesthetic ideas of the second. The first two chapters may therefore be perceived as unrelated storylines. A novel, too, may start with one story line and at a certain moment of its development suddenly start another, seemingly unrelated storyline, only to evolve to the fusion of the storylines at a later stage. This is what happens in Chapter 3. This chapter starts with some considerations about the distinction between technique, style, and idiom; three concepts that are not always used in a clearly distinct way. However, since the terms occur repeatedly as technical concepts in the present text, it seemed appropriate to define them clearly. Once these technical terms have been unambiguously defined, the link can be established between the technical aspects of CIG-serialism and the aesthetic idea of aesthetic universe, showing how my technique is the procedure necessary to express ideas belonging to the idiosyncratic part of my personal aesthetic universe.

Chapter 3 ends with a conclusion of the thesis and with further perspectives, referring to the fact that many of the ideas described are further developed in the doctoral research I have been carrying out since 2009 at the Orpheus Institute in Ghent and at the University of Leuven.

The thesis is followed by two appendices, containing an analysis of two of my compositions that are to illustrate the implementation of CIG-serialism: *Les racines du monde* for piano solo (1998), the first piece that used the then newly developed technique, and *Le sourire infini des ondes* for ensemble (2009), a more recent piece.

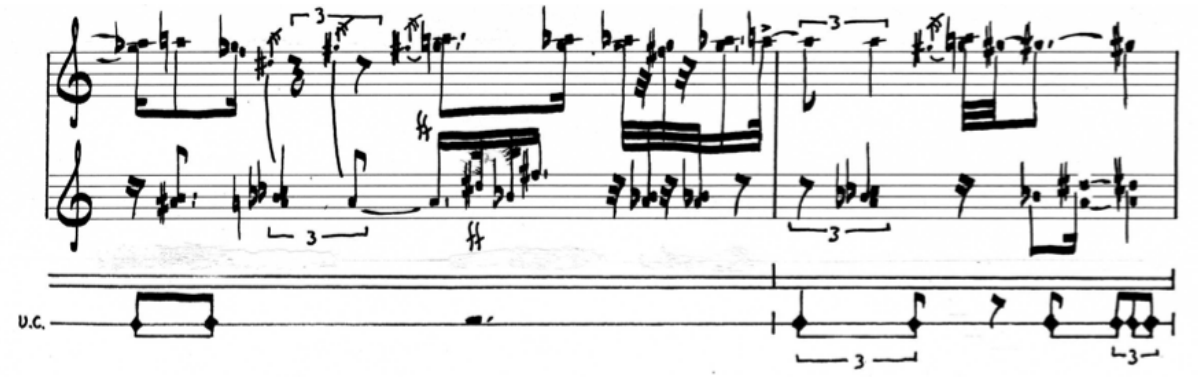
Chapter 1. 54-CIG serialism

1.1 Genesis of chromatic interval group serialism

1.1.1 Prehistory

In my compositions of the first half of the nineties I resolutely opted for a dissonant and atonal sound idiom. This resulted in compositions using predominantly interval class 1 (ic1) around one or several central tones, presuming that ic1 is the most dissonant interval.

Monodie for piano solo (1992; second version 1995) is a clear example of this (see Example 1.1). The whole piece is based on the central pitch class A in different registers of the piano. Around this central note or pitch class I constructed clusters of varying 'thickness'[1], the frequency of occurrence of which is based on a Gauss distribution (the thickest clusters being the least frequent). The clusters have an ornamental function[2], not a structural one; they ornament or embellish the central pitch class.



Example 1.1: bars 29 & 30 from *Monodie* for piano solo.

A similar procedure was used in *La couleur du vent* for flute solo (1996) (see Example 1.2). The two central pitch classes in this piece are C and F sharp. My concern at that time was how to justify the use of more than one central tone in order to be able to use more than just ic1. Which criteria can be applied to change from one central tone to the next if those central tones are not a semitone apart? Why go from C to F sharp (as in *La couleur du vent*) and not to F natural or G? How could I introduce intervals (or interval classes) that are less dissonant than ic1 or have stronger tonal connotations (like the cadential character of perfect fourths and fifths), if I want to obtain highly dissonant and atonal music? How could I obtain more melodic variety and still keep my music atonal and dissonant? These questions are the central research questions addressed in the present text.

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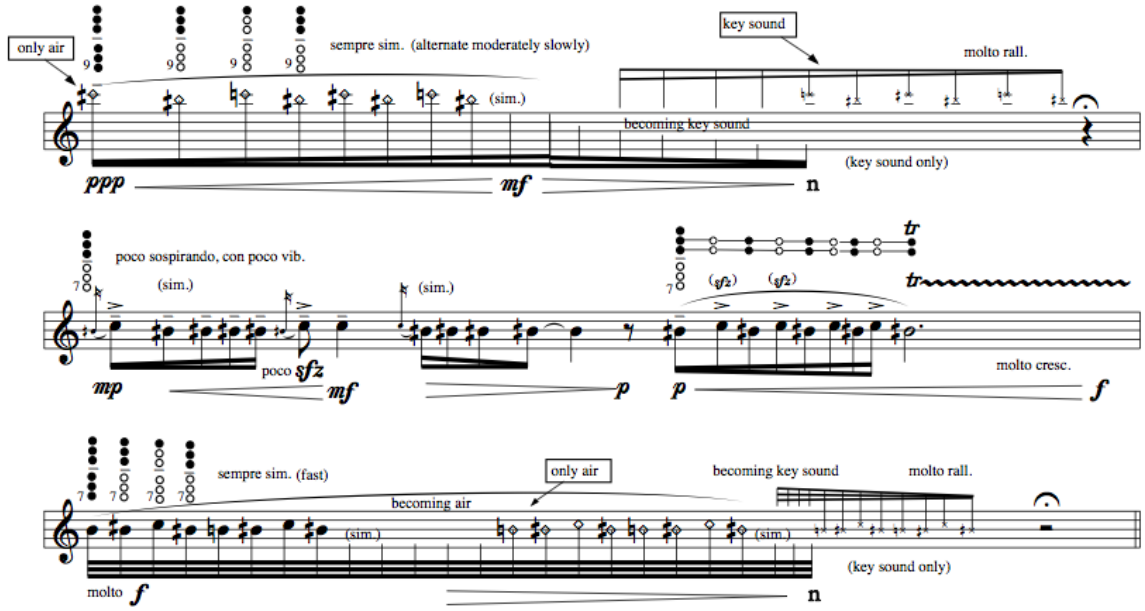
[1] The thickness of a cluster is the number of notes the cluster is made of. The term 'cluster around a pc' is here not used in the strict sense where not a single pc may be left out inside the cluster interval. In some clusters of *Monodie,* even the central pc (A) is absent, as can clearly be seen in the excerpt from Example 1.1.

[2] "The musical arabesque, or rather the idea of 'ornament', is the basis of all forms of art" *("l'arabesque musicale, ou plutôt le principe de 'l'ornement' est la base de tous les formes d'art"*) (Debussy, 1971, pp. 33-34) [my translation].



Example 1.2: Bars 1-3 from *La couleur du vent* for flute solo.

A first answer to the questions stated above was explored through the use of dodecaphonic series, for instance in *Tout près de l'eau* for mezzo-soprano and alto flute (1995). However, I was unsatisfied with this approach because of the discrepancy between the obtained idioms. The 'central-tone' approach yielded a sonic result that was too different from that of the traditional use of dodecaphonic techniques. The former had a more static, stable melodic and harmonic shape than the latter. This melodic and harmonic instability was not in accordance with my aesthetic preference and goals. A second objection to the technique of dodecaphony was the fact that dodecaphony does not necessarily result in atonal music. The explanation for this claim brings us back to the origins of dodecaphony.

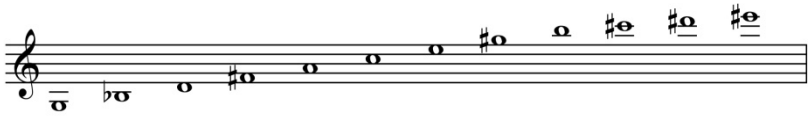
When Arnold Schoenberg developed the dodecaphonic technique in 1921-1922, he was looking for a way to organize music independently from the principles of tonality. René Leibowitz wrote in this respect:

> The twelve-tone technique is an essential discipline within atonality, an organization containing structural elements powerful enough to replace the tonal system.[3]

Schoenberg's pupil Alban Berg, however, showed in practice that, although dodecaphony may be an alternative for tonal thinking, it does not necessarily lead to atonal music. Boulez writes that "avoiding tonality"[4] (or as Leibowitz says: "the suspension of tonal functions"[5]) was Schoenberg's first aim, but if this is true, Schoenberg seems to have failed because it remains possible to compose music that is closely related to tonal music with the dodecaphonic technique, by using sets containing predominantly tonal elements—such as tonal triads, or diatonic scales—or as a result of the way in which the series are treated within the composition. Berg's *Violin Concerto* (1935) is a striking

[3] *"La technique de douze sons constitue au sein de 'l'atonalité' une discipline indispensable, une organisation contenant des éléments structurels suffisamment puissants pour remplacer ceux du système tonal »* (Leibowitz, 1949, p. 27).
[4] "*…la volonté première de Schönberg qui est "d'éviter" la tonalité"* (Boulez, 1966, p.16).
[5] *"…la suspension des fonctions tonales…"* (Leibowitz, 1949, p. 112).

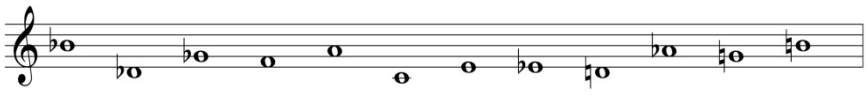
example: the series on which this concerto is based (see Example 1.3) contains several of the mentioned tonal elements.



Example 1.3: the series of Alban Berg's Violin Concerto.

Not only do the triads of g (minor triad, note 1-3), D (major, note 3-5), a (minor, note 5-7), and E (major, note 7-9) occur successively in this series, with a clearly perceived tonic-dominant relation between the triads of g and D, and between the triads of a and E, but on top of that, the first seven notes of the series constitute the complete set of notes of the ascending melodic minor scale of g. Similarly, notes 3 through 9 form the set of the ascending melodic minor scale of a. In addition, the last four notes belong to a whole tone scale that allows for the integration of the Bach Chorale *Es ist genug* from the cantata *O Ewigkeit, du Donnerwort* BWV60 (1723), which starts with this whole tone pattern. These elements constitute decisive reasons why Berg's violin concerto can be said to be closely related to tonality, although it is basically a dodecaphonic composition.

The *13th String Quartet* of Dmitri Shostakovitch (from 1969), as an example of tonal use of dodecaphony within a totally different idiom, is based on the series shown below (Example 1.4). The series is presented by the viola at the very beginning of the quartet.



Example 1.4: series of String Quartet N°13 by Dmitri Shostakovitch.

In the viola introduction, the series is played in groups of four notes. Because of the positioning of the G flat (note 3 in the series) just before F and because the way it is presented in the quartet, this G flat is perceived as an appoggiatura for F. Therefore, the first group of four notes is perceived as a minor triad (B flat, D flat, F) with appoggiatura or added sixth (G flat). In the same manner, the second group of four notes in the series can be perceived as a diminished triad (A, C, E flat) with appoggiatura E (or F flat, note 7 in the series) for E flat. When this second appoggiatura is left out of the picture, the remaining first seven notes (from note 1, B flat, to note 8, E flat) constitute the complete set of the key of B flat harmonic minor. Therefore, this series is closely related to the tonal system; a fact that is amply exploited by Shostakovitch. Not only does the series contain tonal elements—like the series of Alban Berg's violin concerto—but the free way in which Shostakovitch treats the material contained in the series in the elaboration of the string quartet—with his explicit predilection for tonal triads, consonance, and diatonicity—results in music that is much closer to the structural principals of classical tonality than to the system envisaged by Arnold Schoenberg.

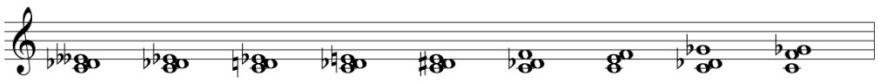
1.1.2 The atonal series

From the examples stated above it is clear that a dodecaphonic series does not automatically result in atonal music provided that it contains enough 'tonal elements'. George Perle calls those elements "non-dodecaphonic elements" (Perle, 1991, p. 78). He claims that a set "may be specially constructed to incorporate features not normally associated with the twelve-tone system" (Perle, 1991, p. 78). Atonal music can only be obtained if those elements are avoided in the construction of the series. In his book *Serial Composition* (1966), Reginald Smith Brindle describes the construction of what he calls 'atonal series'. An atonal series, he says, is "a series which maintains throughout the same degree

of atonality" (Smith Brindle, 1966, p. 12). Atonality is, according to him, a feature of "music which is not clearly organized by traditional systems, such as the modal system, or the major and minor key systems" (Smith Brindle, 1966, p. 12). To construct an atonal series, Smith Brindle claims, one has to eliminate the following elements in the series[6]:

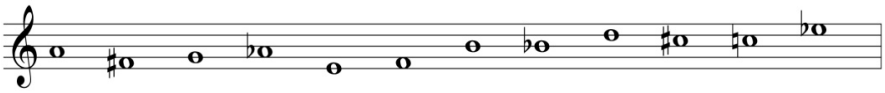
- Tonal triads
- Whole-tone relationships
- Successions of fourths (which produce a cadential effect)
- Chromatic chords (such as diminished seventh chords)

According to Smith Brindle, this can be done if a series is constructed exclusively with the notes of what I call **chromatic pitch class sets**[7] (chromatic pc-sets) of order 3. A chromatic pc-set of order 3 is a pc-set containing 3 pitch classes, at least two of which are ic1 apart.[8] There are only 9 of these chromatic pc-sets in prime form[9], as shown in Example 1.5 below:



Example 1.5: prime form of all chromatic pc-sets

According to Smith Brindle, every three successive notes in an atonal series should form a chromatic pc-set. He gives the example of Anton Webern's *Symphonie op. 21* (composed in 1928) to illustrate this idea. From his opus 17 on, the dodecaphonic series of Webern's works consisted mainly of chromatic pc-sets. The series of the *Symphonie op. 21* is entirely constructed with these pc-sets as is shown in Example 1.6. Every three successive pitch classes within the series (pc's 1 to 3, but also 2 to 4, 3 to 5, etc.) constitute a chromatic pc-set. The series of the Webern's *Symphonie op. 21* is therefore an atonal series according to Smith Brindle.



Example 1.6: Series of *Symphonie op. 21* by Anton Webern.

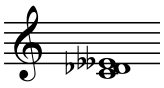
1.1.3 Construction of the series

Since it was my goal to develop a technique that would systematically result in atonal music, starting from the idea of Reginald Smith Brindle about the construction of atonal series, I looked for a way to construct series that, like those of Anton Webern's later works, only contained chromatic pc-sets of order 3.

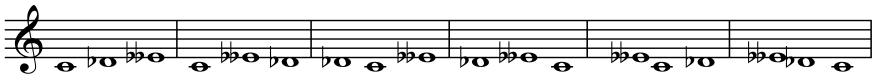
Each of the nine chromatic pc-sets can be turned into an ordered set in six ways (six permutations). I called those ordered sets **chromatic interval groups** (where 'group' stands for 'ordered set') or

[6] See Smith Brindle, 1966, p. 12.
[7] Smith Brindle uses the term "note-groups of a chromatic nature" and "'atonal' note groupings" (Smith Brindle, 1966, p. 12).
[8] The first value in the interval vector of a chromatic pc set of order 3 is at least "1". (The "'interval vector' of a pc set is an ordered 6-tuple of the multiplicities of intervals [interval classes] 1, 2, 3, 4, 5, 6 in that order" (John Rahn, 1980, p. 100). It indicates how many times each of the six interval classes occurs in the pc set).
[9] The chromatic pc sets have Forte numbers [3-1] through [3-5]. The prime form of a pc-set is its standard representation. It is the most compact form of the set with pc 0 (pitch class C) as its base. For more details: see a.o. Allen Forte, 1973, pp. 3-5, and Joseph N. Strauss, 2005, pp. 57-59.

CIG's.[10] Example 1.7b shows the six CIG's that can be obtained by ordering the notes of the chromatic pc-set with Forte name [3-1] shown in Example 1.7a.

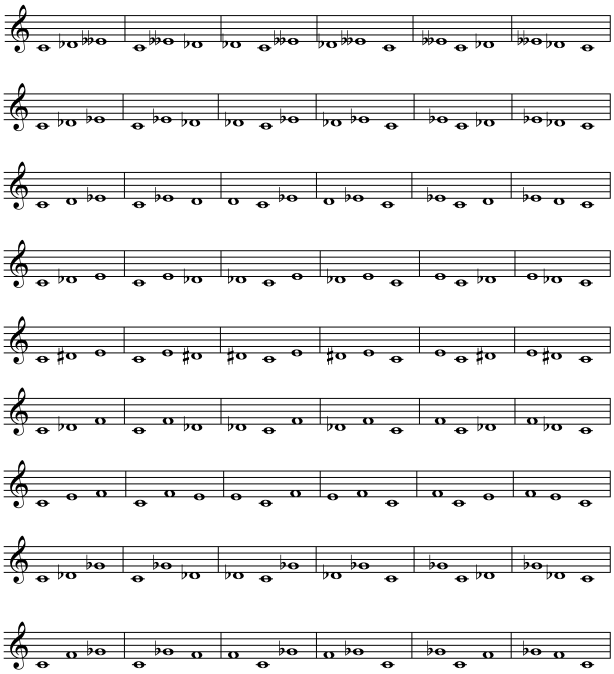


Example 1.7a: chromatic pc-set [3-1]



Example 1.7b: 6 permutations of chromatic pc-set [3-1]

The 54 possible CIG's resulting from the six permutations of each of the nine chromatic pc-sets are shown in prime form in Example 1.8 below[11]:



Example 1.8: all 54 CIG's (chromatic interval groups).

1.1.4 Dissonance and Amotivity

The minor second (ic1) is the most frequent interval class between consecutive series notes in atonal series. The series of Webern's String Quartet, for instance, contains six minor seconds. And when two consecutive notes of the series are not ic1 apart, the interval class between one of these notes and the next note in the series is necessarily ic1. Ic1 is therefore predominant in atonal series (consisting entirely of CIG's). Assuming that ic1 is the most dissonant interval—the interval with the highest

[10] The idea of CIG is in the present context restricted to CIG's or order 3 (CIG's with three pitch classes). After the assessment of CIG-serialism in my doctoral research, it became necessary to specify the order of the CIG, since there appeared to be CIG's of higher order as well. In the present context, however, only CIG's of order 3 (or CIG-3), permutations of chromatic pc-sets of order 3, have to be taken into consideration.

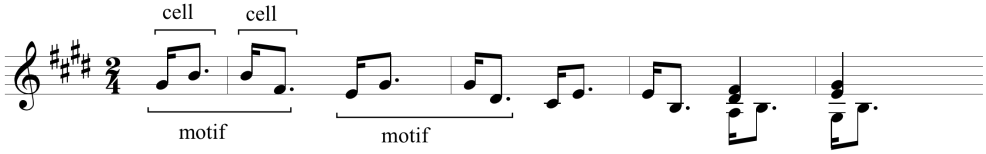
[11] In example 1.8, The CIG's are represented in their prime form (with pc C as their base). We will see that—since intervals are what counts in CIG's and not pc's—all CIG's may appear in any transposition.

degree of dissonance, as Smith Brindle calls it (Smith Brindle, 1966, p. 36)[12]—atonal series easily allow for the most dissonant sound combinations, and thus yield the most dissonant music. A compositional technique based on series that are constructed exclusively with CIG's therefore seems to be appropriate to accomplish my aesthetic goal of atonal and dissonant music.

The dodecaphonic technique—even when restricted to the use of atonal series—didn't seem to be sufficient for my purpose, however, because it provides no solution to my concern about the justification of melodic intervals other than ic1. By constructing an atonal dodecaphonic series, I had to choose ten CIG's from the complete set of 54 possible CIG's. This raised the question: Why would I choose certain CIG's and leave out all the others? I felt the need for criteria to justify this choice. If, furthermore, I would use a particular CIG more than once in a series, its importance would increase. It would become a structural melodic motive in the series.

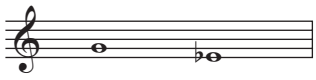
Grove's Dictionary defines a **melodic motive** as "the shortest subdivision of a [melodic] theme or phrase that still maintains its identity as an idea"[13]. It is the smallest group of notes that allows for recognition or identification of or within a piece. Echoing Schoenberg, Anton Webern calls a motive "the smallest independent particle of a musical idea" (Anton Webern, 1963, p. 25)[14] that is recognized because it is repeated.

The smallest possible melodic motive consists of three pitch classes, at least two of which are instances of different pitch classes. A melodic cell that contains only two pitch classes is a melodic interval, which is too small and too common to characterize a piece. Grove's Dictionary states the opening theme of Beethoven's *Sonata in E* op. 109 as a case. In this example, a whole bar can be said to constitute a motive, rather than the recurring pattern of note pairs, "since [only] the two pairs of notes together form an identifiable contour; the two-note members might then be called 'cells'"[15], as shown in Example 1.9.



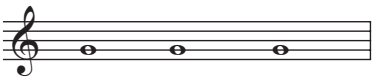
Example 1.9: Opening theme of Beethoven's *Sonata in E* op.109
(source: Grove Music online)

A melodic figure containing three times the same pc is not considered to be a motive either, since it lacks 'identity as an idea' (it is insufficient to allow for identification of a piece). In the example below, cells containing two pc's (Example 1.10a) or three identical pitch classes only (Example 1.10b) cannot be considered as characteristic for a piece. They are not motives. Example 1.10c, on the other hand, is a genuine melodic motive (containing 4 pc's, and two different ones, G and E flat) since the piece it is taken from can easily be identified by it.

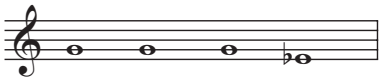


Example 1.10a: interval.

[12] Smith Brindle arranges harmonic intervals according to their degree of consonance from strong consonances to harsh dissonances. In his classification ic5 is the strongest consonance. Then follow in order: ic4, ic3, ic6 (which he calls "neutral"), ic2 and ic1 (which , according to him, has the highest degree of dissonance) (Smith Brindle, 1966, p. 35-36).
[13] Drabkin, W. (s.d.). Motif, in *Grove Music online.* Grove's Dictionary uses the spelling 'motif'. I prefer the alternative spelling 'motive' which will exclusively be used in the present text, except as part of a quote.
[14] Quoted in Straus, 1990, p. 39, and in Campbell, 2010, p. 157.
[15] William Drabkin (s.d.), *Motif*, in *Grove Music online*,



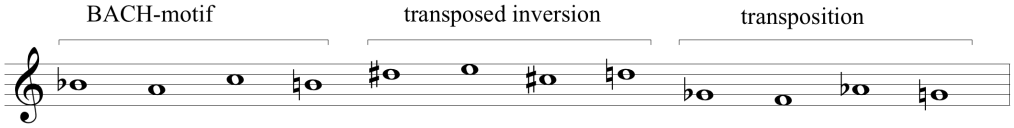
Example 1.10b: three identical pc's in a melodic cell.



Example 1.10c: melodic motive from Ludwig van Beethoven's *Fifth Symphony*.

If one would want to write strictly amotivic music, one would have to avoid the repetition of every possible melodic motive, even the smallest one consisting of three pc's that are not all identical. This would limit the number of notes a composition can contain to 1718,[16] not counting notes immediately repeated more than twice (the melodic motive from Ludwig van Beethoven's *Fifth Symphony* in Example 1.10c, for instance, counts for three notes only: two G's and the E flat). This is of course a purely theoretical consideration, because in practice, a group of notes is neither perceived nor considered as a motive unless its repetition and its function as an 'identifiable contour' can be perceived, that is, if it 'maintains its identity as an idea'. Even in 'motivic' (or thematic) composition not every succession of three notes is perceived or considered as a melodic motive. Only those note groups that have been conceived and can be recognized as motives are considered as such.

I call motives that result from the way series are *structured* **structural motives**. Dodecaphonic series, even atonal ones, may contain structural motives. "Indeed in Webern's own typical use of the row in either three- or four-note self-referential partitions, the 'motive' is the substrate of the 'theme'" (Dunsby, 2002, p. 910). The 'theme' refers here to the undeniable "'thematic' […sense of the dodecaphonic approach…], characterized by an ordered series of intervals" (Dunsby, 2002, p. 910). The atonal series of Webern's *String Quartet op. 28*, for instance, is based on the well-known BACH-motive. This melodic motive is followed by its transposed inversion and transposition, resulting in the motivic series in Example 1.11.



Example 1.11: series of Anton Webern's *String Quartet op.28*, a case of a motivic series.

[16] Counting an ordered pc-set of order 3 with at least two different pc's as a motive, there are 1716 possible (smallest) motives. This is calculated as follows: Let {0,1,2,3,4,5,6,7,8,9,10,11} be the set of all pc's. It is divided in ordered sets of order 3 containing at least two different pc's (hereafter called motives). There are 12 possibilities for the pc in the first position of the motives: [0 . .] through [11 . .] (the dots indicate open positions in the motives).
To fill in the second position of the motives, two distinct cases have to be considered:
a) For each of those possibilities, the second pc can be the same as the first only in one way: [0 0 .] through [11 11 .]
The third position can be filled in eleven ways for each of those motives (only the pc in position 1 and 2 is excluded).
In total, there are 12 x 11 = 132 possible motives.
b) Added to this are the motives in which the second pc is different from the first. This is possible in 12 x 11 = 132 ways (variations of 12 elements in 2 positions). In each of those motives, the third pc can be any of the 12 pc's. In total 12 x 11 x 12 = 1584 possible motives.
Adding the number of motives in a and b, there are 132 + 1584 = 1716 possible smallest melodic motives.
Since strictly speaking (and in theory only), any three successive notes in a piece (discarding notes repeated more than twice) can be considered to form a 'smallest motive', the number of notes in an amotivic piece (again not counting notes repeated more than twice) is limited to 1718 (notes 1 through 3 are the first smallest motive, note 2 through 4 the next, note 3 through 5 the next, and so on. The 1716th and last possible smallest motive contains notes 1716, 1717 and 1718 of the piece. A 1719th note would repeat a smallest motive between notes 1717, 1718 and 1719).

An atonal dodecaphonic series can easily be made strictly amotivic. In order to do this, not even the smallest possible motive—a three note CIG—should occur more than once in the series, as is the case in the series of Webern's *Symphonie* op. 21 but not in the series of his *String Quartet* op.28. Transpositions of a CIG are also to be excluded. Notes 9 through 11 in Webern's *String Quartet* are a transposition of the CIG formed by notes 1 through 3. Therefore, the series is not amotivic.

One may object that strict amotivity is only possible if the three transformations (inversion, retrograde and retrograde-inversion) of each CIG (what George Perle calls the "basic cell" (Perle, 1991, pp. 9-10)) are excluded. I take this restriction into consideration in the next paragraph.[17] Note also that although a series may be amotivic, the music that results from it may contain melodic motives, depending on the compositional approach of the composer. These motives may be structurally planned, but they may also be the result of contingency, much like clouds that may resemble existing objects to us without being conceived that way.

Amotivity of a dodecaphonic series alone doesn't solve the problem of the justification of melodic intervals, however. It provides no criterion of choice. It leaves the question why to choose 10 particular CIG's and leave out all the others unanswered. By including every possible CIG in a series —which is then no longer a dodecaphonic series, of course—one not only avoids certain CIG's (the ones in the series) to be more important than others (the ones left out), but one avoids the problem of choice altogether. It also provides a justification to include the transformations of CIG's mentioned above.

Finally, in order not to distinguish between the first and last CIG in the series on the one hand, and the other ones in between on the other, I determined that the series of my technique should be 'closed'. This means they have a ring structure, they bite their own tail, the last notes of the series form a CIG (one that does not occur elsewhere in the series) together with the first notes (notes 53, 54 with note 1, and note 54 with notes 1 and 2).

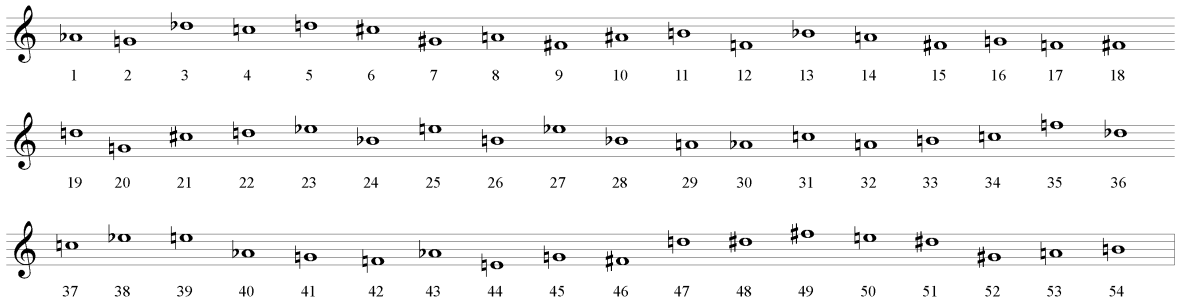
My search for a technique that allowed for an atonal, dissonant, and (structurally) amotivic idiom, and that solved the problem of melodic interval justification, thus resulted in 1997 in the construction of **54-CIG series**, or **CIG-series** in short. I named the technique based on these series **chromatic interval group serialism**, or **CIG-serialism**.

To sum up, the features of a CIG series are:

- It consists exclusively of CIG's, regardless of transposition (making it atonal and dissonant).
- Every CIG occurs exactly once (making the series structurally amotivic).
- The series is 'closed'.

An example of a 54-CIG series is shown below (Example 1.12). It is the series of my piece *Comme un flocon de neige* for flute and ensemble (2007). As can be seen, notes 1 to 3 in this series constitute a CIG. Notes 2 to 4 are different CIG. Notes 3 to 5 another one that did not occur before, and so on until the end of the series (notes 52 to 54). Notes 53-54-1 and 54-1-2 constitute the two remaining CIG's that did not occur in the series before.

[17] Contour transformation is also not taken into consideration, since it has no structural function in the construction of the series. On contour transformation see Pearsall & Schaffer, 2005, pp. 57-80.

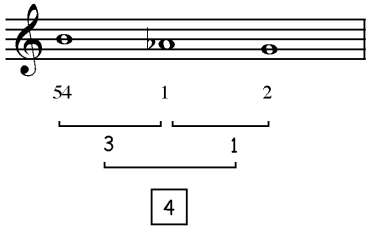


Example 1.12: series of *Comme un flocon de neige*

1.1.5 Constructing a rhythmic-harmonic substructure

According to the assumptions made by Reginald Smith Brindle about the construction of atonal series, and assuming that ic1 is the most dissonant interval, the CIG-series should be an adequate basis for my aspiration to compose atonal and dissonant music that allows for a justification of musical intervals different from ic1. To preserve my personal idiom of non-tonal central pitch classes that characterised my compositions before 1997, I worked out a system that turns the series into a frame of rhythmic cells attached to every note of the series. I called this frame the **rhythmic-harmonic substructure** (hereafter called **RHS**) of the piece. The repeated pitch classes within a rhythmic cell allow for central pitch classes. The RHS provides an intermediate step between series and score in the process of composition. The procedure of transformation from series to RHS is tailor-made for every piece, but always based on the interval class content of the series. The interval class content of a series is the number information provided by the interval classes between the pitch classes in the series.

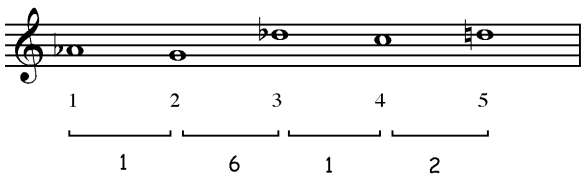
Example 1.13a below shows the unordered interval classes[18] between notes 54 and 1 (unordered ic 3), and between notes 1 and 2 (unordered ic 1) of the series of my piece *Comme un flocon de neige* for flute and ensemble (from 2007).[19] Example 1.13b shows the unordered interval class content between the first five notes of the same series.



Example 1.13a: Notes 54-1-2 with interval class content of *Comme un flocon de neige*.

[18] An ordered interval class is the number of semitones between two pitch classes, taking into account the direction of the interval (whether the interval class is ascending or descending, indicated by a + or - sign respectively (e.g. an ascending ic1 has value +1, a descending ic1 has value -1)). An unordered interval class is the absolute value of the ordered interval class (e.g. 1 for both ascending and descending ic1). Note that Joseph Straus doesn't distinguish between ordered and unordered interval classes, although he does so between ordered and unordered pitch intervals and pitch-class intervals. See Strauss, 2005, pp. 8-11.

[19] An extended example of how the RHS of *Le sourire infini des ondes* for ensemble was constructed is given in the description of artistic output in Appendix 2.



Example 1.13b: First 5 notes with interval class content of *Comme un flocon de neige*.

As a first step in the construction of a RHS, I determined the number of note lengths in the rhythmic cells attached to every note in the RHS. In the case of *Comme un flocon de neige*, this was done by adding the unordered interval class content of the intervals just before and just after the series note in question. Note 1 of the series of *Comme un flocon de neige* (A flat) is 'preceded'[20] by note 54 (B) and followed by note 2 (G). The unordered interval class content of the interval between note 54 and 1 (B and A flat) is 3 semitones, and between note 1 and 2 (A flat and G) 1 semitone.[21] Adding up interval class contents results in 4. The number of note lengths for the rhythmic cell attached to note 1 in the series is therefore 4. The same procedure is applied to the whole series (note 2 and 3: 7 note lengths, note 4: 3 note lengths, etc. as can be deduced from example 1.13b).

To determine the duration (note length) of every note in the rhythmic cell, as the second step in the construction of a RHS, other formulas based on the interval class content of the series are used. In the case of *Comme un flocon de neige,* the durations were determined as follows: for note 1—which has a rhythmic cell with 4 notes, as we have just seen—the first 4 values in the series of unordered interval class content starting at the interval to the right of note 1 are used (see example 1.13b). Those values are:

1 6 1 2

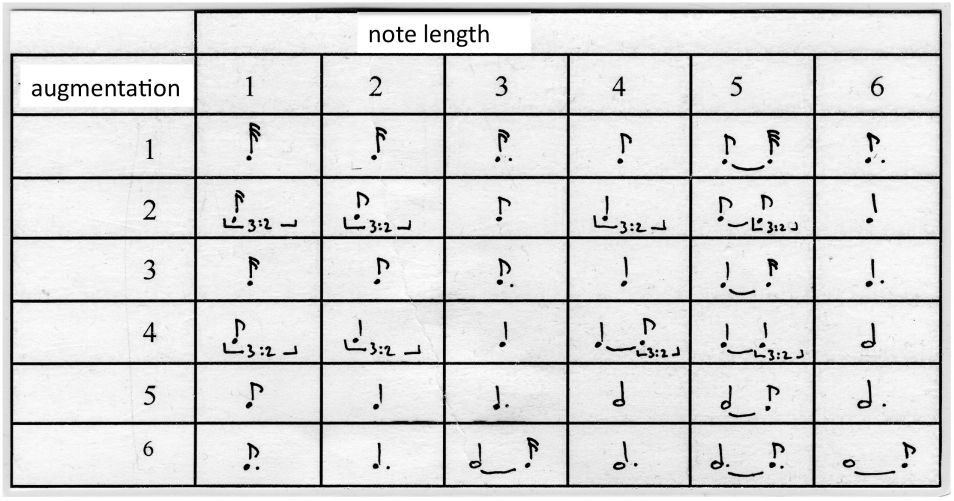
The values for note 2 start from the next value in the series (the interval class between note 5 and 6) and continue to the right, etc. When the end of the series of ordered interval classes is reached, the series starts over from the beginning. Again, as is the case for the series, there is no real beginning or end to the series of interval class content.

To attach note lengths to the strings of numerical values thus obtained, first a 'length unit' or 'augmentation' is determined for every note of the series. This **augmentation** is the note length corresponding to note length value 1, the length unit, varying between demi-semiquaver and dotted quaver, as indicated in the column under "1" in the rhythm chart below (Example 1.14). I could change this rhythm chart for every piece (adding quintuplets for instance), but to date I did not feel the need for this change, so I used the same rhythmic chart for all my pieces since 1997, with the exception of the first piece written with the CIG-technique (*Les racines du monde* for piano (1998)) as is explained in the analysis of the piano piece in Appendix 1.

[20] Since a CIG-series is closed, it has no real first or last note. Any note in the series can be the first. Therefore the first note can be said to be preceded by the last note of the series.

[21] In the case of *Comme un flocon de neige,* unordered interval classes are used. This means the direction of the interval (up (+) or down (-)) is not taken into account in the construction of the RHS. In other pieces, such as *A l'image du monde…originel* (2012), the direction of (ordered) interval classes is relevant.

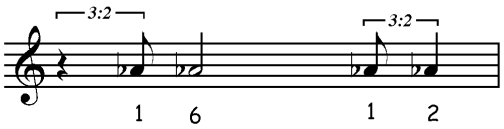
rhythm chart



Example 1.14: rhythm chart used to determine note lengths in the rhythmic cells of a RHS.

In the case of *Comme un flocon de neige*[22], the value used for augmentations is the same as the value for the number of notes in the rhythmic cell (modulo 6)[23]. The rhythmic cell of note 1 has therefore augmentation 4 (3 + 1); note 2 and 3 have augmentation 1 (7 = 1 (mod6)), etc.

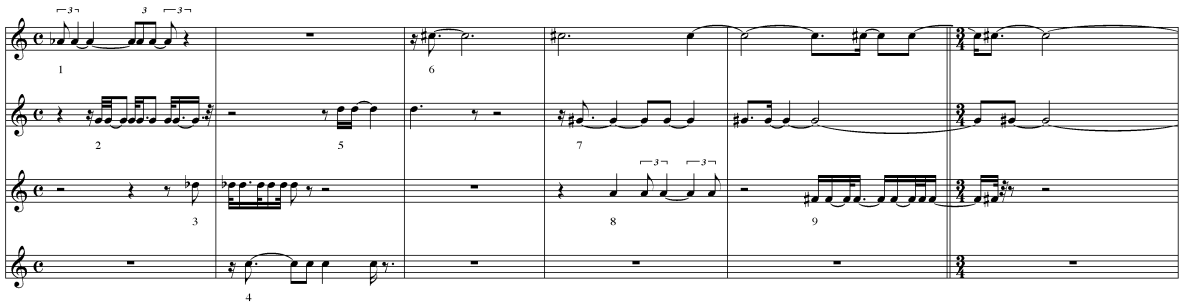
Knowing that the rhythmic cell of note 1 contains four note lengths (1, 6, 1 and 2) in augmentation 4 (1= triplet quaver, 2 = triplet crotchet, etc.) the rhythmic cell for note 1 is as shown in Example 1.15:



Example 1.15: rhythmic cell for note 1 of the series of *Comme un flocon de neige.*

After determining rhythmic cells for all series notes this way, the cells are placed in a metric frame, the RHS of the piece. This can also be done according to strict formulas (as is done in *Es träumte mir...* for for 6-part male choir (from 1998), in the string trio *Etoiles peintes* (2000) and in other pieces,[24] but in the case of *Comme un flocon de neige, Les racines du monde,* and several other of my compositions, this was done freely, aiming at a balanced rhythmic structure. The first 6 bars of the RHS of *Comme un flocon de neige* are shown in Example 1.16.

[22] For other pieces, other formulas may be applied.
[23] Since there are only six augmentations, values higher than 6 are 'reduced' to lower values modulo 6 (7 becomes 1, 8 becomes 2, …, 13 is again 'reduced' to 1, 14 to 2, …).
[24] For an example of systematic distribution of rhythmic cells in the RHS, see the analysis of *Le sourire infini des ondes* in Appendix 2.

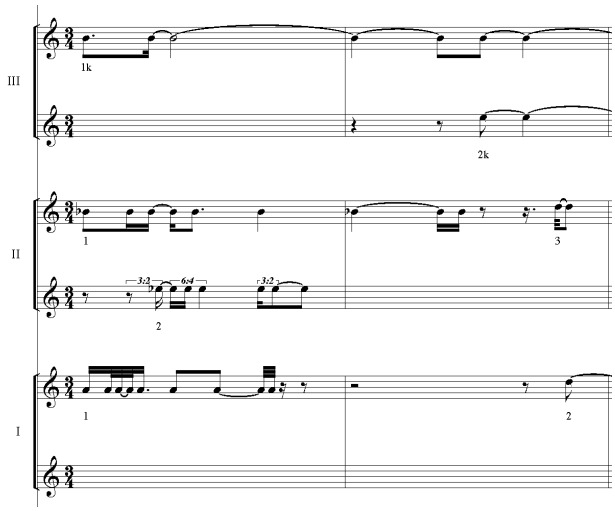


Example 1.16: bar 1-6 of the RHS of *Comme un flocon de neige*.

1.1.6 Turning the rhythmic-harmonic substructure into a surface structure

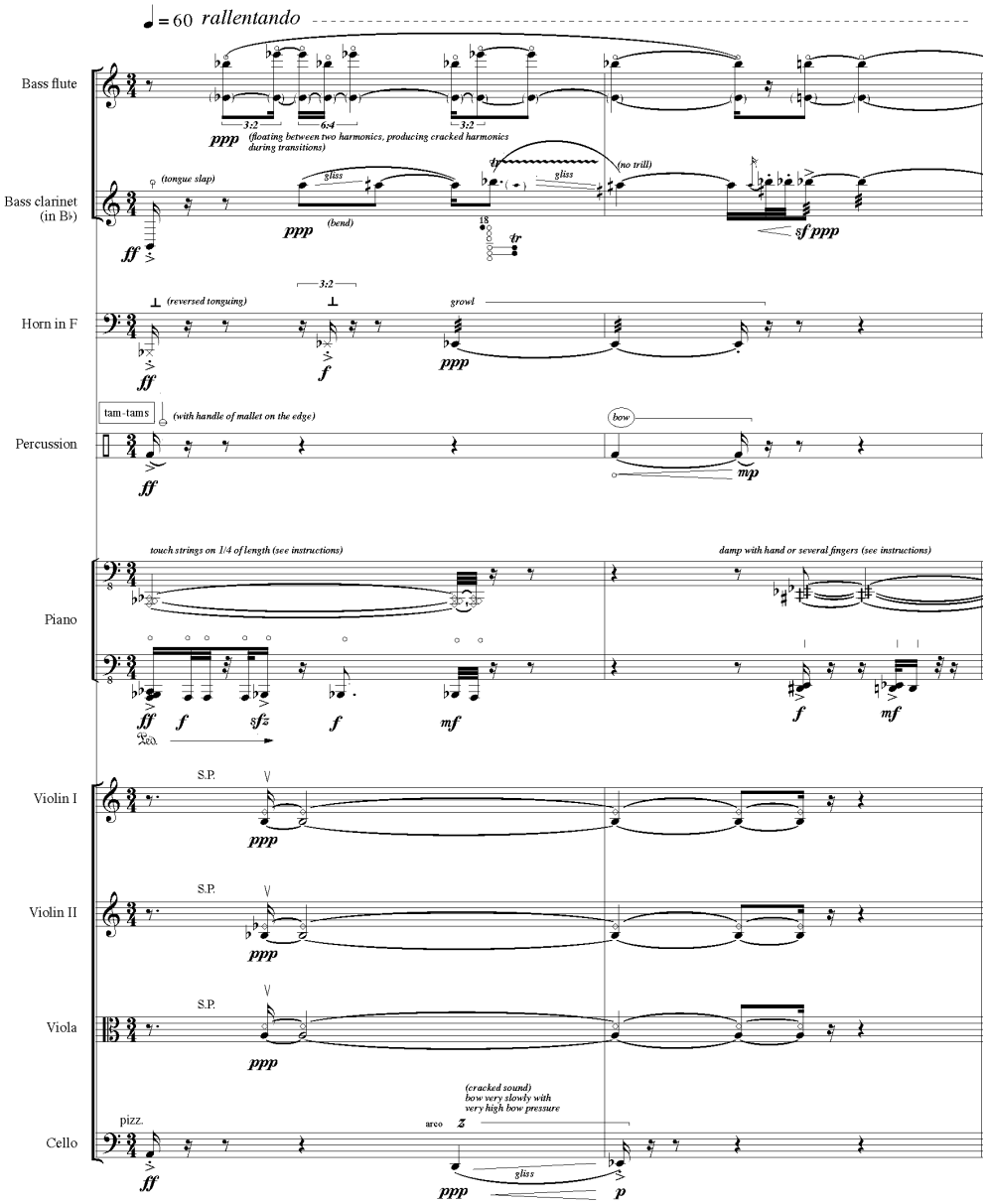
Once the RHS of a piece is determined, the composition of the final score can begin, turning the RHS into the surface structure of the piece. In this process, artistic creativity is more important than structural strictness and rigor. Still this process is performed according to some well-determined rules: Every note appearing in the RHS should also appear in the score at the corresponding place in the RHS. The first note of *Comme un flocon de neige*, for instance, should be an A flat, since it is the first note in the RHS. The instrumentation, pitch, instrumental technique, etc. used are usually under the composer's control however (but not necessarily, as in the case of the cantata *Close my willing eyes* for three sopranos and ensemble (from 1999)).

Example 1.17a shows the first two bars of the RHS of *Le sourire infini des ondes* for ensemble (2009). The RHS contains three transpositions of the same form of the series (I, II and III) a semi-tone apart, with different rhythmic cells attached to them.[25] Example 1.17b shows the score generated from the RHS for the same two bars.



Example 1.17a: first 2 bars of the RHS of *Le sourire infini des ondes* for ensemble.

[25] A detailed analysis of this piece is given in Appendix 2 of the present thesis.

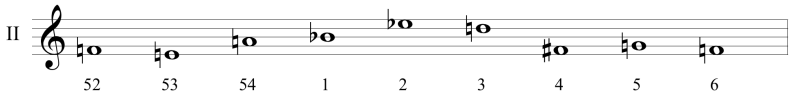


Example 1.17b: bars 1 & 2 of the score (in C) of *Le sourire infini des ondes* for ensemble.

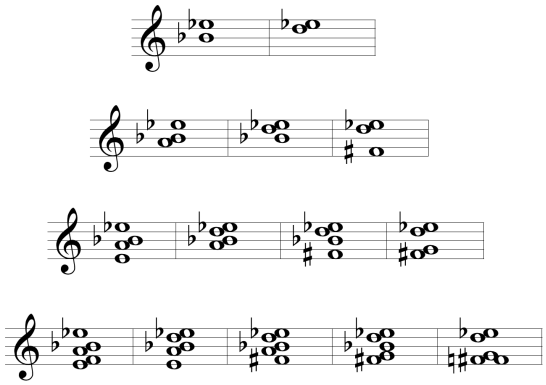
The RHS starts with three notes: B, B flat and A. Those pitch classes also occur on the first beat of the score (B is played by the bass clarinet, B flat by the horn, and A by the cello, and all three pitch classes occur in the piano part).

An additional 'chord rule' is used to construct chords on any series note at any given moment in a piece. The rule states that series notes in a RHS can be accompanied by the series note that immediately precedes and/or follows it (the neighbouring notes in the series). In some pieces this rule is extended: if a neighbouring note occurs in the chord, the next or previous note in the series may also be used, and so on. This way, chords are build that consist entirely of notes belonging to the CIG's, thus preserving the alleged high degrees of atonality and dissonance. The range of extension of the chords varies from piece to piece or from section to section within a piece according to the desired complexity of texture. Chord notes can also be used as grace notes preceding the RHS notes. Abundant grace notes have always been part of my style and idiom.

Examples 1.17a and b above and 1.18 a and b below illustrate the procedure of chord formation according to the chord rule. The third beat of the RHS of *Le sourire infini des ondes* starts with B flat and E flat. In the score, the bass flute and piano play B flat and the horn plays E flat on this third beat. But there is also a D in the cello, which does not occur in the RHS at that moment. This D is the third note in version II of the series (the one starting on B flat) in the RHS, and a neighbouring note of E flat in the series (the note following E flat). The addition of D turns the consonant interval B flat – E flat in the RHS into a (dissonant) CIG of order 3. Example 1.18a shows the eight notes surrounding note 2 (E flat) in version II of the series of *Le sourire infini des ondes*. Example 1.18b shows all the possible chords that can be constructed on this note containing two to five pitch classes based on the chord rule described above. Whether a series note is extended into a chord, and which chord, is determined by me. This way I, as a composer, have extra control over the texture and dissonance of the piece at all times.

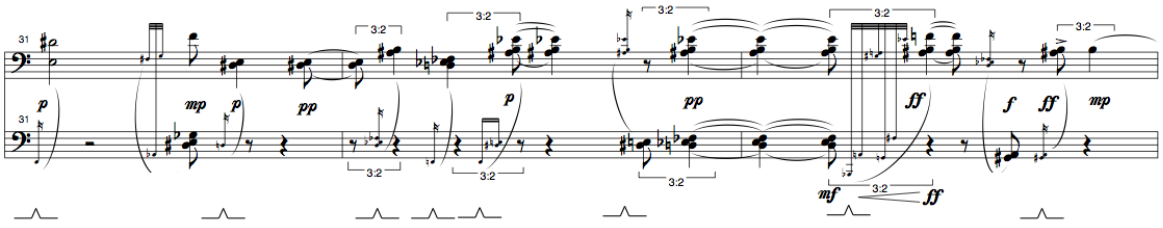


Example 1.18a: eight notes surrounding note 2 (E flat)
in the second transposition of the series of *Le sourire infini des ondes.*



Example 1.18b: possible chords up to five pc's on note 2
in the second transposition of the series of *Le sourire infini des ondes.*

If we compare the excerpt from *Les racines du monde* (1997) in Example 1.19 below with the excerpt from *Monodie* in Example 1.1, it is clear that, although the pieces are written with a different technique, they belong to a similar sound idiom characterized by its ornamented central tone(s), but, whereas *Monodie* was completely composed around pitch class A, there is more pitch variation in *Les racines du monde*, as was the goal of the development of CIG-serialism.



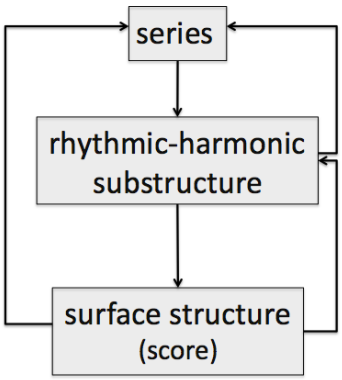
Example 1.19: bars 31 to 33 from *Les racines du monde* for piano solo.

As a final remark, a parallel may be drawn between the levels of series, rhythmic-harmonic substructure, and score in my CIG-serial technique on the one hand and Schenker's idea of strata[26] or structural levels[27] on the other. The series would then correspond to Schenker's "background" the rhythmic-harmonic substructure to his "middleground" and the score to the idea of "foreground".[28]

1.2 Teleology and mutations

As we have seen, the series lies at the basis of the construction of the RHS, which, in turn, provides material for the score. The processes involved happen, as was discussed, according to strictly determined rules as well as on the basis of free artistic choice and intuition. In both cases, the series contains the basic information for the construction of my pieces. It can therefore be compared to the genetic material of living organisms, which contains the necessary information for the 'construction' of the living organisms. The series provides the 'genotype' of a piece; the score is the 'phenotype'. Strict transformative formulas in combination with artistic choice rule the compositional processes of CIG-serialism; physico-chemical laws determine the processes involved in biological processes.

There is an important difference between the processes of CIG-serial composition and genetic biology however. Contrary to biologic evolution, CIG-serialism is a teleological process. This means that every step in the process can be influenced by the envisaged goal. Even before the construction of series, I have an idea in mind of how the piece is going to sound (this sound idea is usually the initialising step in the composition process). The construction of the series can therefore depend on the envisaged result. During the compositional process, at all moments, there is a possibility of feedback between the construction of series, RHS and score, in order to obtain the envisaged sonic and narrative result. The envisaged result may influence the preceding steps in the process. The envisaged RHS may influence the construction of the series or the formulas from the transformation of the series into the RHS; the envisaged surface structure influences the construction of series and RHS and the transformational rules. The arrows in Example 1.20 show the different processes of CIG-serialism. The ascending arrows indicated the transformational feedback processes.

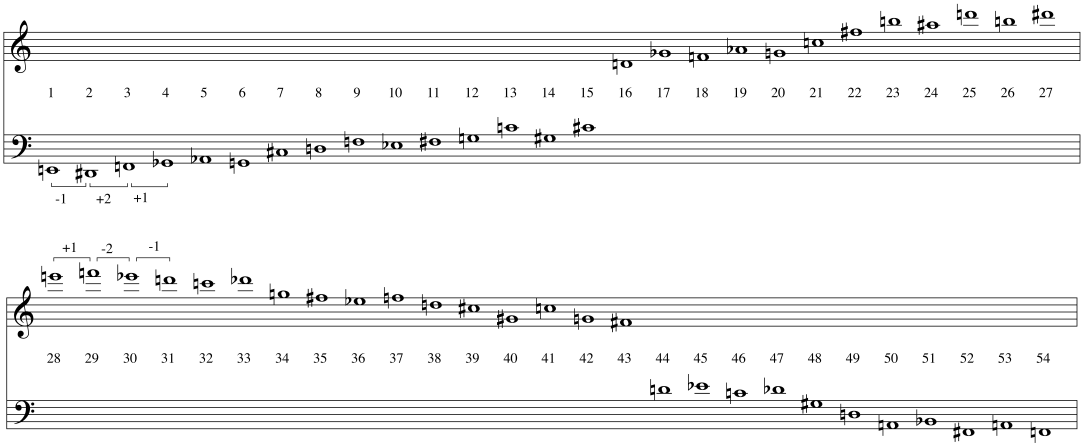


Example 1.20: transformational processes in CIG-serialism.

Let us have a look at the construction of the series of *Après la pluie* for piano and live electronics (2008), as an example of these feedback processes. In this piece, the sound of the piano is manipulated by live electronics. The level of manipulation evolves during the nine sections of the piece, gradually increasing until section 5, and then decreasing until almost no manipulation in the final section

[26] See Jonas, 1954, p. XXII.
[27] See Forte & Gilbert, 1982, p. 131.
[28] The background (*Hintergrund*) constitutes "the contents of a tonal work at the most basic level [represented by the *Ursatz* that] gives rise to more elaborate harmonic-contrapuntal designs. These in turn generate further development, in stages, until the final elaboration is reached, which is the piece itself with all its details of rhythm and tempo, dynamics and articulation, and scoring. This level is called the *foreground* of a composition (*Vordergrund*). Between the extremities of background and foreground lies the *middleground* (*Mittelgrund*), an area whose scope and complexity is dependent on the size and nature of the composition" (Drabkin, 2002, p. 819).

(section 9) of the piece. In order to obtain numerical values that make this arc shape of manipulations possible, I constructed a series that has an arc shape, in which all net rising CIG's occur in the first half and net descending CIG's in the second half. A net rising CIG is a CIG in which the sum of the two ordered interval classes it contains is positive. The first CIG in the series, for instance, constitutes of ordered ic's -1 an +2 (see Example 1.21). The sum of these ordered interval classes is +1, a positive number. The first CIG is therefore a net rising CIG. The second half of the series was constructed as the inversion of the first half, which automatically lead to the desired result (the arc shape of the series) as can be seen in Example 1.21. Also the smallest numerical values occur at the beginning of the series, gradually increasing towards the end of the first half of the series (note 27).



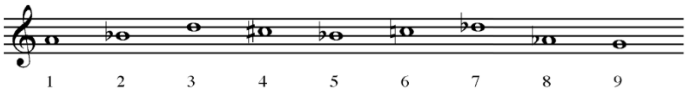
Example 1.21: series of *Après la pluie* for piano and live electronics.

At all times during the compositional process, I can decide whether I want to abide strictly by the self imposed rules or make free adaptations. Since I see the series as the genetic material of my compositions[29], I call the free (sometimes random but mostly deliberate) deviations from the rules **mutations**. In the biological processes of construction of new genetic material—the recombination of existing material in sexual reproduction—as well as in its transformation, random mistakes occur (which are the driving power behind the process of evolution). In the processes of my compositional practice, mutations can appear at all levels: in the implementation of the series, in the construction of the RHS, and in the composition of the score. They are mostly the result of artistic considerations, not mere chance (random mistakes), as is the case in biological mutations[30]. In this respect artistic creation differs from biology: artistic mutations can be teleological.

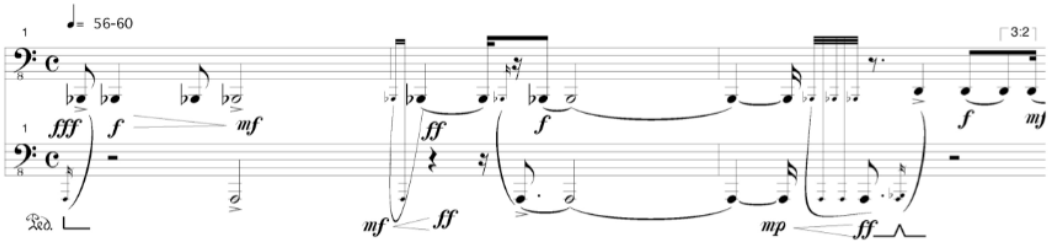
The example below shows a mutation in *Les racines du monde* for piano solo at the level of RHS construction. In this piece, the position of every rhythmic cell in the RHS was not determined by a formula, but was the result of my creative search for rhythmic balance. Whenever it seemed appropriate, I changed the order of rhythmic cells in the RHS; this means a rhythmic cell of a series note could start before the rhythmic cell of the previous series note in the RHS. Example 1.22 a shows the first nine notes of the series of *Les racines du monde*. Example 1.22 b shows the opening bars of the score of that piece. As can clearly be seen, the first rhythmic cell appearing in the score is the cell of the second series note (B flat in the right hand part). The rhythmic cell of note 1 (A) only starts in the second bar of the piece (left hand part).

[29] Arnold Schoenberg too "liked to call [the relationship of material at all levels] 'subcutaneous'—that is, more than skin-deep—but in fact it is positively molecular. The note-row is, so to speak, the DNA molecule of twelve-tone music: the agent which stamps every bar, every theme, every chord, as belonging to a single, unique work." (MacDonald, *2*008, p. 142).

[30] I restrict the meaning of 'biological mutations' to non-artificial biological mutations in the present context. I am leaving artificial mutations (as they are produced in genetic manipulation) out of the picture here, although there are striking similarities between the processes of genetic control in my approach to CIG-serialism and genetic manipulation.



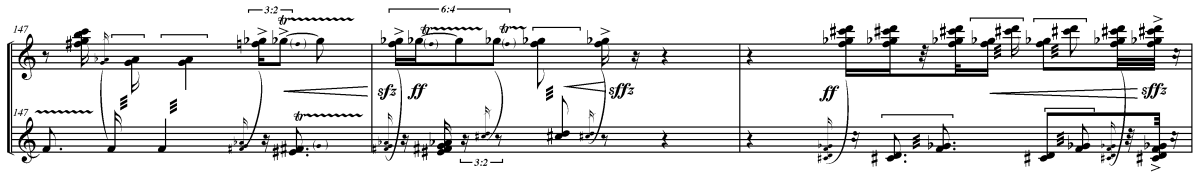
Example 1.22 a: first 9 notes of the series of *Les racines du monde* for piano solo.



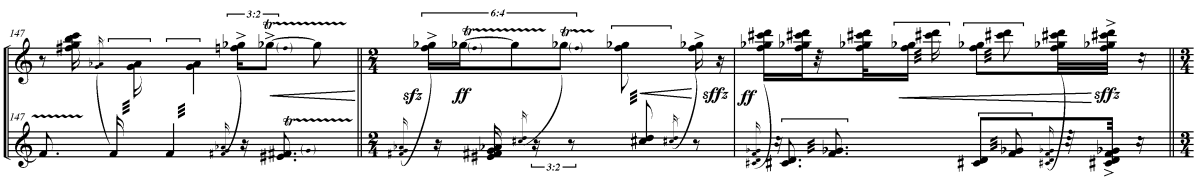
Example 1.22 b: first bars of *Les racines du monde* for piano solo.

As a restriction to this mutational process, I allowed swaps of rhythmic cell introduction only if the series note of the postponed rhythmic cell is played as a grace note for the first note of the anticipated rhythmic cell. In example 1.22 b, for instance, the first B flat of bar 1 is preceded by a grace note A (the series note that is anticipated by the rhythmic cell on B flat). This way, although the order of rhythmic cells is not preserved, the series notes themselves are still introduced in the 'right' order.

At other times, deviations from the structure yielded by the RHS are introduced if the sounding result can be improved by doing so (according to the composer's personal aesthetic judgment). For instance, there was a gap of more than two crotchet beats between bar 148 and 149 in the score of *Les racines du monde*, because of the way the RHS was constructed (see example 1.23 a). This resulted in an interruption of the building up of the climax. To avoid this shortcoming, I left out the two beats of rests, as is shown in example 1.23 b, because I felt this would produce a better result. I claim that, at all times, my personal aesthetic judgment is more important than strictness of rules in the process of composition.



Example 1.23 a: bars 147-149 of *Les racines du monde* for piano solo, before mutation.



Example 1.23 b: bars 147-149 of *Les racines du monde* for piano solo, after mutation.

The distinction between deliberate (conscious) and unintentional (accidental) mutations is not always clear. The latter could be called 'mistakes', but I see them rather as results of the composition process

that have the same artistic legitimacy as conscious mutations. Such mistakes, or rather unintentional mutations, may occur in the transcription of the manuscript to the computer version of the score. As long as they do not result in theoretical or physical impossibilities, it is exclusively up to my aesthetic judgement whether I correct the mutation or not. Most of the time, minor deviations in the surface structure due to unintentional mistakes have no relevant impact on the sounding result. As long as the surface structure is in accordance with the way I mentally hear the piece, there is no reason to make any changes. Imperfections due to unintentional mutations may even add to the aesthetic value of a piece, as is the case in the *campanile* of Pisa, better known as *the Leaning Tower*. Arnold Schoenberg too, was very clear about deviations from technical rules in his music (which may arguably have been unintentional), as the following anecdote related by Eugen Lehner, violist of the Kolisch Quartet, about Schoenberg's third string quartet demonstrates:

> Once, we spent a summer with Steuermann and Kolisch, down in the mountains in a village, and we analyzed the whole third quartet, bar by bar, note by note and, in those nearly thousand bars, to our great satisfaction, we found two places where Schoenberg had made a grave mistake. So, as soon as we came to Berlin, the first time we went to Schoenberg, we showed it to him. "Is that a misprint?" "No, no, that's correct." So we said, "Oh, it's not a misprint, then it's a mistake." Then we explained to him and Schoenberg got mad-red in the face! "If I hear an F-sharp, I will write an F-sharp; if I hear an F-natural, I will write an F-natural. Just because of your stupid theory, are you telling me what I should write?"[31]

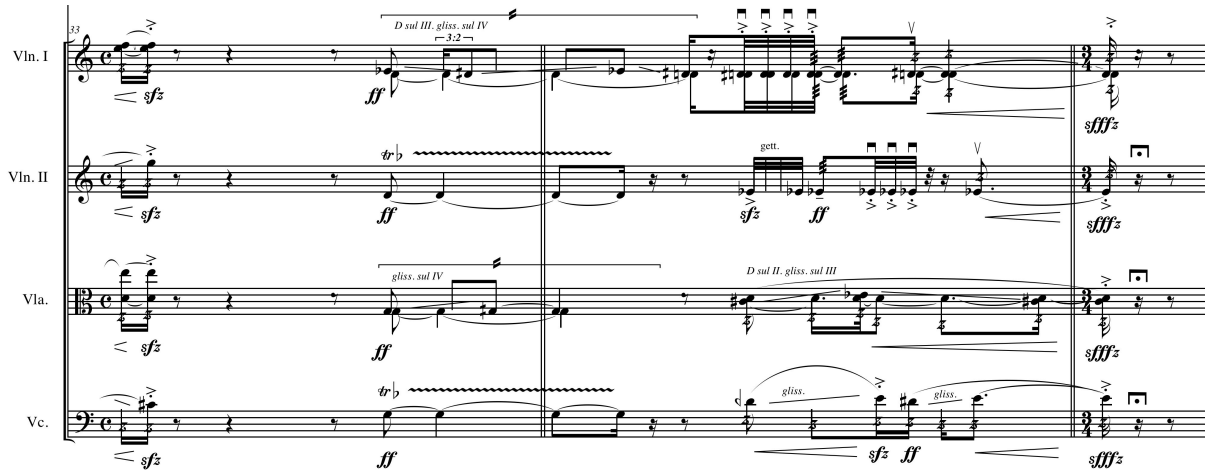
1.3 A note on micro-intervals

The technique of CIG-serialism is based on the use of the twelve pitch classes of the chromatic scale. It does not take into account micro-intervals. Micro-intervals (quarter-tone sharps and flats and others such as listed in Example 1.24 below) do appear in my music however, yet they never have any structural function (they are never part of the rhythmic-harmonic substructure of a piece). Micro-intervals only have an ornamental or colouring function in my music. They always accompany structural notes the way semi-tone intervals ornamented the central notes in my works prior to 1997, or they fill in semi-tone intervals, as can be seen in example 1.25 below (an excerpt from my piece *Le sourire infini des ondes* for ensemble (2009)).

♯	: one quarter-tone sharp
𝄲	: one quarter-tone flat
𝄳 𝄬 𝄭 𝄮 𝄯	: a little higher (arrow up) or lower (arrow down) than given accidental

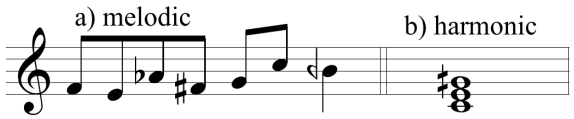
Example 1.24: notation of micro-intervals in my music

[31] Eugen Lehner, quoted in Smith, 1979-80, p. 263. Smith stresses the remarkable fact that Schoenberg talked about "your [Lehner's] system" when referring to his own dodecaphonic technique.

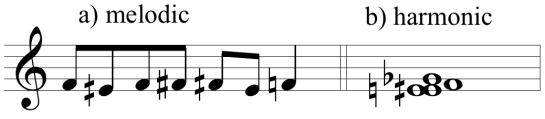


Example 1.25: micro-intervals in *Le sourire infini des ondes* (bar 33-34).

Structural micro-intervals in an idiom that is based on the pitch classes of the chromatic scale (or even more so, on the pitch classes of a diatonic scale) in well-tempered tuning may easily be perceived as being 'out of tune' by listeners who are acquainted with well-tempered tuning. The B quarter-tone flat in the highly chromatic melody of Example 1.26a may be perceived as being either a flat B natural or a sharp B flat (or A sharp). The G quarter-tone sharp in the chord of Example 1.26b may similarly be perceived as being sharp (tonally acculturated listeners will probably not interpret the note as a flat A flat). In a 'non-chromatic' context, this perception disappears if the scales, tuning, or sound combinations used deviate enough from the chromatic well-tempered scale, when melody and harmony occur in a context that uses predominantly intervals that are different from the well-tempered chromatic intervals, as is illustrated in Example 1.27a. The use of micro-intervals *in micro-interval combination* with 'in-tune' chromatic pitches in my music is an instance of this approach. In Example 1.27b, listeners do not usually interpret the quarter-tone sharps as 'out of tune substitutions' for notes belonging to the chromatic scale, as was the case in Example 1.26b, since the context makes it hard or impossible to determined which note is a substitution for which other 'in tune' note.



Example 1.26: the use of micro-intervals in a chromatic or diatonic context
as (a) melodic and (b) harmonic intervals.



Example 1.27: the use of micro-intervals in a non-chromatic micro-tonal context
as (a) melodic and (b) harmonic intervals.

Extending CIG-serialism to the quarter-tone-chromatic scale with 24 (equal or unequal) quarter-tone intervals, or a scale based on another division of the octave, may be an interesting enterprise, but it would not be an option in a quest for atonal music. The concept of atonality used in the present text is strictly related to the use of diatonic and chromatic scales. Music that is structurally based on other types of octave division would be neither tonal nor atonal, but non-tonal.

Chapter 2. Aesthetic considerations

2.1 Artistic practice and the aesthetic universe

An individual's personal knowledge can be grouped in different but usually overlapping subsets of knowledge according to the different domains of thought that require and activate that specific knowledge. A mathematician's professional activity, for instance, demands a different set of knowledge, a different area of thought, than his or her participation in a political debate. Whenever such a subset of personal knowledge is highly developed and structured, and occupies a prominent place in the individual's activities (such as the mathematician's set of mathematical knowledge), I call the subset a **cerebral universe**. Cerebral universes can be a.o. social (professional, private[32], political,…), ethical or moral (containing knowledge in the realm of right and wrong), logico-mathematical (the domain of true and false), or aesthetic (the domain of beauty and the arts).

The **aesthetic universe** of an artist (or an informed non-artist with highly developed aesthetic interests) is the set consisting of all the artist's aesthetic knowledge. A musician's aesthetic universe, for instance, contains not only all the musician's theoretical and historical knowledge of music, and his or her knowledge of the repertoire, but also the procedural knowledge necessary to play an instrument, read a score, or compose a new piece, as well as the knowledge consisting of the emotional traces left in the musician's brain by aesthetical experiences.

Arnold Schoenberg stated that "[c]omposition […] is above all the art of inventing a musical idea and the fitting way to present it" (Schoenberg, 1975, p. 374). I extend this claim as follows: The musician's **artistic practice**—creation or performance—is the expression of the complete meaning of aesthetic messages or ideas within his or her aesthetic universe. I define an **aesthetic idea** as any idea belonging to a message (a coherent set of ideas) that is expressed artistically. The meaning of an aesthetic idea for an artist is the web of all concepts that are connected to the aesthetic idea within the artist's aesthetic universe. An **artist** can thus be defined as a person who is able to—feels the urge and has the skills (the procedural knowledge) to[33]—express the meaning of the aesthetic ideas belonging to his or her aesthetic universe through the creation and/or performance of artworks. An **artwork** (as a physical object or procedure external to the brain) is the sign vehicle—the external outcome of the process of encoding— of aesthetic ideas resulting from the expression of the whole meaning of those aesthetic ideas.

In formal communication, the relevant meaning of the concepts used is normally restricted. In some cases only the definition[34] of the communicated concepts is relevant. In colloquial communication, connotations, nuance, ambivalence, humour, irony or sarcasm, 'reading between the lines', sophistry or demagoguery may play a more or less important role in the extension of the relevant meaning of the

[32] It is frequently said that becoming a father or a mother, for instance, changes one's 'whole world'. There is indeed a completely new private social universe that comes into being with the birth of a child: a parental universe that will have a major influence on one's thought for the rest of one's life. This universe contains entirely new knowledge but also rearranged existing knowledge.

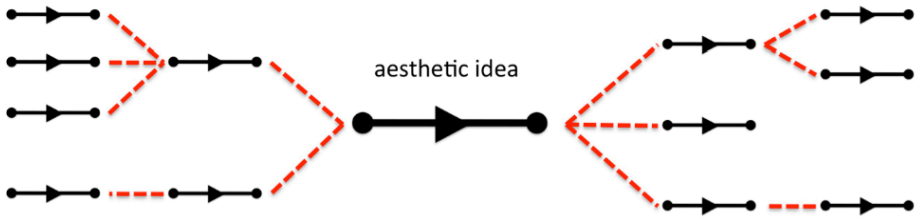
[33] Schoenberg claims "art is born of 'I must' [I feel the urge], not of 'I can' [I possess the skills]" (Schoenberg, 1975, p. 365). It seems improbable to me however that urge without artistic skills could lead to the creation of an artwork.

[34] The term 'definition' (of a concept) is here defined as 'the meaning of the concept that is necessary and sufficient to discern it from all other concepts within a given context (a given set of concepts)'.

concepts expressed. In artistic expression the *complete* meaning of the aesthetic message, of which the artwork is the sign vehicle, is relevantly expressed without limits to the possible connections between the concepts contained in the artist's aesthetic universe. This results in an arborescent structure of the web of meaning of an aesthetic idea, or the aesthetic universe in general, in a constantly evolving web of metaphoric, intuitive, logical or completely free connections between concepts, wherein, to use Gilles Deleuze's phrasing, "any point […] can be connected to anything other" (Deleuze & Guattari, 2004, p.7). The continuous creation of new connections between concepts in the aesthetic universe is therefore not unlike a steadily proliferating Deleuzian rhizome. New relevant knowledge of any origin (be it rational, emotional or of any other kind) is added to the aesthetic idea—and, by extension, to the subject's aesthetic universe—every time the aesthetic idea is activated in thought. Kant phrases this idea as follows:

> An aesthetic idea is a presentation of the imagination which is conjoined with a given concept and is connected, when we use imagination in its freedom, with such a multiplicity of partial presentations that no expressions that stand for a determined concept can be found for it. Hence it is a presentation that makes us add to a concept the thoughts of much that is ineffable, but the feeling of which quickens our cognitive powers and connects language, which otherwise would be mere letters, with spirit. (Kant, 1987, p. 185)

Turning a web of meaning into a rhizome, and the effect it has on emotional experience is what the aesthetic experience consists of; it is not the perception of an artwork, but what is *done* with it by the individual (be it the addresser or the addressee). The web of meaning of an aesthetic idea, is turned into a rhizomatic web when all concepts belonging to the meaning of the aesthetic idea are—or can be—interconnected, as long as those interconnections are physiologically possible (that is, on a neuronal level). The aesthetic idea is then no longer the centre or node of a butterfly or bowtie-shaped web of meaning as shown in Example 2.1. Since any concept of the web may be connected to any other concept, its centre disappears.



Example 2.1: bowtie-shaped web of meaning of an aesthetic idea before it is turned into a rhizome when any concept in the web is interconnected with any other concept.
Concepts are here represented by arrows, connections by dotted lines.

The construction of the aesthetic rhizome is not limited to logical or even to metaphoric interconnections between concepts; any concept can be connected to any other concept without exception. In an aesthetic rhizome, triangular circles 'exist', "Colorless green ideas [may] sleep furiously" and add to the relevant meaning of the artwork. Although the latter sentence is "nonsensical" according to Noam Chomsky[35], on the communicative level of art, it can become meaningful. Intuition (the faculty of acquiring intuitive knowledge) and voluntary suspension of disbelieve play an important role in the process of constructing an aesthetic rhizome, which is the core of aesthetic experience.

[35] The sentence "Colorless green ideas sleep furiously" was composed by Noam Chomsky as an example of a sentence that is grammatical yet nonsensical. See Chomsky, 1957, p. 15.

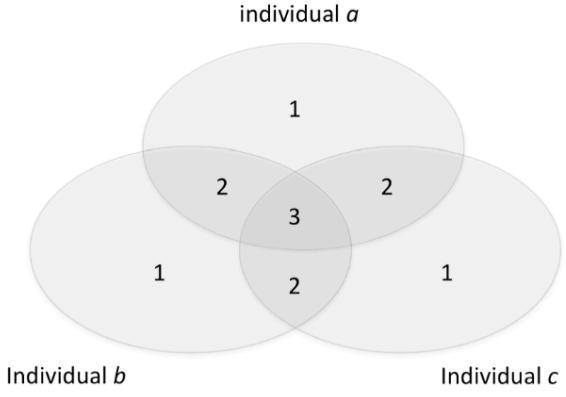
It is not unthinkable that the scope of the aesthetic universe of an artist may coincide with the complete web of knowledge of the artist. Every aspect of an artist's life, all his or her thoughts, may belong to his or her aesthetic universe. The artist's every breath may be part of his or her artistic life.

2.2 Cultures and their boarders

Most artists share common aesthetic knowledge or ideas with other people (artists and non-artists alike). This common knowledge is what I call a **culture**. People sharing a common set of aesthetic knowledge are said to belong to the same aesthetic culture.[36]

The set of knowledge shared by two individuals constitutes their common culture. In theory it is possible to determine this set of knowledge. In practice this is impossible, since, although an individual's set of knowledge may be a very concrete set of interconnected neurons in the neo-cortex, it is impossible to list; not only because an individual's knowledge continuously changes (that would still make synchronic listing possible), but also because listing knowledge is a form of expressing knowledge, and, this is not a one-to-one process when applied to a complete set of knowledge. Determining a common set of knowledge between two individuals can therefore only be done approximately or in the form of a theoretical model. This doesn't have to be a practical problem, however, because for practical cases, the set of knowledge that is relevant in the determination of a culture can be limited to very specific elements.

But even if one would limit the relevant set of knowledge, as soon as three or more individuals are involved, the set of common knowledge shared by all the members of the population decreases quickly and considerably. There might be no relevant element of knowledge[37] that is shared by all of them. In a population of three individuals, the set of knowledge shared between the three members will probably be smaller (in any case never larger) than the sets of knowledge shared between every couple of them. In example 2.2, the set of knowledge shared between all three is contained in zone 3; the knowledge only two members of the population share, is represented in zones 2. Zones 1 contain knowledge that is possessed by one member of the population only; the knowledge contained in the latter zones is what I call **idiosyncratic knowledge**, knowledge possessed by only one individual in the population.



Example 2.2: shared knowledge for 3 individuals.

The culture of the population of three is the set of all knowledge contained in zones 2 and 3. Each element of knowledge in those zones has a **cultural weight** that is equal to one less than the number of

[36] More precise would be to say that a common aesthetic culture belongs to the knowledge or the aesthetic universes of those people.

[37] The elements of knowledge can be conceptual as well as procedural (e.g. knowledge of ritual procedures). Moral values are here, for the sake of simplicity, also considered as knowledge. When a moral value belongs to a culture, there is a shared knowledge of the value of moral judgment (appreciation or condemnation) of certain procedures within the culture. Elements of knowledge may be individual concepts or propositions, but also larger combinations of both, and also complete procedure (rituals, habits,…).

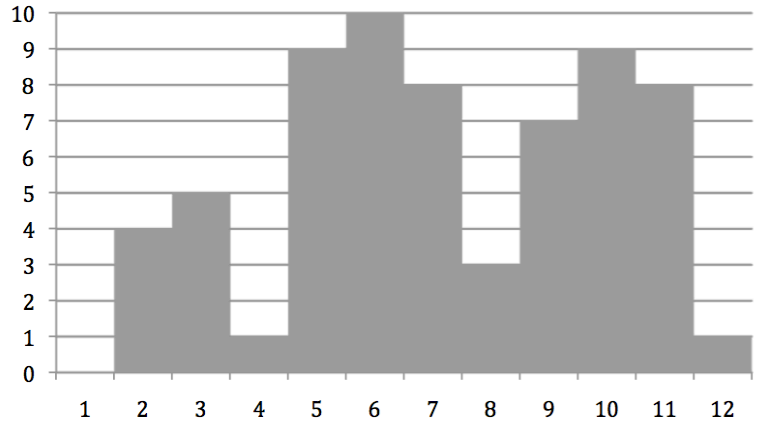
individuals in the population possessing that knowledge (cultural weight of knowledge in zone 2 = 1; in zone 3 = 2). This way, idiosyncratic knowledge is excluded from the culture (it has no cultural weight).

Let us consider the model case of 12 relevant elements of knowledge contained in a population P (consisting of at least 11 individuals), as shown in Example 2.3. The cultural weight of an element *e* of knowledge is one less than the number of people in the population that know *e*. Elements known by many people of the population have a higher cultural weight (e.g. element 6 in Example 2.3 has the highest cultural weight (10) because it is known by 11 people). Element 1 is known by only one person of the population (i.e. individual *a*). Its cultural weight is 0. It is idiosyncratic knowledge of individual *a* and is not part of the culture of population P.[38] The culture of the population P (C) is shown as the dark grey area in example 2.4a.

cultural element	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
cultural weight	0	4	5	1	9	10	8	3	7	9	8	1
individual *a*	x	x			x	x	x			x	x	

Example 2.3: weight of elements of knowledge 1-12 in culture C.
All elements of knowledge possessed by individual *a* are indicated with a cross (x).

There will hardly ever be an individual that possesses all the knowledge of a culture of a large population. Still it is possible to determine how well the individuals fit in the culture. In other words, we can determine, at least theoretically[39], any individual's **cultural congruence** (more precisely the cultural congruence of the individual's knowledge) with a culture. Take for instance individual *a*, who knows elements 1, 2, 5, 6, 7, 10 and 11 (see Example 2.3). The cultural congruence of individual *a* with culture C is shown as the light grey area in Example 2.4b[40]. For every element of culture C known by individual a, the light and dark areas overlap. All the cultural knowledge not known by individual *a* is shown in dark grey in example 2.4b. The smaller the surface of the dark area is, the higher the cultural congruence an individual's knowledge with a culture.

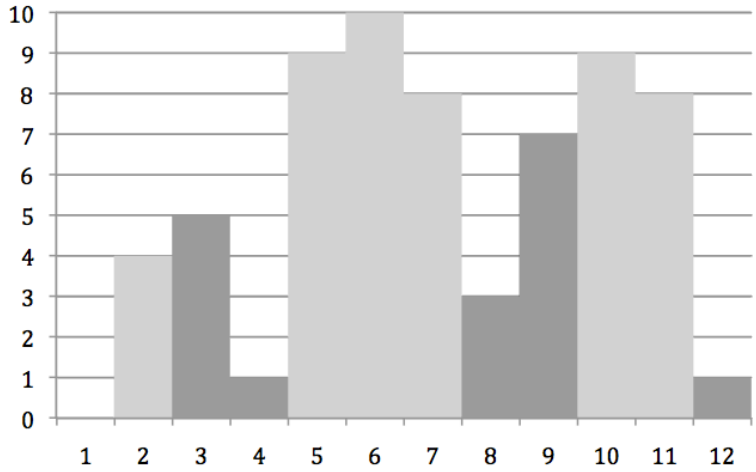


Example 2.4a: model of the culture (C) containing 12 elements of knowledge.

[38] This model is a simplification because the weight added by each member is the same. In reality, the weight added by an individual to cultural elements depends on that person's cultural authority. The ideas of highly respected artists, for instance, add more cultural weight.

[39] In practice, cultural congruence is only determined intuitively. We have an intuitive idea of how well we (or someone else) fit in a given culture, and we may perceive an immediate culture shock when we are confronted with a culture with which we have very little cultural congruence.

[40] Note that the individual's cultural congruence is not the same as the weight of his or her knowledge within the culture (which is, in this case, 1 for every element of the individual's knowledge). The individual's cultural congruence is determined by multiplying the unit (1) of each element of the individual's contribution to the culture (each of his or her elements of knowledge) by the cultural weight of the element within the culture.



Example 2.4b: cultural congruence of knowledge of individual *a* (light) with culture C (light & dark).

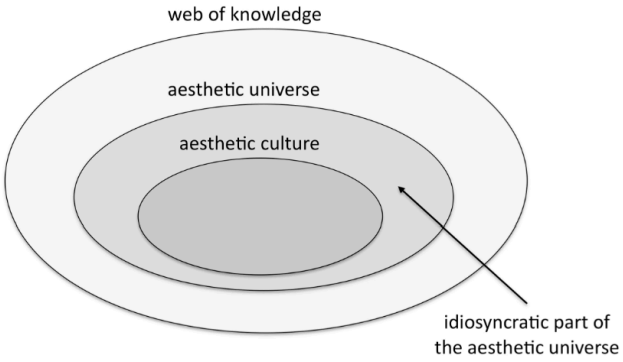
An individual's knowledge may be very congruent with one culture and at the same time highly incongruent with a different culture. Individuals whose knowledge is highly congruent with one and the same culture are said to belong to the same culture.

Although the meaning of the aesthetic ideas attached to a score or performance is usually different from individual to individual, people belonging to the same culture will usually possess similar codes for artistic communication, and will, as a result, create and develop *similar* meaning for a particular score or performance, as long as the aesthetic ideas of the piece or performance can be situated within the shared culture. There will in that case be common elements in the meaning of the different individuals. The stronger and more extended these common elements are, the more similar the meaning of the piece of music will be to individuals who are acquainted with the elements of meaning. This acquaintance is the result of acculturation. When we perform scores or hear performances that are considered conventional within our culture, we have no problems to attach meaning to the score or performance that is very likely to be similar to the composer's or performer's expressed meaning. This is, for instance, generally the case when Westerners perform or hear tonal music belonging to the common practice of their Western culture, where, for instance, minor scales are commonly associated with sadness. This means that there is a connection between the culture members' concepts of 'minor scale' and 'sadness'. 'Sadness' (and all its connections to individual emotional knowledge) is an element of the meaning of the concept 'minor scale' for most tonally acculturated subjects; not just the subject's concept 'sadness', but the entire cerebral activity related to 'sadness' (the concept being highly influenced by that activity). It is this commonality that enhances the strength of musical communication of pieces of music. Such pieces stay within "a *tonal universe* where [the score or performance] is accessible to us in all its warmth and charm", as Leonard Bernstein (1976, p. 307 [my italics]) put it. Similarity of meaning is the only thing we can strive for if we want to understand the intentions of a composer or performer. This similarity can be improved by the acquisition of additional information about the composer's or performer's aesthetic universe, intentions, life, and culture, resulting in what is called 'informed performance' and 'informed listening'.

Not all artists stay within Bernstein's 'warm and charming' safe boundaries of existing and established culture, however. Some artists—the "true artists"[41] according to Arnold Schoenberg—consciously or (more often) unconsciously operate at the borders of the prevailing culture or radically venture into regions of their aesthetic universe far removed from the culture they belong to; the regions that I call the **idiosyncratic part of the aesthetic universe**. These are regions or territories of knowledge that

[41] "True artists" may also be defined as artists whose aesthetic universe coincides with their complete set of knowledge, as was discussed before.

are specific for the individual artists and that lie beyond the boarders of the existing cultural space (see Example 2.5). Note that what may be idiosyncratic knowledge in relation to one culture may be cultural knowledge for another culture.



Example 2.5: aesthetic universe and culture within an artist's web of knowledge. The idiosyncratic part of the aesthetic universe is the area that belongs to the aesthetic universe but not to the aesthetic culture of an individual.

Artists are not always aware of the fact that their artistic practice involves the expression of knowledge belonging to the idiosyncratic part of their aesthetic universe. To use the words of Arnold Schoenberg:

> [T]he young artist does not know himself; he does not yet sense wherein he is different from the others, different above all from the literature. He still adheres generally to the precepts of his education and is not able to break through it everywhere in favour of his own inclinations. He does not [consciously] break through; where there is breakthrough he does not know it. He believes that his work is at no point distinguishable from what is generally found to be in good art; and all of a sudden he is violently awakened from his dream, when the harsh reality of criticism makes him aware that somehow he is not really so normal after all, as a true artist should never be normal: he lacks perfect agreement with those average people who were educable, who could commit wholly to the *Kultur*. (Schoenberg, 1983, p. 400 [Schoenberg's italics]).

By leaving the familiar territory of prevailing musical aesthetics, musicians venture a quest on the untrodden "paths to new music" (*"Der Weg zur neuen Musik"*), as Anton Webern called it. "New music", Webern said, "is the one that has never been said"[42], music that expresses aesthetic ideas belonging to the idiosyncratic regions of the artist's aesthetic universe. 'True artists', in the Schoenbergian sense, composers as well as performers, operate to an important extent in these idiosyncratic regions. Sometimes there may be an important and (temporarily) unbridgeable gap between those idiosyncratic aesthetic regions and culturally accepted aesthetics. Gustav Mahler said "Everything I write is too strange and new for the listener, who cannot find a bridge to me."[43] Expression of ideas belonging to this idiosyncratic territory opens up totally "new worlds" of ideas in the process of artistic communication. This is how Pierre Boulez can be understood when he claims that Webern was "essentially on a conquest of a new world"[44]. New worlds of this kind often abide by laws that are different from the prevailing aesthetic laws, and, once accepted by a culture, the ideas

[42] *"Neue Musik ist jene, die nie gesagt wurde*" (Anton Webern 1960, p.12).
[43] Gustav Mahler in Killian, 1984 quoted in Floros, 1993, p.21.
[44] *"…essentiellement à la conquête d'un monde nouveau"* (Boulez, 1966, p.19) [my translation].

contribute to the development of the culture, create musical paradigm shifts or even sometimes cause complete aesthetic revolutions.

The task of the budding artists is to discover their own aesthetic universe (even to find out whether they do have a personal aesthetic universe!) in order to avoid becoming an epigone. The ideas and theories of others may help in this process, but should not be copied unless existing laws of the others' universes turn out to apply to the personal universe. This is of course possible. There can be similarities between the individual and distinct aesthetic universes of different artists (possibly caused by (cultural) upbringing, development and influence)[45], just like parallel physical universes would most probably show similarities in the laws that govern them. There is however a difference between constructing an aesthetic universe based on an existing example (like epigones do) and the adoption of existing laws that appear to apply in the newly discovered, explored and developed aesthetic universe of the budding artist. Marcel Danesi describes this creative force as follows:

> [T]here are creative forces constantly at work in individual human beings. The Neapolitan philosopher Giambattista Vico (1688-1744) termed these fantasia and ingegno. The former is the capacity that allows human beings to imagine literally anything they desire freely and independently of biological or cultural processes; it is the creative force behind new thoughts, new ideas, new art, new science, and so on. The latter is the capacity to convert new thoughts and ideas into representational structures—metaphors, stories, works of art, scientific theories, etc. So, although human beings are indeed shaped by the cultural system in which they are reared, they are also endowed with creative faculties that allow them to change that very system. (Danesi, 2004, p. 42)

Semantics is the link between concepts as part of a cultural denotative network and a cultural procedure of encoding and decoding, and is therefore part of the communicative process. Although the aspect of semantics is limited in musical communication, there are culturally determined semantic elements in music too. In 'Western' musical culture, for instance, many aspects of the tonal idiom have semantic functions. Minor and major modes are typically linked to communication of specific emotional concepts. Indeed, for tonally acculturated people it is hard and sometimes sheer impossible not to attach certain (often emotional) concepts to music in minor or major mode, in the same way as it is hard or impossible for people who are familiar with a natural verbal language not to make semantic connections between words they hear and verbal concepts in their minds. Arnold Schoenberg once said: "I want to express myself—but I hope to be misunderstood."[46] In order to achieve this misunderstanding he had to avoid possible associations of his music with existing semantic connections as much as possible. Avoidance of tonality was therefore necessary for him. One may, of course, in this respect justly wonder why Schoenberg repeatedly resorted to linguistic texts and didn't restrain to purely instrumental music.

2.3 Artistic research

It is not only possible for artists to *express* (the meaning of) ideas belonging to their aesthetic universe, but also to *explore* that aesthetic universe. The conscious and deliberate exploration of the artist's aesthetic universe is how I define **artistic research**. Edwin Hubble's claim: "Equipped with his five senses, man explores the universe around him and calls the adventure Science" (Hubble, 1954, p.6) can be restated as: 'Equipped with reason and imagination, the artist explores the aesthetic universe within and calls the adventure artistic research.'

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[45] As described in: James Joyce, *A Portrait of the Artist as a Young Man*, (1916). This book describes the development of Stephen Daedalus from childhood to maturity and the way his (Catholic) upbringing and his interest in art and literature formed and influenced his aesthetic universe and made him into an artist.

[46] Arnold Schoenberg in a letter to Alma Mahler (07 October 1910). Quoted in Simms, 2003, p. 258.

It is obvious that, since the artists alone have unmediated, direct access to their own aesthetic universe, artistic research can only be performed by the individual artists themselves. It can happen within the cultural boundaries of the artist's aesthetic universe as well as across those cultural boarders, in the idiosyncratic part, and it is aimed at gaining new knowledge about the aesthetic universe. When the new knowledge thus generated is situated entirely within an existing culture, it enlarges cultural knowledge or may lead to changes in existing knowledge. Sometimes, however, it is only after taking some distance, by leaving the familiar cultural territory, that certain facts about this familiar territory become clear, and that (sometimes short-sighted) misconceptions get exposed; misconceptions that may result from "the slovenliness of tradition"[47]. Artistic research therefore often happens in the idiosyncratic regions of the artist's aesthetic universe, or it can require or cause the extension of an aesthetic universe. It is in the latter two cases that the artist-researcher leaves the safety of familiar territory behind and ventures the experimental[48] quest on new and potentially perilous[49] untrodden paths of musical aesthetics, explores new aesthetic worlds, and seeks out new artistic possibilities.

2.4 The endophysical laws of an aesthetic universe

Artistic practice and artistic research, as the exploration and expression of the artist's personal aesthetic universe, usually result in the development of that aesthetic universe. An artist is therefore not just a creator of artworks, but also a creator (in the demiurgical sense) or developer of a universe, of which the artwork is 'only' an expression. In this aesthetic universe, according to Jonathan Harvey (although he does not use the term aesthetic universe), artworks are rather *discovered* through inspiration than created. In his words:

> Beethoven's sketch books are perhaps the most eloquent witness to the idea of inspiration as a gradual, 'clarifying' process: in them we can trace the emergence not only of the themes but of entire structures, gradually becoming more and more crystalline.
>
> For composers who, like Beethoven, are inspired in this way, composition is perhaps less a process of *creation* than one of *discovery*. (Harvey, 1999, p.35)

In my opinion, composition (or artistic creation in general) is a combination of discovering the aesthetic universe and the possibilities of the aesthetic idea (and its connections with the procedures of musical encoding) through exploration on the one hand, and the development of the aesthetic universe through the expansion of the meaning of the aesthetic idea on the other, as part of a larger procedure of artistic expression. This comes close to what the Romanian-French playwright Eugène Ionesco may have meant when he wrote: "A work of art is, for me, the expression of an innate intuition that owes almost nothing to all others: by creating a world, by inventing it, the creator discovers it."[50]

Many writers and artists consider artistic practice as the creation of 'a world', as do Jonathan Harvey and Eugène Ionesco. Johannes Brahms expressed the idea of the artwork as 'the creation of a world' in a letter of 1877 to Clara Schumann accompanying his transcription of Bach's *Chaconne* for solo violin as follows: "The chaconne is in my opinion one of the most wonderful and incomprehensible pieces of music. Using the technique adapted to a small instrument the man writes *a whole world* of the deepest thoughts and most powerful feelings."[51]

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[47] This refers to Mahler's "Tradition is laziness". See a.o. Ditzler, 1998, pp. 11-28.
[48] For the elaboration of the experimental aspects of artistic practice and research, I refer to the chapter *A New Path to Music, which* I contributed to the ORCiM Sourcebook on Artistic Experimentation (Leuven University Press, forthcoming).
[49] Perilous and experimental have a common Latin root (*perire*), referring to the risk of perishing.
[50] *"Une œuvre d'art est, pour moi, l'expression d'une intuition originaire ne devant presque rien aux autres: en créant un monde, en l'inventant, le créateur le découvre."* (Ionesco, 1962, pp. 62-63) [my translation].
[51] Quoted in Fisk, 1997, p. 134 [my italics].

Gustav Mahler sees the composer as an instrument in the process of artistic creation. In the context of his *Third Symphony* he writes: "Try to conceive a work so vast, that in it *the entire world is mirrored*—one is, so to speak, only an instrument on which the whole universe plays… In such moments I no longer belong to myself."[52] Although during the process of composition a composer does indeed sometimes get the *impression* to be "a mere 'vessel' through which the piece passes", as Stravinsky said about the composition of *Le Sacre du Printemps*[53], the process is still executed by the composer, so it is still the composer who is the active creator. Jonathan Harvey notes in this respect: "The composer frequently becomes so absorbed in the piece of music that it begins, for him, to constitute a separate, *self-sufficient world*. This is proved by the way in which composers write that they 'live in' or 'inhabit' their music" (Harvey, 1999, p.33 [my italics]). This feeling of 'being absorbed' in the piece is the result of a complete concentration of the composer's thoughts on the piece. It represents the creative activity called 'inspiration' or creative 'flow', which is the activation of the logic of thought of the aesthetic universe of the artist. **Inspiration** (or creative potential) is the ability of the artist to create rich and consistent systems of links between concepts that comply with the inherent logic of their aesthetic universe. These links arise from cerebral activity that seems to have its own élan, that is not (entirely) controlled, and that therefore at times seems to be controlled by an autonomous aesthetic universe. It would therefore be better to say that, in inspirational moments, the composer no longer belongs to the physical, empirical world, but roams his or her aesthetic universe.

Contrary to what the composers quoted above claim, I do not consider the artwork as a universe. I see the artwork rather as the *expression* of (ideas belonging to) this 'universe of its own' (the aesthetic universe) than as the *creation* of a world or universe. In my opinion, the artwork is like 'a satellite image' of the aesthetic universe that is transmitted to the mind of other individuals (or to their aesthetic universe) via the physical universe. Since the artist alone has direct access to his or her aesthetic universe, 'images' of that universe in the form of artworks are the only vehicles through which an artist's aesthetic universe can be made 'accessible' to other individuals. The artwork is thus like a wormhole connecting different aesthetic universes.

Jonathan Harvey wrote: "Music […] must obey its own laws, not those of the everyday world." (Harvey, 1999, p.141) If musical creation and performance are considered to be the expression of ideas belonging to an aesthetic universe, this claim may be rephrased as: the aesthetic universe of an artist obeys laws that are (or may be) different from the laws that govern the physical universe. Artworks are constructed according to laws that are different from those of the physical world. Umberto Eco states that this is often typical for contemporary art. He says: "whereas classical art introduced original elements within a linguistic system whose basic laws it substantially respected, contemporary art often manifests its originality by imposing *a new linguistic system* with its own inner laws" (Eco, 1989, p. 60). According to Jackson Pollock "new needs need new techniques, and the modern artist has found new ways and new means of making his statement. It seems to me that the modern painter cannot express this age—the airplane, the atom bomb, the radio—in the old forms of the Renaissance or of any other past culture. Each age finds its own techniques."[54]

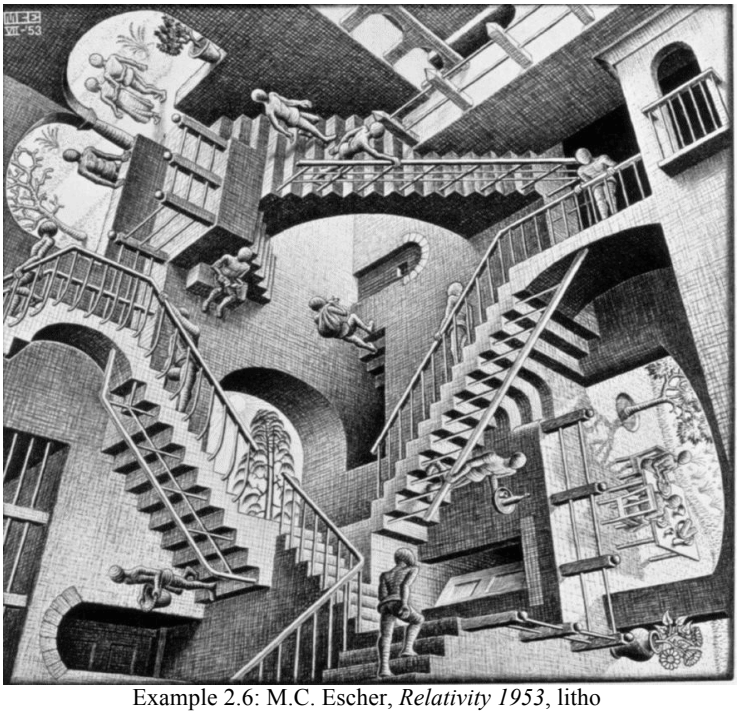
I call the laws that govern an aesthetic universe the **endophysical laws** of the aesthetic universe. The prefix 'endo' stresses the fact that, although the laws of the aesthetic universe may be different from those of the physical world, they are no metaphysical laws. The aesthetic universe is not a metaphysical universe, since it is not *beyond*[55] the physical world. An aesthetic universe, as a cerebral construction, is clearly a physical entity[56], but at the same time it constitutes a world of a different kind, governed by laws that do not exactly apply to the external physical world. The laws of cerebral activity are physical laws, but they may lead to constructions that abide by their own internal laws or

[52] Gustav Mahler, letter to Anna Bahr-Mildenburg, 18 July 1896, quoted in Harvey, 1999, p.6 [my italics].
[53] "I am the vessel through which Le Sacre passed." (Stravinsky & Craft, 1959, p. 148).
[54] Jackson Pollock, opening statement of the 1987 Documentary *Portrait of an Artist: Jackson Pollock,* directed by Kim Evans. http://www.youtube.com/watch?v=4G5hQWPP74s&feature=player_embedded [last accessed: 28-12-2012].
[55] The Greek "meta" means "beyond".
[56] The human brain and cerebral activity are, after all, physical objects and processes.

logic, much like a game, with its own internal logic, its own possibilities, and its own restrictions. Therefore I call the aesthetic universe an endophysical world[57]; it is a world that is metaphysical— mystical, miraculous, transcendent, virtual— *within* the physical world.

As was suggested above, the endophyscial laws of an aesthetic universe, and those of the artworks that result from it, may differ from the laws governing the physical universe. Charles Peirce phrased this as follows: "There is a great distinction between reasoning which depends upon the laws of the inner world and reasoning which depends upon the laws of the outer world" (Peirce, 1998, p.24). In his unfinished book *The Musical Idea*, where "for the first time an attempt is made to extract a musical logic from the facts of the musical technique of presenting an idea" (Schoenberg, 2006, p. 90), Arnold Schoenberg states that art operates according to its own laws of logic, determined by musical technique: "[I]n art the meaning of what is called logic has to be somewhat modified, even though fundamentally the human mind is capable of only a single manner of thinking" (Schoenberg, 2006, p. 103). He stresses that "[a]rt is different from science" (p. 91), and "ideal and purely logical conclusions can claim no implications in an artistic realm" (p. 106).

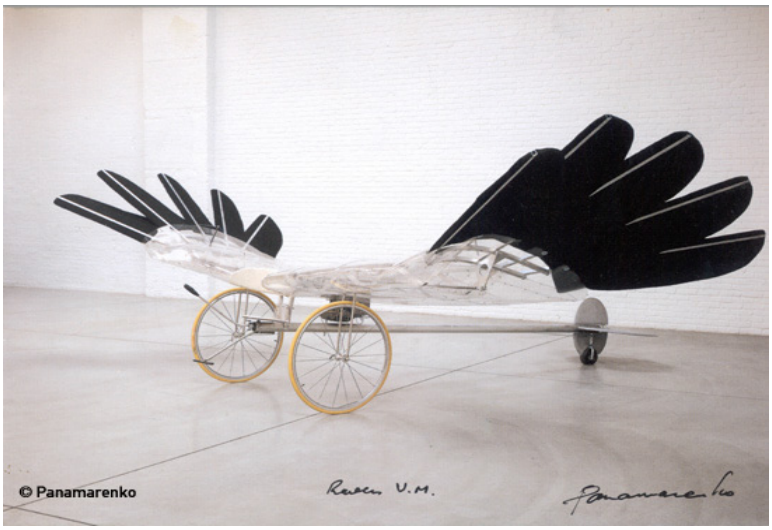
To illustrate this idea, let us have a look at the work of Escher and Panamarenko. The work of the Dutch graphic artist Maurits Cornelis Escher (1898-1972) features many so-called 'impossible worlds' or 'impossible constructions', constructions that are impossible in the physical universe because they are not in accordance with some physical law. His famous litho *Relativity* (see Example 2.6) illustrates a world where the gravitational forces operate in three Cartesian spatial dimensions *independently*. The vertical gravitational force along one axis seems to have no influence on the objects and processes happening in the two superimposed spatial dimensions, where the other Cartesian axes are considered as vertical. This is an impossibility in the physical universe, but not in Escher's aesthetic universe.



Example 2.6: M.C. Escher, *Relativity 1953*, litho
(source: http://europrogovision.blogspot.be/2011/02/3-dutch-pictures-3-m-c-escher.html [last accessed: 31/10/2013]).

[57] The aesthetic universe it is situated *within* (the Greek "endo" means "within, inside") the physical universe.

The second example concerns the aircraft, submarines, ships and other vehicles, such as *Raven's Variable Matrix* (Example 2.7), created by the Flemish sculptor Panamarenko[58]. These are not meant to be mere artistic objects, elegant as they are. They have been engineered and technically designed by the artist in order to fly, float, or function in other ways, but, as a matter of fact, they don't. None of Panamarenko's vehicles function the way they are conceived. They are as helplessly clumsy, vulnerable, and weak in the physical world as Baudelaire's *Albatross* on the deck of a ship.[59] The laws according to which his works are designed don't seem to be valid in the physical world, but are laws of his imaginative aesthetic universe.



Example 2.7: Panamarenko, *Raven's Variable Matrix*, 2000
(source: http://www.dbnl.org/tekst/_vla016200301_01/_vla016200301_01_0008.php [last accessed: 31/10/2013]).

I claim that even though the aesthetic universes of Escher and Panamarenko are different from the physical world, or from our own aesthetic universes or ideas, we can still appreciate their works because although their aesthetic universes obey laws that are different from those of the physical world, they are still *recognizable*. There is a *similarity* between the endophysical laws of Escher's or Panamarenko's aesthetic universes on the one hand, and the laws of the physical world we are acquainted with on the other. We can understand an artist whose aesthetic universe has a substantial *resemblance* with the "versions of the world"[60] we are most familiar with, be it the physical universe or the parts of aesthetic universes that belong to our culture. This resemblance makes recognition possible, the way similarity in code makes understanding of a message possible. In artistic communication, as in all kinds of communication, similarity of code appears not to be sufficient for understanding. Similarity in the universes to which the message and the corresponding decoded message belong is also crucial. When messages belonging to the cultural part of an aesthetic universe are communicated, this resemblance is evidently present. It is only when artists express ideas belonging to the idiosyncratic part of their aesthetic universe that effective communication may become problematic, even if the code used is part of the culture of both addresser and addressee. In the latter case, effective communication is only possible if there is enough resemblance between the

[58] Panamarenko is the pseudonym of Henri van Herwegen (°1940).
[59] See Charles Baudelaire, 1861. *Albatros* is the well-known second poem in this set.
[60] For the idea of 'versions of the world', see Nelson Goodman, who claims that even physical worlds come in individually created versions: "For the man-in-the-street, most versions from science, art, and perception depart in some ways from the familiar serviceable world he has jerry-built from fragments of scientific and artistic tradition and from his own struggle for survival. This world, indeed, is the one most often taken as real; for reality in a world, like realism in a picture, is largely a matter of habit." (Goodman, 1978 p. 20). See also David Lewis's highly controversial idea of "modal realism, which holds that our world is but one world among many" (Lewis, 1986, p.2). According to Lewis, and in contrast to what Goodman claims, those worlds "are not of our own making" (Lewis, 1986, p.3). Aesthetic universes, on the other hand, are subjective (part of an individual's knowledge and thinking) and "made" (developed) by the individual.

addresser's aesthetic universe and the physical universe or cultural cerebral universes of the individuals involved in the process of communication. This is how I interpret Ionesco's claim: "The artwork […] is not the image of the world; it is *in* the image of the world."[61] Again, I rephrase this claim into a statement that is of crucial importance for my entire artistic practice and research and also within the present context:

> The artist's aesthetic universe is not the image of the world; it is *in* the image of the world.

It is because of this resemblance or similarity between an artist's aesthetic universe and 'the (physical) world' that effective artistic communication is possible. Let us return to the examples of Escher and Panamarenko to illustrate this claim. Although Panamarenko's *Raven* was designed in accordance with (endophysical) laws that differ from the laws of physics (and therefore doesn't fly in the physical universe), it is recognizable because it resembles flying objects we encounter in our physical world (airplanes, birds, …). We might therefore imagine that the *Raven* would really fly in Panamarenko's aesthetic universe if it were a physical universe, or if the raven were an endophysical object belonging to that aesthetic universe instead of a physical object. We could even claim that *the aesthetic idea* for which the *Raven*—as a physical object—is the sign vehicle, *can* actually fly in Panamarenko's aesthetic universe. This requires the same voluntary suspension of disbelieve as is necessary in the appreciation of plays or movies; although we know that plays and movies are not real, we are willing to believe they are real in the fictional world they depict and we understand them because of the resemblance with reality. Mutatis mutandis, a similar thing can be said about Escher's litho *Relativity*.

Umberto Eco describes the resemblance between the physical world and the world described in novels as follows:

> Fictional texts never take as their setting a world which is totally different from the one we live in, not even if they are fairy tales or science fiction stories. Even in such situations, if a forest is mentioned, it is understood that it should be more or less like the forests of our real world, where the trees are vegetal and not mineral, and so on. If by chance we are told that the forest consists of mineral trees, the notion of "mineral" and "tree" should be the same as in our real world. (Eco, 2011, p. 79)

Although resemblance between aesthetic universe and physical universe is necessary for artistic communication, I am convinced that the strength of an aesthetic universe—and the relevance of an artist—resides in the *difference* between its laws and those of the physical universe. Or, to quote Ionesco yet again: "what is the purpose of music if it is not the revelation of other laws?"[62] The most interesting artists are, in my opinion (and, I suppose, also in Schoenberg's opinion), those whose aesthetic ideas deviate to a certain extent from the culturally accepted, those who explore the idiosyncratic parts of their aesthetic universe. In Ionesco's words:

> Renewing the language is renewing the conception, the vision of the world. Revolution is a change in mentality. All novel artistic expression is an enrichment that corresponds with a requirement of the mind, a broadening of the boarders of the known reality: it is an adventure, it is a risk, it can therefore

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[61] *"L'œuvre d'art répond […] au besoin de faire œuvre de création. […] Le monde ainsi créé n'est pas l'image du monde; il est à l'image du monde."* (Eugène Ionesco, 1962, p. 127) [my underlining]. Virginia Woolf is reported to have said: "Art is not a copy of the real world. One of the damn things is enough" (quoted in Goodman, 1976, p. 3). In contrast to the manifold worlds of modal realism, there are spatiotemporal relations between aesthetic universes and the physical 'worlds'. If it is true that "[t]here are so many other worlds, in fact, that absolutely every way that a world could possibly be is a way that some world is" (see Lewis, 1986, p.2), how much more does this apply to possible aesthetic universes.

[62] *"A quoi sert la musique sinon à être […] révélatrice d'autres lois?"* (Ionesco, 1962, p. 85) [my translation].

> not be a repetition of a catalogued ideology, it cannot serve another reality than its own (because once it is expressed, it is already outdated).[63]

Ionesco wrote that art "is an objective discovery in its subjectivity, […] a testimony of the way the world appears to the artist."[64] In the present context, this can be rephrased as: art is a testimony of the way the aesthetic universe appears to the artist, a reflection of the aesthetic universe in the physical reality. This aesthetic universe is, in turn, influenced by, and connected to the physical world, since the artist exists in the physical world, and so does his or her aesthetic universe (as a conceptual world within the artist's mind). In that sense, art is a testimony of how the world (or at least that virtual part of it) appears to the artist. Ionesco stresses the fact that the universe created by the artist has both objective and subjective aspects: "[A]rtistic creation […] as a construction, as an autonomous universe, as a monument, becomes an objective reality, although, of course, it is subjectively interpreted."[65] He claims that this artistic testimony has objectivity "in its subjectivity".

> The witness tells a story, or not even that; he exhibits how the facts appear to him. He tells the truth… a subjective truth of course. […] The witness […] tells how the world appears to his consciousness. But all testimony is a kind of re-creation, or creation, since everything is subjective. We also know that subjectivities meet. Objective is, therefore, a consensus of subjectivities.[66]

When knowledge belonging to an artist's aesthetic universe is expressed it results in facts in the physical world (the material object or procedure of the artwork) and in knowledge about those facts in the brain of the addressee. According to many authors there is at least a resemblance between the facts about the physical world (**scientific truth**) and the facts the aesthetic universe (**aesthetic truth,** the subjective truth referred to by Ionesco in the previous quote). "From Nelson Goodman's *Languages of Art* and subsequent works, a general view of the arts as contributing to the understanding and indeed to the building of the realities we live in emerges. Ultimately, in Goodman's view, art is not sharply divided, in goals and means, from science and ordinary experience. Paintings, musical sonatas, dances, etc. all are symbols that classify parts of reality for us, as do such things as scientific theories and what makes up common, ordinary knowledge."[67]

Although, according to Stephen Davies, Monroe Beardsley criticizes Goodman's conviction by arguing that "[r]ather than aiming at higher truths, artists bend the truth for the sake of aesthetic effect"[68], many artists and writers attribute equal value to scientific and aesthetic truth. In *Ways of Worldmaking,* Nelson Goodman states: "The arts must be taken no less seriously than the sciences as modes of discovery, creation, and enlargement of knowledge in the broad sense of advancement of the understanding" (Goodman, 1978, p. 102). Ionesco backs this idea, claiming: "I don't believe there is a contradiction between creation and knowledge, because the structures of the mind probably reflect the universal structures."[69] Samuel Coleridge puts it this way: "Poetry […has] a logic of its own, as severe

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[63] "Renouveler le langage c'est renouveler la conception, la vision du monde. La révolution c'est changer la mentalité. Toute expression artistique nouvelle est un enrichissement correspondant à une exigence de l'esprit, un élargissement de frontières du réel connu : elle est aventure, elle est risque, elle ne peut donc pas être répétition d'une idéologie cataloguée, elle ne peut être servante d'une autre vérité (parce que celle-ci étant dite, elle est déjà dépassée) que la sienne."(Ionesco, 1962, p. 85) [my translation].

[64] "*une découverte objective dans sa subjectivité, […] un témoignage de la façon dont le monde apparaît à l'artiste.*" (Ionesco, 1962, p. 84) [my translation].

[65] *"[L]a création artistique […], en tant que construction, univers autonome [my italics], monument, devient une réalité objective, même si, bien sûr, elle est subjectivement interprétée."* (Ionesco, 1962, p. 51) [my translation].

[66] *"Le témoin raconte une histoire, ou même pas; il expose comment les faits lui sont apparus. Il dit la vérité… subjective bien entendu. […] Le témoin […] raconte donc comment le monde apparaît à sa conscience. Mais tout témoignage est une sorte de re-création, ou de création, puisque tout est subjectif. Nous savons aussi que les subjectivités se rencontrent. L'objectivité est donc un consensus des subjectivités."* (Ionesco, 1962, p. 94) [my translation].

[67] Giovannelli, *2010*, referring to Goodman, 1976.

[68] Davies, 1994, p. 9, referring to Beardsley, 1979, pp. 723-749.

[69] *"Je ne crois pas qu'entre création et connaissance il y ait contradiction car les structures de l'esprit reflètent, probablement, les structures universelles."* (Ionesco, 1962, p. 85) [my translation].

as that of science; and more difficult, because more subtle, more complex, and dependent on more, and more fugitive causes"[70].

Umberto Eco goes a step further, making a distinction between what he calls "encyclopedic truth" (physical truth), which are the subject of constant revision, and the indubitability of assertions belonging to aesthetic expression (aesthetic truth), in the following statement:

> So let me use the term 'encyclopedic truths' for all those items of common knowledge that I learn from an encyclopedia (such as the distance of the Sun from the Earth […]). I take these pieces of information to be true because I trust the scientific community, and I accept a sort of 'division of cultural labor' by which I delegate specialized people to prove them. Yet encyclopedic assertions have limits. They are still subject to revision, since science is by definition always prepared to reconsider its own discoveries. If we keep an open mind, we must be ready to revise our […] beliefs about the Sun's distance from the Earth as a result of new astronomical measurements. […] In contrast, the assertion 'Anna Karenina committed suicide by throwing herself in the path of a train' cannot be cast in doubt. (Eco, 2011, pp. 89-90)

This striking idea of the irrefutability of aesthetic truth is also defended by Arnold Schoenberg, who wrote: "in the work of art there are no mistakes, no false doctrines, and for that reason a work of art can never be refuted, whereas it is the sad fate of all human sciences that each new perception, discovery, or invention topples many older theories and assigns a new explanation to the fact" (Schoenberg, 2006, p. 103).

[70] Coleridge, 1817, p. 4, also quoted in the commentary to Schoenberg, 2006, p. 44.

Chapter 3. CIG-serialism and the aesthetic universe

3.1 Preliminary remarks on technique, idiom and style

In the present chapter, we will have a closer look at my artistic practice—and more in particular at the technique of CIG-serialism explained in Chapter 1—in the light of the ideas about the artist's aesthetic universe discussed in Chapter 2. How does the development of CIG-serialism fit those ideas? The present chapter aims at providing an answer to that question, bridging the gap between technique and aesthetics. First, however, some preliminary remarks on the concepts of technique, idiom, and style seem appropriate. The concepts of technique, style, and idiom occur as technical terms in the present thesis, but they are not always used in a clear and distinguishable way in the conventional discourse of aesthetics. Dodecaphony, for example is often referred to as a style, especially in non-academic writing but also within the academic discourse. This seems to me to be a misinterpretation of what 'style' means. To avoid all confusion and misinterpretation it is therefore necessary to distinguish clearly between the concepts of technique, style, and idiom. This is the purpose of the preliminary section of the present chapter. Once the three terms have been clearly defined, the CIG-technique can be assessed accordingly.

3.1.1 Technique

I define a **technique** as 'a set of procedural rules used to create a work of art'. These rules can either be determined by the nature of the medium used in the artistic creation, or they can be used to generate a particular idiom. The former type of rules are what I call **affordance-based**, the latter are **idiogenic**.

Examples of affordance-based rules in the visual arts are the technical rules related to oil painting, or the use of watercolour or liquid household paint. Each of those artistic media requires its own typical techniques. In music, the nature of musical instruments highly determines the compositional and performance techniques; also the techniques of instrumentation and orchestration are determined by the physical affordances provided by the instruments. The Alberti bass[71], for instance, is not just an aesthetical invention as part of the *galant* style of the 18th century, but it may well also be determined by the limitations of the early pianofortes. The tuning of those instruments was very unstable; therefore playing all the notes of a chord simultaneously often yielded an out of tune result. This problem was avoided by playing the notes of the chord one at the time, as is the case in the Alberti bass.

Examples of idiogenic technical rules in the visual arts are action painting, 'drip' technique, calculated composition or the technique of perspective. None of these rules are completely affordance based; the rules of perspective, for instance, can be used in oil painting as well as watercolour, pencil drawing, or any other medium. Calculated composition, the determination of the structure of an artwork with a set of mathematical formulas, is also independent of the medium used. In music, the rules of tonal harmony, Fuxian species counterpoint, dodecaphony (or serialism in general), or the Landini Cadence, to name only some techniques, are independent of the musical medium used. They are therefore not affordance based, but idiogenic.

[71] This accompanying figure was named after Domenico Alberti (1710-1740) who, according to Richard Taruskin, "famously abused it" (Taruskin, 2010, p. 425) (As will become clear later: it was part of Alberti's style).

3.1.2 Idiom

Rules belonging to a technique may be, as was said, idiogenic; this term refers to the idea that techniques may be used to generate a particular idiom. I define the concept of **idiom** as 'a choice or use of a particular set of elements provided by one or several artistic mediums and techniques'. This set of elements is an **idiomatic** set, a set related to a particular idiom.

Idiom is a term commonly used in linguistics. Merriam-Webster's Collegiate Dictionary defines 'idiom' as an "individual peculiarity of language, […] the language peculiar to a people or to a district, community, or class". In this sense it is related to the concept of dialect, although it differs from it to a considerable extent. This can be illustrated with the following example. Regardless of the dialect of the speaker, people use different ways of greeting (different idioms) according to the particular social situation: on formal occasions people use the formula "How are you doing" or even the archaic and nowadays mostly obsolete "How do you do", which is answered with "How do you do". Friends will greet each other with some variation of "Hi!"; whereas in some subcultures formulas like "What 's up!" are used. Although all of those formulas belong to English (a linguistic technique), they belong to different (social) linguistic idioms.

In the arts, there are also different social idioms. Art is often divided into high-brow and low-brow art. Classical music and museums are generally considered to be part of high-brow art; graffiti and pop music are often qualified as low-brow. But there is more than just a distinction between *social* artistic idioms. Depending on which elements provided by artistic mediums and techniques are used, the artworks produced belong to one idiom or another. In visual arts, for instance, figurative and abstract painting are distinct idioms. In music, a distinction can be made between tonal or atonal idioms, dissonant or consonant idioms, metric or a-metric idioms, thematic or a-thematic (or even amotivic) idioms.

3.1.3 Style

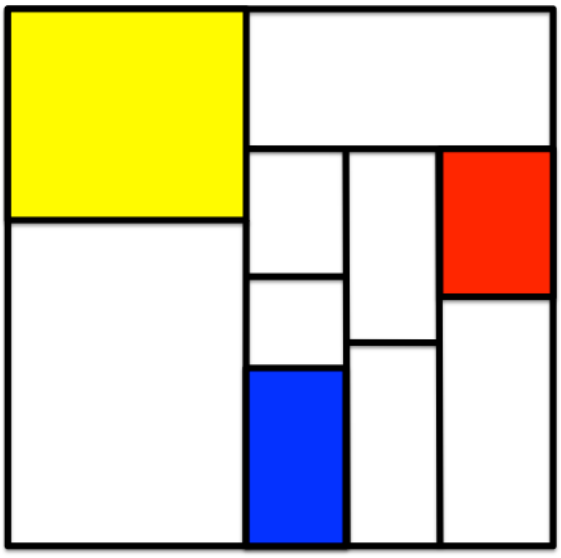
In relation to the arts, Merriam-Webster's Collegiate Dictionary defines the term 'idiom' as "a style or form of artistic expression that is characteristic to an individual, a period, or a movement, or a medium or instrument". This definition of 'idiom' includes 'style', and may therefore be a possible cause of confusion or misunderstanding. That is why I want to distinguish more clearly between the concepts of idiom and style. I define the term **style** as 'a set of particular features that are typical for an artist and that make it possible to identify an artwork as being produced by this artist'. Style is a personal feature; it is related to a particular artist (or group of artists). This is why I call elements related to an artist's style **idiosyncratic**, which refers to an individual's characteristic or quality. The term 'idiosyncratic' is generally used with a derogatory connotation, but is exclusively used in a neutral sense in the present context.

Style makes identification of the artist possible, sometime mistakenly so. A historic example of mistaken identification is provided by the case of the painting *The Disciples at Emmaus*, an alleged work of Johannes Vermeer, 'accidentally' discovered in 1938. This painting, shown in Example 3.1 below, was unanimously acclaimed as a masterpiece by the artistic establishment, which led to some embarrassment when it turned out to be a 'forgery'[72] by Han van Meegeren, who is considered to be one of the most ingenious art forgers of the 20th century.[73]

[72] 'Forgery' is here written between quotation signs, because the work is actually an original, not a copy of an existing work by Vermeer. It is, therefore, no case of plagiarism, only of *stylistic* forgery.
[73] See for instance Kraaijpoel, 1996.

Example 3.1: Han van Meegeren, *The Disciples at Emmaus* (1937)
(source: http://www.statenvertaling.net/kunst/grootbeeld/356.html [last accessed: 31/10/2013]).

In the same way, Example 3.2, below, could be identified as a work of Piet Mondriaan, but it is actually made by me. The obvious misidentification is caused by the fact that Mondriaan's style is extremely recognizable. Highly recognizable style makes 'cheap imitation' easy. In music, this is also the case with the work composers with outspoken and highly recognizable styles such as Dmitri Shostakovitch, Antonio Vivaldi, or Eric Satie.



Example 3.2: not a Mondriaan.

Sometimes stylistic features are hard to grasp, and therefore hard to imitate. Jackson Pollock's 'drip' technique[74], as was used in his painting *N°5* (shown below in Example 3.3) for instance, may seem easy to copy, but it is clear that most imitations fail. There is something in the way Pollock *moves* that results in his inimitable style, something the *result* of which can only be detected in his art. There

[74] A short video clip showing Jackson Pollock at work can be watched on: http://www.youtube.com/watch?v=7bICqvmKL5s [last accessed: 15-10-2013].

appear to be complex fractals in the work of Jackson Pollock; fractals that are the result of the artist's idiosyncratic way of moving, as was claimed by Jennifer Ouellette:

> In Jackson Pollock's drip paintings, as in nature, certain patterns are repeated again and again at various levels of magnification. Such fractals have varying degrees of complexity (or fractal dimension, called D), ranked by mathematicians on a series of scales of 0 to 3. A straight line […] or a flat horizon, rank at the bottom of a scale, whereas densely interwoven drips […] or tree branches rank higher up. Fractal patterns may account for some of the lasting appeal of Pollock's work. They also enable physicist Richard Taylor to separate true Pollocks from the drip paintings created by imitators and forgers. Early last year, for instance, an art collector in Texas asked Taylor to look at an unsigned, undated canvas suspected to be by Pollock. When Taylor analyzed the painting, he found that it had no fractal dimension and thus must have been by another artist.
>
> […] Pollock's drip method was as complex and exquisitely controlled as it seemed crude and haphazard. It often took him weeks to achieve the fractal layerings in his paintings. To create and analyze paintings with similar fractal dimensions (if not the same beauty), physicist Richard Taylor invented a machine he dubbed the Pollockizer. It consists of a container, suspended on a string, that flings paint onto the canvas from a nozzle as electromagnetic coils kick it into motion. Taylor is quick to add that no machine, no matter how clever, can ever replace the human eye when it comes to aesthetic judgments. (Ouellette, 01 November 2001)

Example 3.3: Jackson Pollock, *N°5*, 1984, fragment
(source: http://www.ibay.co.nz/product.php?productid=17388&js=n [last accessed: 31/10/2013]).

On a technical-idiomatic-stylistic level, Igor Stravinsky is a special case in the context of music. Throughout his career Stravinsky has written pieces based on a multitude of techniques in the most distinct idioms, ranging from the impressionistic influences in his early Rimski-Korsakov-influenced works such as *Feu d'artifice* op.4 (1908), over neo-classical pieces such as *Pulcinella* (1920) or *Apollon Musagète* (1928, rev. 1947), to strictly dodecaphonic works such as his late *Movements for Piano and Orchestra* (1958/1959) or the *Variations: Aldous Huxley in memoriam* (1963-1964). Sometimes, a particular style is related to only one of his compositions, as is the case for the seminal *Le sacre du printemps* (1913, rev. 1947/1967), which has been the stylistic inspiration for many composers, while Stravinsky himself evolved in another direction soon after the ballet was finished. Strikingly, although Stravinsky's idioms and techniques cover almost the whole range of at that time customary idioms and techniques, his style remains personal and highly recognizable; in every idiom he uses, the works of Stravinsky remain totally 'Stravinskian'.

Composers usually don't choose their style deliberately. They often only notice the elements of their style after they have been using them for a long time. Stylistic features are often the result of a long evolution of involuntary idiosyncratic mannerism and characteristic peculiarities resulting from natural tendencies. Excessive use of grace notes, for instance, is a feature of my style. I did not introduce them in my music to distinguish my music from that of anyone else; I just used them because I happen to like them. The habit stuck and added to the recognisability of my music; grace notes became a stylistic element of my music without premeditation.

Examples 3.4a & b sum up the examples that illustrate the ideas discussed above. They show the clear distinction made between technique, idiom and style in the present text.

technique	idiom	style
oil paint liquid "household" paint Canvas fiber board ---------- action painting "drip" technique calculated composition perspective	abstract figurative	Jackson Pollock Piet Mondriaan Johannes Vermeer

Example 3.4a: technique, idiom and style in the visual arts.

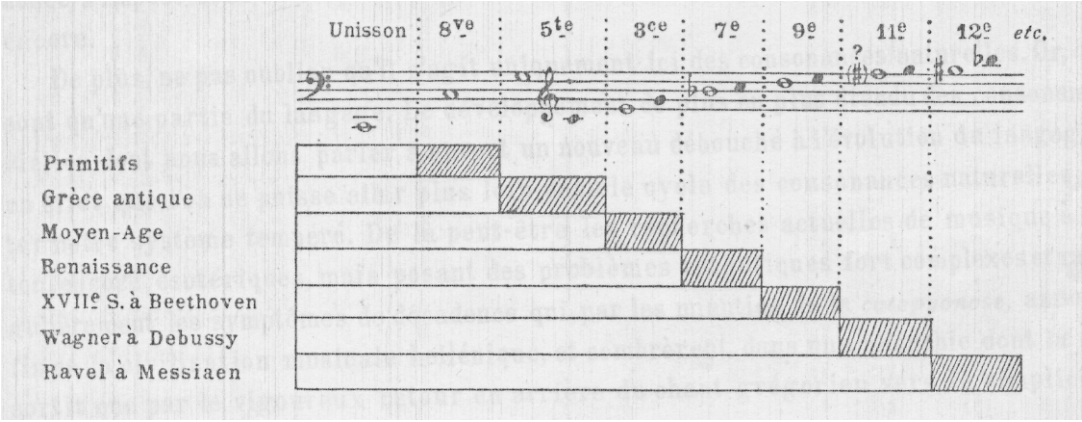
technique	idiom	style
instruments orchestration Alberti bass ---------- rules of tonal harmony dodecaphony/serialism Landini cadence	tonal – atonal consonant – dissonant metric – a-metric thematic – a-thematic (→ amotivic)	Antonio Vivaldi Igor Stravinsky Eric Satie

Example 3.4 b: technique, idiom and style in music.

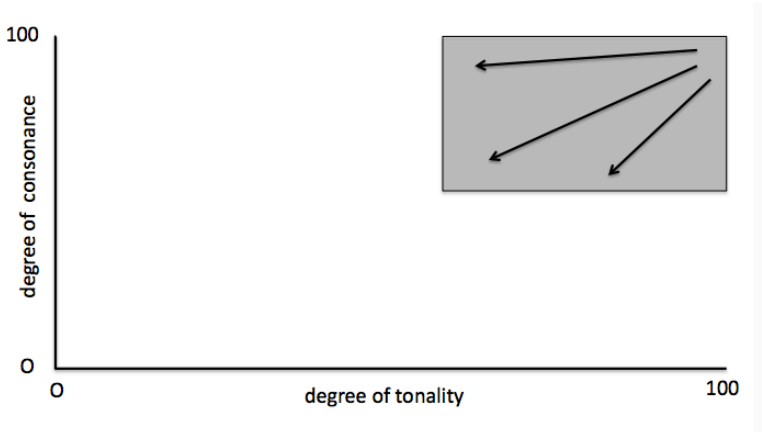
3.2 Aesthetic incentives and goals

It is time now to return to my own compositional practice. As was explained at the beginning of the present thesis, I have always been attracted by atonal and dissonant musical idioms without relying on traditional tonal harmony, consonance or melody formation. Unconsciously I realized that an atonal and dissonant idiom corresponded best to my aesthetic ideas.

Atonality and dissonance have been part of the culture of a growing population, especially in Western Europe, over the last century. Indeed, Western music has continuously evolved towards an increasing degree of atonality and dissonance even long before the start of the 20th Century. The tendency can be observed in the evolution of consonance and 'tonality'[75] from ancient Greek times, over the Middle Ages, Renaissance, all the way to Debussy, Ravel, and Messiaen, as can be seen in the diagram in Example 3.5. The evolution of increasing consonance and dissonance in Western music is also illustrated in Example 3.6.



Example 3.5: historical evolution of consonances,
showing when the indicated intervals became accepted in triadic chords
(source: Chailley, 1951, 15).



Example 3.6: The historical evolution of consonance and tonality in Western music
is shown in the enlarging grey square.

[75] Remember that the term tonality is here used in the broad sense of relation with the diatonic scales, not in the historical sense that distinguishes between modal and tonal music. According to the latter, music from before the start of the 17th century can be called neither tonal nor atonal. For a further discussion of this topic, I refer to my forthcoming doctoral dissertation. For more details on the historical evolution of consonance and its perception, see for instance Chailley, 1951, pp.14-16.

With Schoenberg came the complete "emancipation of dissonance" (Schoenberg, 1975, 260), disconnecting consonance and dissonance entirely from triadic thinking. My musical ideas build further on Schoenberg's legacy. However, whereas Schoenberg's idea have become part of the culture of a still small but increasingly larger group of musicians and listeners, the ideas that I want to express in my compositions are situated just beyond the borders of the culture I belong to, in the front yard of the idiosyncratic part of my aesthetic universe. Although they are influenced by the cultural knowledge that I have build up over the years—and are therefore not completely detached from 'my' culture—they also depart from them to a substantial extent.

Another aspect of my compositional practice (apart from my predilection for atonality and dissonance) is that I aim at the highest possible degree of aesthetic 'pureness'. I try to reach this goal through a directed choice of idiomatic and stylistic elements aiming at the strongest possible coherence of musical materials; this can be done, for instance, by avoiding the blend of tonal and atonal elements.

In 1997, I realized that the existing techniques were inadequate for the expression of my idiosyncratic aesthetic ideas. A new technique was required; one that reflected the endophysical laws of may aesthetic universe more accurately, whilst preserving the idiosyncracies of my personal style. CIG-serialism seemed the outcome of the search for such a technique that was the most suitable and workable to achieve my objectives.

Like dodecaphony or tonal harmony, CIG-serialism too is not more than a technique. A technique is a tool; it is a procedure necessary to express the ideas of an aesthetic universe. What I want to express in my music is not (or at least not merely) a technique. Technical aspects may belong to the aesthetic message I want to convey, just like grammatical aspects may belong to the message conveyed in a poem, but to reduce a message to the technique used to express it would be an undervaluation of the aesthetic value of a work of art.

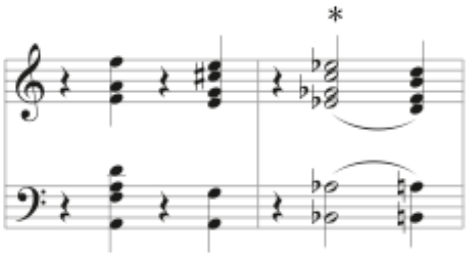
I am well aware of the fact that the CIG-serialism as a means to obtain technical and idiomatic purity is necessarily limiting my choices as a composer, but in this respect, CIG-serialism does not differ from other compositional techniques or idioms, including the tonal ones. Limitation is indeed central to any form of composing. A composer can only create a musical structure that can be called a 'composition' by choosing certain elements, and thereby excluding all others. Without making that choice, without imposing restrictions, there is no composition, no matter how strict or flexible those restrictions may be. John Cage's piece *4'33"* (from 1952), for instance, is based on only two well-specified constraints: the duration of the piece and the actions performed (or rather not performed) by the performer(s). The piece is limited in time to a duration of exactly four minutes and thirty-three seconds—hence the title. In addition, the score just prescribes that the performers do not play their instrument throughout the entire three movements of the piece. The performers are therefore, just as is the case in any other composition, not entirely free in their actions. Without the presence of these restrictions *4'33"* could not be called a fully-fledged composition.

Composers of any stylistic or idiomatic predilection—whether tonal or serial or whichever stylistic or idiomatic group—pick the elements they want to use and the elements they want to avoid in their compositions. The purer they want to keep their idiom, the more stringent and targeted the restrictions they impose upon themselves will be. Despite persistent general opinions, the choices made in what is traditionally called tonal music, are no less restrictive than those of serial composition. Tonal music is mostly limited to the local use (during a shorter or longer duration within a piece) of *only* seven of the twelve pitch classes of the chromatic scale (the so-called diatonic sets[76]), while most serial techniques exclude no pitch class (sometimes they don't even limit themselves to those of the chromatic scale). In terms of the simultaneous use of the pitch classes (in chord formation) the limitations of tonal music are even stricter still. Traditional tonal chords are formed exclusively by stacking minor and major

[76] The term 'diatonic set' is here used in its larger sense including pc-sets 7-32, 7-34 and 7-35.

thirds on top of one another. This limits the tonal composers to only 4 of the 19 possible triads (the tonal triads) and 8 of the 43 possible four note chords (the seventh chords). Chords containing more than four pitch classes are very rare in tonal music (at least until the end of the nineteenth century), since they reduce the perception of tonality and are situated at or beyond the border between tonality and atonality. And if, in rare cases, ninth chords occurred in tonal music, their use was vigorously restricted for centuries, as is rather painfully (to 21th century musicians at least) illustrated by the following example.

When Arnold Schoenberg composed his string sextet *Verklärte Nacht* op. 4 back in 1899, inversions of ninth chords were strictly forbidden and 'therefore' nonexistent, as Schoenberg describes in his seminal *Harmonielehre* (Schönberg, 1983, p. 346). The Viennese *Musikverein* refused to programme the sextet because of a single inversion of a ninth chord it contains (in Example 3.7 below, the ninth chord is indicated with an asterisk).



Example 3.7: bars 41 and 42 of Arnold Schoenberg's *Verklärte Nacht* Op. 4.

Schoenberg remarked, not without a healthy dose of cynicism:

> Only now I understand the objection, at that time beyond my comprehension, of that concert society which refused to perform my Sextet on account of this chord (its refusal was actually so explained). Naturally: inversions of ninth chords just don't exist; hence no performance, either, for how can one perform something that does not exist. (Schönberg, 1983, p. 346)

In sixteenth-century music even tighter restrictions were prevalent than in later tonal music. Josquin Desprez and his contemporaries squeezed into a very tight straitjacket of musical restrictions. However, this does not diminish the artistic value of their music. On the contrary, Goethe's *"In der Beschränkung zeigt sich erst der Meister"*[77] (Goethe, 1906, p. 235) may be regarded as a quality label. This applies to serial music as much as to tonal music. To create valuable art with limited resources is an artistic endeavor of all time.

The difference between my approach—which may be considered to be part of the ideas of (neo-) modernism[78]—and its more traditional counterpart lies in the fact that in my idiom based on a serial technique I am consciously exploring aesthetic boundaries in order to expand my aesthetic universe, and the possible aesthetic universe of the culture that is willing to adopt my music and the aesthetic ideas it expresses. I strive for independence in that area but realize that I can never ignore tradition.

[77] The quote literally translates as "It is in restrictions that the master reveals himself", which is more commonly phrased as "less is more".

[78] Artistic modernism is an aesthetic movement, tendency or conviction that searches for aesthetic innovation, in order to push (cultural) aesthetic boundaries. Historically, an idea of progress, improvement and truth has been associated with modernism since the Enlightenment; an idea that, in my opinion, no longer seems tenable after postmodernism. That's why I prefer "neo-modernism" as an epithet for my idiom and style, since it distinguished between the idea of innovation and the idea of progress.

My choices are necessarily coloured by influences from the culture that I carry with me. That does not mean that it is impossible to move aesthetic boundaries in an imaginative, personal and meaningful way. I just feel no obligation to adopt the artistic restrictions determined by the compositional practice of the past unchanged and unchallenged. Such obedience to tradition would be, according to Gustav Mahler, mere "sloppiness"[79], as was already suggested before.

In addition to my search for purity, the search for music that forms an organic sounding whole is a second major aesthetic endeavour in my practice as a composer. Striving for organic unity in serial composition assumes that the resulting musical works transcend their strictly serial substructure. In this respect, I like to compare my approach, once again, with the principles of genetics: just as living organisms are highly (but not solely) determined by their genetic material, my compositions are highly (but not solely) determined by their series. The series not only provides for the pitch material but also directs the course of the entire structuring and transforming process leading to a piece of music, comparable to the biochemical processes that transform genetic material (the organism's genotype) into the ultimate living organism (its phenotype). But just like living beings transcend their genetic material, my compositions (the musical phenotype) are more than the series (the structural genotype) on which they are based. In this creative process, which to a large extent is based on intuitive aesthetic sensitivity or taste, the serial technique is not more decisive than the way it is implemented. Technique and artistic taste cannot be considered separately from each other but should complement each other in a constant interaction. Strictly adhering to rules does not guarantee artistically valuable results; an aesthetic transcendence is un-dispensable. In this respect again, serial techniques are in no way different from the techniques used in tonal composition.

My serial technique may be cerebral, but that does not mean the music that results from it is not more than a product of the brain, lacking all expressive power and emotion. Serial music is not necessarily less expressive, or no less 'coming from the heart' than tonal music. Each composition is a product of cerebral effort. The thought processes of composing, irrespective of the style or idiom or the technique used, are partly conscious but also escape to some extent conscious control, as was mentioned before. It is these uncontrolled processes that are said to come 'from the heart'. Both conscious and unconscious cerebral processes provide organic structure, coherence, and consistency of a composition.

Besides constrains, structure is a second indispensable cornerstone of composing. Without structure, there can be no question of a composition. Igor Stravinsky noted in this context: "Music's exclusive function is to structure the flow of time and keep order in it."[80] Strictly designed structure is no impediment to expressive power however. Musical expression is a controversial concept. Stravinsky claims that music is not able to express anything at all. He writes:

> I consider that music is, by its very nature, essentially powerless to *express* anything at all, whether a feeling, an attitude of mind, a psychological mood, a phenomenon of nature, etc....*Expression* has never been an inherent property of music. That is by no means the purpose of its existence. If, as is nearly always the case, music appears to express something, this is only an illusion and not a reality. It is simply an additional attribute which, by tacit and inveterate agreement, we have lent it, thrust upon it, as a label, a convention - in short, an aspect unconsciously or by force of habit, we have come to confuse with its essential being. (Stravinsky, 1962. pp. 53-54)

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[79] *"Tradition ist* Schlamperei" Quoted in Ditzler, 1998, p. 11. Charles Rosen phrases it even more strongly: "The name generally given to widely accepted error is *tradition"* (Rosen, 1994, p.11) [Rosen's italics].

[80] Quoted in Szamosi, 1986, p. 232. This puts Stravinsky in line with Eduard Hanslick who wrote: "The content of music is tonally moving forms." (Hanslick, 1986, p. 29).

On the other hand, if we restrict the term 'expression' to 'emotional expression'—the kind of expression Stravinsky was probably referring to[81]—one could argue that there is no music that is *not* expressive; that all music has the potential to express something. Just like every object of communication, whether it is a poem, a statement or a facial expression, music is potentially expressive. That expression is subjective, relative and culture-bound. Musical expression is subjective because each listener reacts in a different way on the musical stimuli, and the response to these stimuli depends on the context in which the music is heard. The expression is relative and culture-specific because it depends on the relationship between the listener and the music. This relationship is personal and is partly due to the familiarity of the listener with the culture the music belongs to, as was discussed above. Let us, in order to make this clear, compare music with poetry. People who do not understand Japanese could, based on their complete lack of familiarity with the language, claim that un-translated Japanese poetry doesn't express anything. A poetry-loving Japanese would strongly object. The same can be said in relation to the music: acculturation and familiarity with the musical idiom are essential in order be able to explore and experience the expressive possibilities of *any* idiom. Most Westerners are familiar with the tonal system because they are exposed to it from childhood and because its boundaries are familiar. The tonal system has become part of their aesthetic universe through education. Idioms with new or less familiar elements that lie beyond the borders of the listener's aesthetic universe or culture provide for many listeners much bigger difficulties; not only atonal music—like most serial music—but also non-Western music such as the music of Japanese Kabuki theatre, but that does not mean that this music has not expressive power.

3.3 Conclusion and further directions

My artistic practice as a composer gradually evolved into a search for a technique that would yield an atonal, dissonant and structurally amotivic idiom in the purest possible way, without major influence on my personal style. Starting from ideas of Reginald Smith Brindle and from Arnold Schoenberg's dodecaphony, this resulted in the development of the technique of CIG-serialism described in the present thesis. This technique has proven to serve my artistic purposes adequately. It has been the basis of all of my compositions since 1997, and has enabled me to appropriately express the (idiosyncratic and other) ideas of my aesthetic universe.

Because of their size, CIG-series turned out to be an unquenchable source of musical material. Indeed, for over ten years, all my pieces from *Les racines du monde* (1998) up to the piano quintet *Que l'aube apporte la lumière* (2008) have been written with one and the same series, and still, I am convinced that not all of the possibilities this series provides have been exploited.

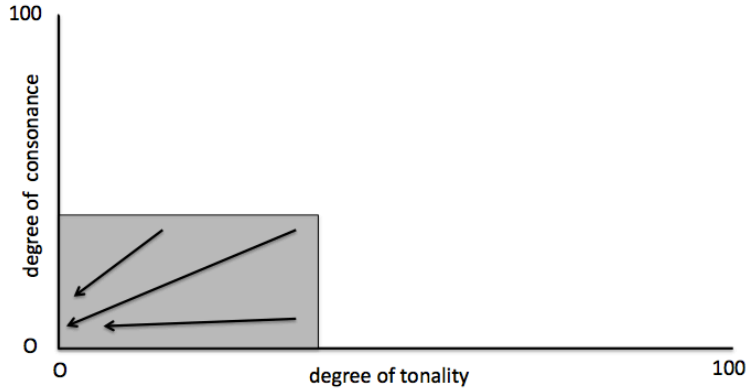
The fact that the CIG-technique optimally serves my artistic purposes does not mean that no assessment or adaptations to further optimize the technique are required or desirable. Indeed, there is a considerable flaw to the CIG-technique. As we have seen, the technique started from assumptions made by Reginald Smith Brindle about the construction of atonal series and from my own assumptions about the dissonance of ic1.

Smith Brindle claims that series based on the exclusive occurrence of (what I called) chromatic interval groups have *a high degree* of atonality, but he does not specify what is meant by this degree of atonality. It suggests that music is not either tonal or atonality, but that it has some sort of degree of tonality that makes it more or less tonal, more or less atonal.

My claim that ic1 is the most dissonant harmonic interval was also no more than an assumption. What are this claim and Smith Brindle's claim about atonality based on? A thorough assessment seemed necessary to corroborate both claims. This was the starting point for the doctoral research I started in

[81] In the broader sense of the term 'expression' used in the present text, *all* art is expression (of ideas belonging to the artist's aesthetic universe).

2009. In this research I studied the concepts of tonality and consonance and developed two formulas that allowed for a quantification of degrees of tonality and prime consonance. Those formulas were necessary to assess the CIG-technique and, if necessary, to make adaptations to the technique in order to obtain a technique that systematically results in music with an even higher degree of atonality and dissonance (as is illustrated in Example 3.8), thus making my idiom as pure as possible.



Example 3.8: the aim of the systematization of atonality and dissonance in my doctoral research.

Appendix 1
Analysis of *Les racines du monde* for piano (1998)

The first piece I wrote with the CIG-technique was the piano solo piece *Les racines du monde*. Jan Christiaens describes the piece as follows:

> The overall progression of pitches in *Les racines du monde* proceeds through the whole ambitus of the piano keyboard, starting with the lowest note and ending with the highest. Seen from this perspective, the title of the work seems to refer to a cosmic evolution, in which the creation of human life out of the primal elements of the world (*les racines du monde*) is evoked. The lowest register of the piano can be seen as a representation of anorganic nature, while the middle register is the creation of organic nature and the descant range symbolises the development of human life. *Les racines du monde* can thus be considered a sounding paraphrase of Schopenhauer's philosophy of music. (Christiaens, 2005, p. 38) [my italics]

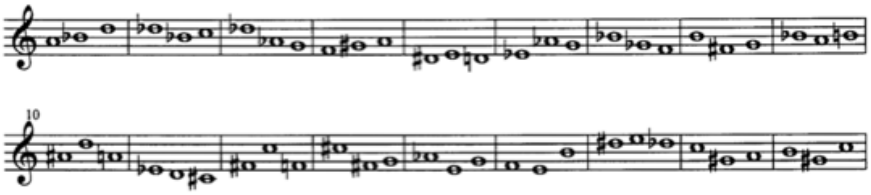
Although the title of the piece was chosen predominantly for its poetic value, there may be some unconscious truth in Christiaens' description. In retrospect, the title may also refer to the idea of the aesthetic universe, an idea that I only developed many years later though, but that may have been present in an unconscious way from the start. *Les racines du monde* could then be interpreted as the root of a new aesthetic world, as the title suggests. Being the first piece composed with the technique of CIG-serialsm it is indeed the first expression of ideas belonging to a new area of the idiosyncratic part of my aesthetic universe. It is this idiosyncratic part (or at least the procedural knowledge belonging to it) that I have explored and expressed in the years following the composition of *Les racines du monde* until today. The piece may therefore justly called 'the root of a new world'.

Christiaens stresses the contrast between the title of the piece and its rigorously calculated substructure when he writes:

> The evocative title does not, however, betray anything of the restrictive compositional process on which this work is based. Vanhecke writes in the post-serial tradition, ordering a number of parameters of the sound in discreet quantities and then mutually correlating these elements according to a strict mathematical matrix.
>
> In this work, only the parameters of pitch and duration are subjected to a (typically serial) analytical concept of musical material. The composer did leave himself the freedom to decide such matters as the sound intensity (dynamics) and the timbre (here, the manner of attack) of each note. In terms of the first, the overall dynamic curve of the work runs parallel to the pitch evolution. The lowest registers of the piano keyboard are generally loud (up to ***fff***); as the work moves through various octave registers up to the highest notes of the keyboard, the volume generally decreases (to ***ppp***). The variation in timbre is mainly dependent on this dynamic spectrum, since the composer works with only three nuances concerning the manner of attack: accented (>), staccato and normal attack.

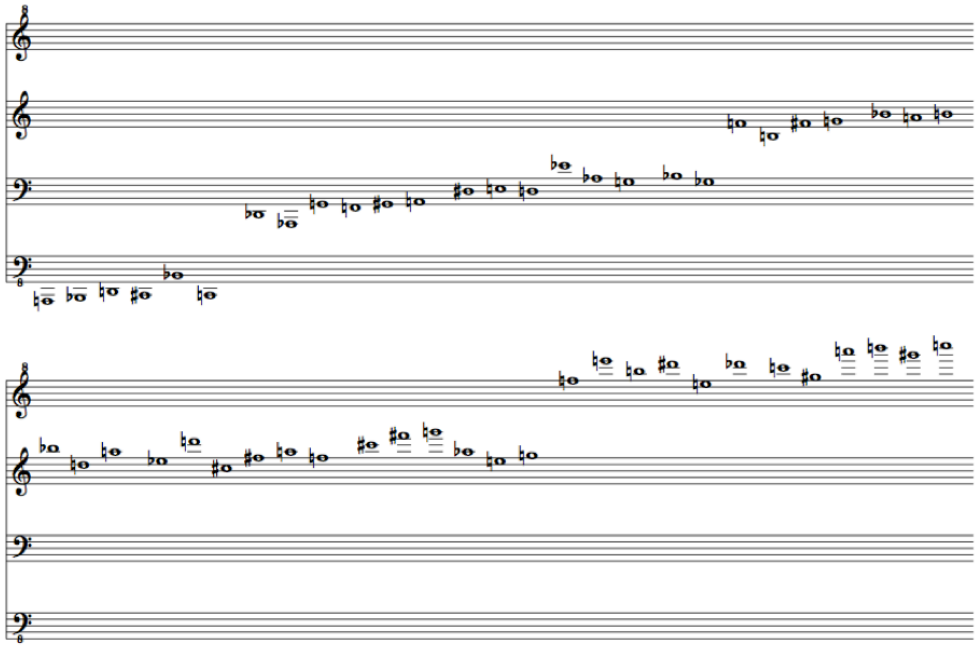
> For the pitch organisation of *Les racines du monde*, Vanhecke uses a basic series of 54 notes, the structural characteristics of which are established with an eye to the final sounding result. The basic series is constructed of eighteen cells, each with three notes, (at least) two of which are at a distance of a semitone.
>
> Keeping in mind this restriction, there are only eighteen different three-note cells with the above characteristics that can be constructed from the chromatic total. (Christiaens, 2005, pp. 38-39)

It is important to remark that Jan Christiaens mistakenly talks about "only eighteen different" CIG's. He does not take into account that the CIG's are interwoven in the series, i.e. that the CIG's do not only appear successively (note 1-3, note 4-6, note 7-9,…). Example A1.1, taken from Christiaens's analysis clarifies his interpretation.



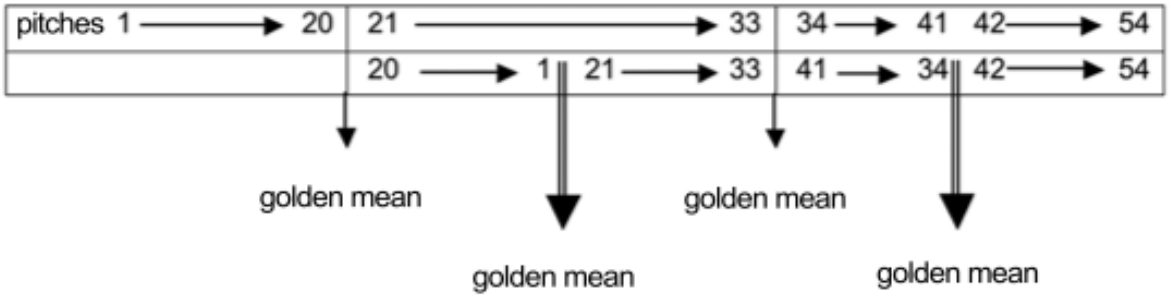
Example A1.1: erroneous subdivision of the series of *Les racines du monde.*

A more accurate representation of the series of *Les racines du monde* is given in Example A1.2. It shows how the notes of the series are distributed over the whole range of the piano, starting on the lowest A and ending on the top C, as was also mentioned by Christiaens. In this case, the series notes do not represent pitch classes—as is usually the case in serial music—but actual pitches. The first series note (A) for instance only occurs as the lowest pitch of the piano, never in a higher octave. The piece therefore only uses 54 of the 88 possible pitches on a standard piano.



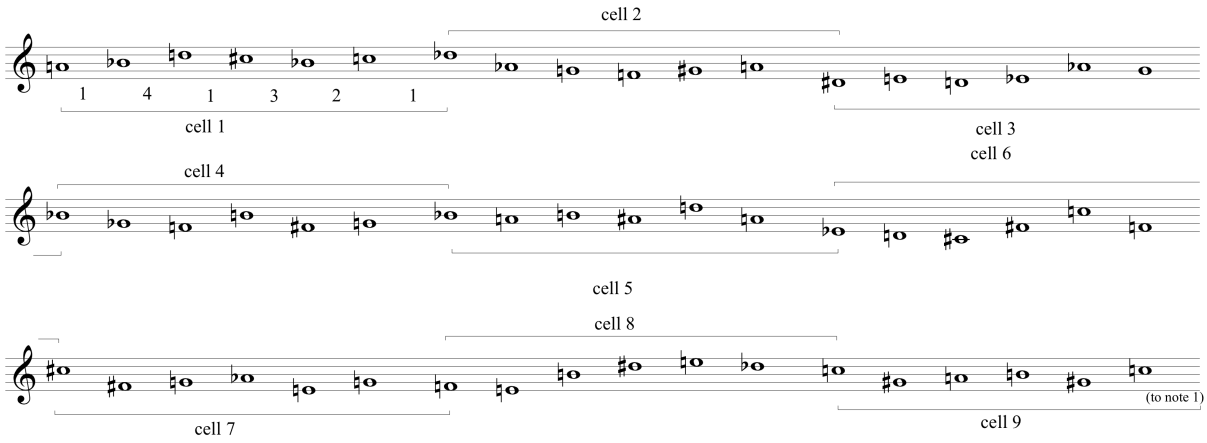
Example A1.2: distribution of the series notes of *Les racines du monde* over the whole range of the piano.

The series is run through twice in the piece. The pitches (series notes) are distributed according to the golden ratio principle. The golden ratios for a series of 54 notes occur at 20,25 and 33,75. After note 20 starts the second presentation of the series going from note 20 to 1 backwards and then from note 21 to 31. After note 33 the second presentation of the series runs from note 41 to 34 (41,64 being the golden ratio between 34 and 54) and then from 42 to 54, in parallel with the first cycle. This distribution is illustrated in Example A1.3.



Example A1.3: distribution of series notes in *Les racines du monde* according to the golden ratio principle[82].

The RHS of *Les racines du monde* is based on 9 rhythmic cells consisting of six note lengths. The note lengths are determined by the unordered interval class content between the series notes. The first rhythmic cell contains the first six interval classes in the series (1 4 1 3 2 1). The second rhythmic cell the next six, and so on, as indicated in Example A1.4.



Example A1.4: determination of the 6 rhythmic cells of based on the unordered interval class content of the series.

Each rhythmic cell appears in prime form and in retrograde exactly once in each of six augmentations (with basic lengths of a demi-semiquaver triplet semiquaver, semiquaver, triplet quaver, quaver and crotchet[83]), and which are distributed over the series notes according to a classification of the CIG of which the series notes are the first note, in a procedure similar to that of the N-matrix described below in the analysis of *Le sourire infini des ondes*. This way, each op the 108 central notes in the piece is assigned a unique rhythmic cell.

[82] The golden ratio is called 'golden mean' by Jan Christiaens in this example taken from Christiaens, 2005, p. 38.
[83] Note the deviation from the rhythm chart that was not net used at the time of composition of *Les racines du monde*: The crotchet is later replaced by a dotted quaver in the rhythmic chart.

The distance between the start of successive rhythmic cells within the RHS of *Les racines du monde* was chosen freely and according to my own artistic taste in order to obtain a 'balanced' rhythmic structure. As was mentioned in Chapter 1, the order of presentation of the rhythmic cells was not always preserved; at times deliberate 'mutations' occur.

Appendix 2
Analysis of *Le sourire infini des ondes* (2009).

1. Title

Le sourire infini des ondes is a piece for an ensemble or nine performers (bass flute, bass clarinet, horn, percussion, piano en string quartet) that was commissioned in 2009 by the Spectra Ensemble.

The title of *Le sourire infini des ondes* is taken from Luigi Nono's explanatory notes accompanying his piece *...sofferte onde serene...* for piano and tape from 1976. In these notes, Nono talks about the *"endless smile of the waves"* (Nono, 1993, p. 320). Nono himself places the expression between quotation marks because it is a quote from *Prometheus bound* by Aeschylus :

> O divine air Breezes on swift bird-wings,
> Ye river fountains, and *of ocean-waves*
> *The multitudinous laughter* Mother Earth!
> And thou all-seeing circle of the sun,
> Behold what I, a God, from Gods endure![84]

2. Elements from ...*sofferte onde serene...*

The structure of *Le sourire infini des ondes* is based on the following elements from *...sofferte onde serene...*:

a) form and duration

...sofferte onde serene... consists of nine sections, separated by eight "tape reference points" (*riferimento nastro*) indicated in the score. Nono's indications of the precise moment of occurrence of each of tape reference point in the score are listed in Example A2.1:

reference point	time
1	54"
2	1'56"
3	2'57"
4	5'11"
5	6'49"
6	9'16"
7	11'49"
8	13'14"

Example A2.1: tape reference points in the score of *...sofferte onde serene...*

The total duration of the piece is 13'58".[85]

---

[84] Aeschylus, *Prometheus* bound, http://classics.mit.edu/Aeschylus/prometheus.html [my italics][last accessed 10-02-2012].

[85] 13'58" is the exact duration of the recording of the piece made by Maurizio Pollini in 1979. Pollini was the pianist who worked in close collaboration with Nono during the composition of the piece and the recording of the tape. Therefore, this recording may be seen as a reference.

b) tempo structure

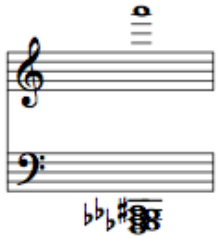
The tempo of ...*sofferte onde serene*... fluctuates constantly between the following speeds:

♩ = 35, 40, 44, 46, 50, 54, 58, 60, 63, 66 en 72

In addition, numerous tempo changes occur in ...*sofferte onde serene*... in the form of rallentandi and accelerandi, especially in the first two sections of the piece.

c) the first chord

...*sofferte onde serene*... starts with the following chord (Example A2.2):



Example A2.2: first chord of ...*sofferte onde serene*...

This chord contains the pitch classes of the pitch class set with Forte number [6-14] with interval vector <323430>. Notice the absence of ic6 in the interval vector.

3. Form of *Le sourire infini des ondes*

Le sourire infini des ondes consists of nine sections that correspond to the nine sections of ...*sofferte onde serene*.... They contain the same number of crotchet beats as each corresponding section in Nono's piece, as is shown in the list below (Example A2.3).

section	number of crotchet beats
1	39
2	39
3	20
4	96
5	96
6	112
7	144
8	56
9	16

Example A2.3: number of crotchet beats in each section
of ...*sofferte onde serene... and Le sourire infini des ondes*.

Although the number of beats in each section is exactly the same, the grouping of the beats in bars is different from that of ...*sofferte onde serene*.... This grouping is adapted in order to make tempo indications and changes coincide with the beginnings of bars as much as possible. The time changes in

Le sourire infini des ondes are therefore not related to metre (since the piece is essentially a-metric) but to the tempo structure of the piece.

4. Tempo structure and duration

a) tempo structure

The tempo structure of ...*sofferte onde serene*... is adopted unchanged in *Le sourire infini des ondes*, with exactly the same tempo changes and pauses (fermata). The position of the fermata in the piece may differ slightly from that of ...*sofferte onde serene*....

b) duration in motion

Starting from the tempo structure within each section of ...*sofferte onde serene*..., but disregarding the fermata, and assuming that tempo changes happen in a linear way (in order to be able to use the average of the highest and lowest tempo in each tempo change), the 'duration in motion' of each section can be calculated. The 'duration in movement' of a section is its duration without the fermata.

For instance, section 6 'moves' during 52 beats at the tempo72 for a crotchet first. This is followed by a linear rallentando from 72 to 50 during 8 beats. The tempo remains 50 during 32 beats and then continues at tempo 32 for 20 beats as shown in the list in Example A2.4.

tempo	number of crotchet beats
♩ = 72	52
♩ = 72 → ♩ = 50	8
♩ = 50	32
♩ = 35	20

Example A2.4: number of crotchet beats in section 6 in different tempos

The duration in motion of section 6 can be calculated as follows (taking 61 to the crotchet as the average tempo during the rallentando):

(60" x 52 / 72) + (60" x 8 / 61) + (60" x 32 / 50) + (60" x 20 / 35) = 123,89"

The duration in motion of section 6 is therefore (approximately) 125 seconds. The duration of the other sections is calculated in the same way.

c) pauses

The difference between duration in motion and (real) duration of each section between the points of reference is the time that has to be allocated for the pauses. The table below (Example A2.5) shows a complete overview of the time distribution of ...*sofferte onde serene*...:

section	total duration	duration in motion	total duration of pauses	number of crotchet beats
1	54”	51”	3”	39
2	62”	43”	19”	39
3	61”	34”	27”	20
4	134”	95”	39”	96
5	98”	50”	48”	96
6	147”	125”	22”	112
7	153”	154”	-1” (!)	144
8	85”	84”	1”	56
9	44”	24”	20”	16
total	838”	658”	180”	618

Example A2.5: time distribution of ...*sofferte onde serene*....

Note that section 7 has a duration in motion that lasts 1 second longer than the total duration and that, as a result, there is no time left to add a fermata. This can only be done when the tempi of this section are made a little higher than prescribed, but this can be no objection, since all tempi in ...*sofferte onde serene*... are marked “circa”.

I opted not to determine the length of the fermata for each section separately (a.o. because this creates the problem mentioned above in section 7), but to distribute the entire duration of the fermata (180 seconds) over all the fermata of the piece on the basis of the following criterion.

The whole piece contains 51 pauses of two kinds: short and long, indicated in the score as shown below in Example A2.6.

Short pause :

Long pause : 

Example A2.6: notation of short and long pauses.

The pauses are distributed over the sections as indicated in the table of Example A2.7 below.

Section	Number of	Number of 
1	4	1
2	1	1
3	2	2
4	19	9
5	5	1
6	0	2
7	1	1
8	0	1
9	0	1
total :	32	19

Example A2.7: distribution of pauses in ...*sofferte onde serene*...

The total duration of pauses (180") is the sum of 32 short and 19 long pauses.

180 = 32 x 𝄐 + 19 x 𝄐

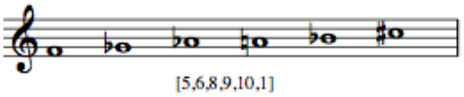
With this formula, the average duration of 2 to 3 seconds was determined for short pauses, and of 4 to 7 seconds for long pauses.

𝄐	=	2 - 3"
𝄐	=	4 - 7"

Example A2.7: average distribution of pauses in ...*sofferte onde serene*...

5. Construction of the series

For the construction of the series for *Le sourire infini des ondes*, I took the first chord of ...*sofferte onde serene*... as a starting point. This first chord is based on the pitch class set with forte number [6-14]. Reduced to its normal form, this pc-set is shown in Example A2.8:



Example A2.8: pc-set of the first chord of ...*sofferte onde serene*...

The prime form of this pc-set is: (013458).

My aim was to construct a series that contained permutations of the pc-set [6-14] as often as possible. In total, there are 720 possible orderings (permutations) of [6-14]. However, most of these cannot be used in the construction of the series because they do not consist entirely of chromatic interval groups, and therefore cannot be contained in a CIG-series.

An analysis of the prime form (013458) shows that its permutations contain CIG's that are all permutations of the following (unordered) pitch class sets:

(0,1,3)	(1,3,4)
(0,1,4)	(1,4,5)
(0,1,5)	(3,4,5)
(0,1,8)	(3,4,8)
(0,3,4)	(4,5,8)
(0,4,5)	

Eight of these represent the same pc-set twice; they differ only by transposition but contain the same interval sequence: (0,1,4) is an instance of the same pc-set as (4,5,8), (0,1,5) the same as (3,4,8), (0,1,8) the same as (0,4,5), and (0,3,4) the same as (1,4,5).

Therefore, finally only 7 pc-sets remain. Each of those can be ordered in six ways to form 42 CIG's. The interval content of the CIG's is listed below.

for	(0,1,3):	:	+1+2	+3-2	-1+3	+2-3	-3+1	-2-1
	(0,1,4) or (4,5,8)	:	+1+3	+4-3	-1+4	+3-4	-4+1	-3-1
	(0,1,5) or (3,4,8)	:	+1+4	+5-4	-1+5	+4-5	-5+1	-4-1
	(0,1,8) or (0,4,5)	:	+1-5	-4+5	-1-4	-5+4	+4+1	+5-1
	(0,3,4) or (1,4,5)	:	+3+1	+4-1	-3+4	+1-4	-4+3	-1-3
	(1,3,4)	:	+2+1	+3-1	-2+3	+1-3	-3+2	-1-2
	(3,4,5)	:	+1+1	+2-1	-1+2	+1-2	-2+1	-1-1

Each ordered appearance of [6-14] in the series should consist only of CIG's. There are 56 permutations of the prime form of [6-14] in which all groups of three consecutive pitch classes (each group of two consecutive intervals) form one of the 42 possible CIG's. These 56 permutations are shown below (without brackets):

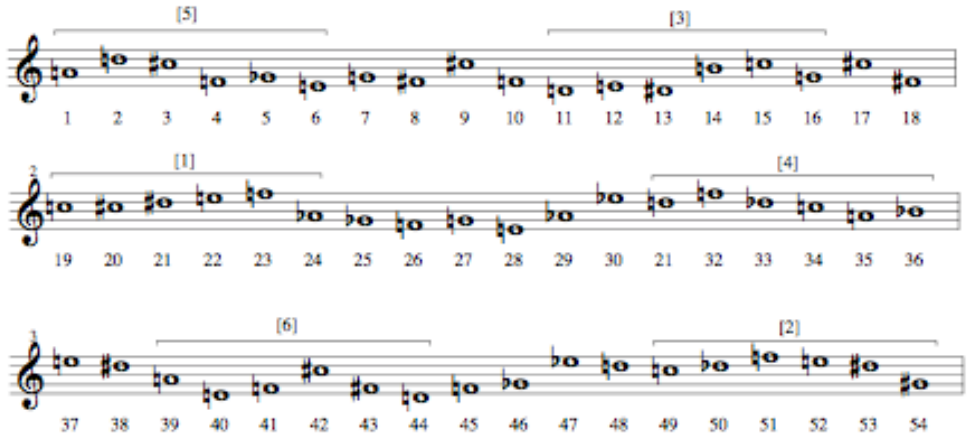
013458	013485	015438	015483	031458	051438
103458	103485	105438	105438	105483	130458
150438	301458	301548	310458	310548	345018
345108	354018	354108	384501	384510	501348
501438	510348	510438	534018	534108	543018
543108	584301	584310	801345	801435	801453
801543	810345	810435	810453	810543	834015
834051	834105	834150	834501	834510	843015
843105	845013	845103	854013	854031	854103
854130	854301	854310			

It is obvious that not all of these permutations of [6-14] can appear together in the CIG-series, because one and the same CIG would occur more than once, and this is forbidden in CIG-series, even if the CIG's occur in different transpositions. (013458), for instance, cannot be used in the series together with (013485), because both ordered pc-sets contain CIG (0,1,3).

Starting from the prime form (013458) considered as an ordered pc-set, all permutations of [6-14] that contained a repetition of the CIG's in the permutation (013458) were eliminated. This resulted in the six remaining permutations that could occur in the same CIG-series listed below, together with their ordered interval class content.

[1]	(013458)	+1	+2	+1	+1	+3
[2]	(015438)	+1	+4	-1	-1	+5
[3]	(354018)	+2	-1	-4	+1	-5
[4]	(584301)	+3	-4	-1	-3	+1
[5]	(810453)	+5	-1	+4	+1	-2
[6]	(834051)	-5	+1	-4	+5	-4

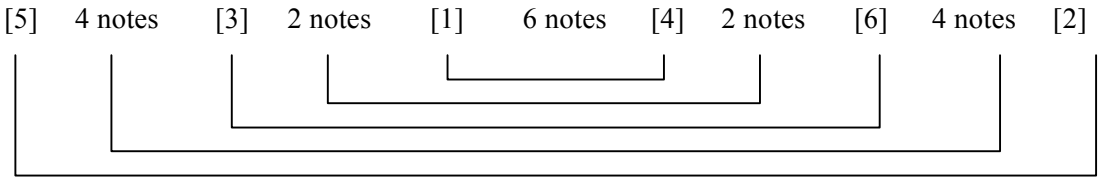
These six permutations were incorporated into the CIG-series of *Le sourire infini des ondes*. I constructed the sequence in such a manner that the six permutations of [6-14] are distributed symmetrically within the series, and that the four instances of ic 6 (the only ic that does not occur in the interval vector of [6-14])[86] are placed symmetrically around the two axes of symmetry. This resulted in the series shown in Example A2.9:



Example A2.9: permutations of [6-14] in the series of *Le sourire infini des ondes.*

The six permutations of [6-14] in the series are indicated with numbers in square brackets. The axes of symmetry occur between notes 54 and 1 (the 'end' and 'beginning'[87] of series), and between notes 27 and 28 (the middle of the series). The six permutations of [6-14] are distributed at equal distances from the axes of symmetry as shown below:

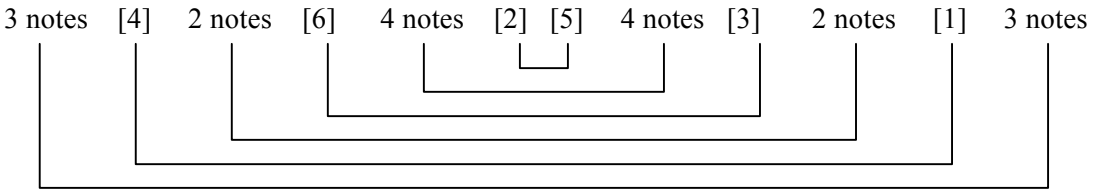
Axis of symmetry in middle of series (between note 27 and 28):



[86] The interval vector of [6-14] is <323430>. Each number in an interval vector indicates the number of interval classes in the pc-set. The first number in the string indicates the number of ic 1's (3), the second number the number of ic 2's (2), etc.. The last number in the interval vector (0) indicates there are no ic 6's in [6-14].

[87] 'End' and 'beginning' are here written between quotation marks, because strictly speaking, a CIG-series has no beginning or end. It has a ring shape, as was explained in chapter 1.

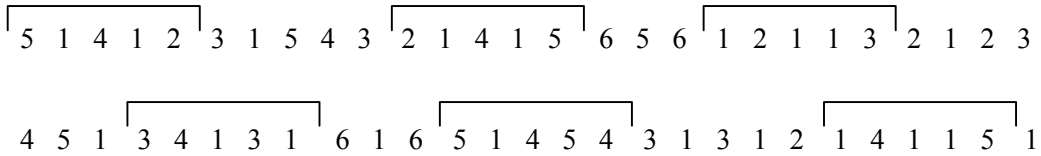
Axis of symmetry at beginning of series (between note 54 and 1):



The ic 6's constitute the transitional intervals between notes 16 and 17, 18 and 19, 36 and 37 and 38 and 39, which are also situated symmetrically (at paired equal distances) from the axes of symmetry.

6. Determination of rhythmic cells

Once the series is determined, the next step in my compositional process consists of attributing rhythmic cells to every series note. In the case of *Le sourire infini des ondes,* this is done by defining nine rhythmic cells based on the interval content of the series. The complete set of unordered interval class numbers of the series of *Le sourire infini des ondes* is:



The square brackets in this string of numbers indicate the interval class numbers of the six permutations of [6-14]. Six of the rhythmic cells are determined by the interval content of those six permutations. The other rhythmic cells are formed by the interval class numbers between the six permutations in the series. The sets containing ic 6 are left out, because they would result in rhythmic cells with only three note lengths. The omission of ic 6 also reflects the absence of ic 6 in [6-14]. The transition between the end and the beginning of the interval content series was also omitted because it only contains one number (which would result in a rhythmic cell with only one note length).

This results in the following number strings for the nine rhythmic cells of *Le sourire infini des ondes*:

(1) 5 1 4 1 2

(2) 3 1 5 4 3

(3) 2 1 4 1 5

(4) 1 2 1 1 3

(5) 2 1 2 3 4 5 1

(6) 3 4 1 3 1

(7) 5 1 4 5 4

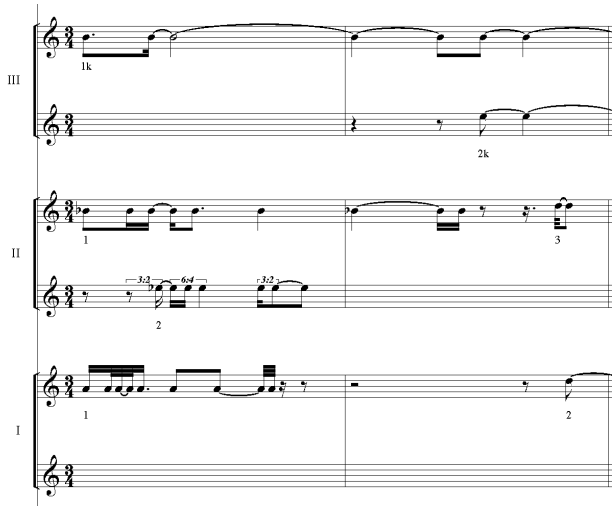
(8) 3 1 3 1 2

(9) 1 4 1 1 5

These values correspond to the note lengths in the rhythmic chart shown in Example 1.14. Value 1 corresponds to the length unit of each augmentation (demi-semiquaver, triplet semiquaver, semiquaver, triplet quaver, quaver, dotted quaver). Value 2 is twice the length unit, value 3 three times the length unit, etc. (see Chapter 1).

7. Determination of the forms of the series used

In order to obtain a higher degree of dissonance, three transpositions of the series a semitone apart are used simultaneously in the piece. Series I (transposition I) is the original un-transposed series (starting on A). Series II begins a semitone higher (on B flat instead of A), and series III another semitone higher (starting on B). The first beats of the combined series is shown in Example A2.10:



Example A2.10: beginning of the RHS of *Le sourire infini des ondes*,
showing the original series (I) and two semitone transpositions (II and III) used simultaneously.

Although the series are used simultaneously, different rhythmic cells are assigned to the notes of each of the transposition of the series in order to obtain a certain rhythmic independence of the three transpositions of the series. In addition, the start of the rhythmic cells coincides only at the beginning of each of the nine sections.

The entire piece consists of 618 quaver beats. A musically useful and balanced density of the rhythmic cells is obtained by running through each transposition of the series three times forming three segments (segments A, B and C). This results in a total of 3 x 3 x 54 = 486 rhythmic cells for the entire piece (3 times each of the 3 forms of the series, each containing 54 notes).

The series are attached in a symmetrical manner to the three segments in the following way:

segment	A	B	C
section	1 - 4	5 - 6	7 - 9
series notes	1 → 54	27 → 1 / 28 → 54	54 → 1

In segment A, the series is used in prime form. Section C uses the retrograde of the series and section B is based on a combination of both.

The series notes were distributed over the segments and sections the following way:

segment	section	number of beats	number of series notes	series notes
A	1	39	12	1 – 12
	2	39	12	13 – 24
	3	20	6	25 – 30
	4	95	24	31 - 54
B	5	96	27	27 – 1
	6	112	27	28 - 54
C	7	144	36	54 – 19
	8	56	14	18 – 5
	9	16	4	4 - 1

8. Construction of the N-matrix

The next step in the composition process consists of the construction of an N-matrix for the series, a process that had its for-runner in the distribution of rhythmic cells over the series notes in *Les racines du monde* and that was first implemented in its full version in *Après la pluie* for piano and live electronics (2008).

The N-matrix is a matrix consisting of nine rows and six columns that are determined by the interval class content of the CIG's. The prime forms of the nine chromatic pc-sets (see Example 1.5) are listed in 'ascending'[88] order below:

(0,1,2)
(0,1,3)
(0,1,4)
(0,1,5)
(0,1,6)
(0,5,6)
(0,4,5)
(0,3,4)
(0,2,3)

The 54 permutations of those chromatic pc-sets (6 for each pc-set) are then listed in ascending order from left to the right after the corresponding prime forms, resulting in the following matrix:

(0,1,2)	(0,2,1)	(1,0,2)	(1,2,0)	(2,0,1)	(2,1,0)
(0,1,3)	(0,3,1)	(1,0,3)	(1,3,0)	(3,0,1)	(3,1,0)
(0,1,4)	(0,4,1)	(1,0,4)	(1,4,0)	(4,0,1)	(4,1,0)
(0,1,5)	(0,5,1)	(1,0,5)	(1,5,0)	(5,0,1)	(5,1,0)
(0,1,6)	(0,6,1)	(1,0,6)	(1,6,0)	(6,0,1)	(6,1,0)
(0,5,6)	(0,6,5)	(5,0,6)	(5,6,0)	(6,0,5)	(6,5,0)
(0,4,5)	(0,5,4)	(4,0,5)	(4,5,0)	(5,0,4)	(5,4,0)
(0,3,4)	(0,4,3)	(3,0,4)	(3,4,0)	(4,0,3)	(4,3,0)
(0,2,3)	(0,3,2)	(2,0,3)	(2,3,0)	(3,0,2)	(3,2,0)

[88] The term 'ascending' has to be understood here as follows: it means the 3-digit numbers *that would be obtained by removing the commas in the representations of the pc-sets* are put in ascending order. The 3-digit-number for (0,1,2) for instance is 012.

Next, each of the 54 ordered pc-sets is replaced by an interval class-set (ic-set). These ic-sets contain the interval content between the successive pitch classes in the ordered pc-sets; they are obtained by subtracting the successive numbers in the representations of the pc-sets between round brackets; the first number is subtracted from the second; the second from the third. The ic-set for pc-set (0,1,4), for instance, is obtained by subtracting 0 from 1 (1 – 0 = 1) and 1 from 4 (4 – 1 = 3) resulting in ic-set (1,3). All the results are listed in the matrix below[89]:

1 1	2 -1	-1 2	1 -2	-2 1	-1 -1
1 2	3 -2	-1 3	2 -3	-3 1	-2 -1
1 3	4 -3	-1 4	3 -4	-4 1	-3 -1
1 4	5 -4	-1 5	4 -5	-5 1	-4 -1
1 5	6 -5	-1 6	5 -6	-6 1	-5 -1
5 1	6 -1	-5 6	1 -6	-6 5	-1 -5
4 1	5 -1	-4 5	1 -5	-5 4	-1 -4
3 1	4 -1	-3 4	1 -4	-4 3	-1 -3
2 1	3 -1	-2 3	1 -3	-3 2	-1 -2

Next, the ic-sets in the matrix are replaced by the number of the series note that is the central pitch class in the CIG corresponding to the ic-set. The twenty-second series note in the series of *Le sourire infini des ondes*, for instance (E, see Example A2.9) is the central pitch class in the CIG representing ic-set (1,1), the ic-set in the top left corner of the matrix. This procedure results in the N-matrix shown in Example A2.11:

22	12	26	5	49	52
20	24	31	27	35	25
23	10	3	32	14	47
50	43	53	29	40	33
1	39	38	18	19	30
54	37	16	36	17	8
4	2	42	15	9	13
45	51	28	41	44	34
21	7	6	46	11	48

Example A2.11: N-matrix for *Le sourire infini des ondes.*

[89] In this list, the round brackets for the ic-sets are omitted. Note also that there is no essential difference between +6 and -6.

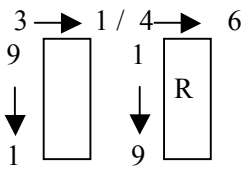
9. Ascription of rhythmic cells and augmentations to series notes

Using the N-matrix, rhythmic cells and augmentations were then ascribed to every series note in the following manner: the six columns of the N-matrix correspond to the six augmentations of the rhythm chart; the nine rows correspond to the nine rhythmic cells that were determined for the piece. The ascription differs from segment to segment, and from series transposition to series transposition. It was determined according to the schedule shown in Example A2.12. Segment B was divided into the B1 and B2, respectively, corresponding to section 5 (retrograde of the series, notes 27 - 1) and section 6 (prime form of the series, notes 28 - 54).

	transposition I	transposition II	transposition III
segment A	1 → 6 1 ↓ 9	3 → 1 / 4 → 6 9 ↓ 1 R 1 ↓ 9	6 → 1 9 ↓ 1 R
segment B1	6 → 1 1 ↓ 9 R	1 → 3 / 6 → 4 9 ↓ 1 R 1 ↓ 9	1 → 6 9 ↓ 1
segment B2	1 → 6 9 ↓ 1 R	6 → 4 / 1 → 3 9 ↓ 1 R 1 ↓ 9	6 → 1 1 ↓ 9
segment C	6 → 1 9 ↓ 1	4 → 6 / 3 → 1 9 ↓ 1 R 1 ↓ 9	1 → 6 1 ↓ 9 R

Example A2.12: distribution of rhythmic cells and transpositions in *Le sourire infini des ondes.*

The squares in the diagram represent the N-matrix or two halves[90] of the N-matrix. The letter "R" in the squares indicate that the retrogrades of the rhythmic cells are used. To understand how to read the diagrams in detail, let's have a closer look at the second transposition (II) in segment A, for instance. The N-matrix was attributed as follows:



This means columns 1 to 3 of the matrix correspond to augmentations 3 to 1 (3 → 1). Rows 1 to 9 in the matrix half of these columns correspond to rhythmic cells 9 to 1 (9 → 1) respectively. Likewise, columns 4 to 6 of the N-matrix correspond to augmentations 4 to 6 (4 → 6) and rows 1 to 9 of this

[90] The vertical division of the matrix in two (columns 1 to 3, and columns 4 to 6) reflects the division of segment B in two halves (segments B1 and B2).

matrix half are ascribed rhythmic cells 1 to 9 (1 → 9). In this second matrix half, the rhythmic cells occur in retrograde (indicated with the letter R).

10. Determination of the distance between entrances of rhythmic cells in the RHS

After a rhythmic cell was determined for each series note in the three transpositions of the series and each of the three segments, a RHS was constructed by determining the distance (in time) between the start of successive rhythmic cells.

In each of the nine sections of the piece, the rhythmic cell of the first note of each transposition starts at the same moment (as can be seen in the excerpt of the RHS in Example 1.17a). The starting position of every rhythmic cell within the RHS is determined in such a manner that the rhythmic cells fill the entire length of the section proportionately. The 'proportioned' distance between the start of the cells is based on the unordered interval class content of the series, as can be seen in the columns 'distance from previous cell' in the diagram in Example A2.13 below, showing the distribution of distances between entrances of rhythmic cells for section 1 of *Le sourire infini des ondes*. This resulted in the RHS of which an excerpt is shown in Example 1.17a, and which was the starting point for the composition of the score.

SECTION 1

	I		II		III	
Note number	Distance from previous cell	Distance from beginning of section	Distance from previous cell	Distance from beginning of section	Distance from previous cell	Distance from beginning of section
1	**0**	**0**	**0**	**0**	**0**	**0**
2	**5+1**	**6**	**1**	**1**	**5**	**5**
3	**1**	**7**	**1+4**	**6**	**4**	**9**
4	**4**	**11**	**4+1**	**11**	**1**	**10**
5	**1**	**12**	**2**	**13**	**1+2**	**13**
6	**2+3**	**17**	**2**	**15**	**3**	**16**
7	**1**	**18**	**3+1**	**19**	**3**	**19**
8	**1+5**	**24**	**5**	**24**	**1**	**20**
9	**5**	**29**	**4**	**28**	**5+4**	**29**
10	**3**	**32**	**4+3**	**35**	**4**	**33**
11	**3+2**	**37**	**2**	**37**	**3**	**36**
12	**1**	**38**	**2**	**39**	**2+1**	**39**

Example A2.13: determination of the distance between entrances
of rhythmic cells in the RHS for section 1 of *Le sourire infini des ondes.*

Appendix 3: list of compositions by Bart Vanhecke

"Camera obscura" (EMS Synthi A. tape. 1989. 15'20'')

"Serenade" (for 2 piccolos, harp and percussion. 1991. ca.6')

"Epitafium" (for alto flute and guitar. 1991. ca.20')

"Monodie" (for piano. 1992 (2° version 1995). ca.10')

"Ombra della sera" (for oboe and piano. 1992. ca.10')

"Twee liederen" (for soprano and 5 instruments (fl., cl., horn, celesta, guit.). 1993. ca.3')

"Quand la lune meurt" (for bass clarinet and ensemble (14 instruments). 1993. ca.20')

"Chaque fleur a une voix" (for bass flute, percussion and live electronics. 1994. ca.22')

"Kwintet" (for woodwinds (alto fl., eng. h., c.b.cl., horn, d. bssn.). 1994. ca.17')

"Tout près de l'eau" (for mezzo-soprano and alto flute. 1995. ca.5')

"La couleur du vent" (for flute. 1996. ca.5')

"Dans les plis des nuages" (for 2 violins and small ensemble (6 instruments). 1996. ca.12')

"Les racines du monde" (for piano. 1998. ca.8')

"Es träumte mir..." (for 6-part male choir. 1998. ca.1'30'')

"Close my willing eyes" (for 3 sopranos and ensemble (9 instruments). 1999. ca.18')

"Etoiles peintes" (string trio. 2000. ca. 9')

"Les fleurs pâles du clair de lune" (for ensemble (12 instruments). 1994 / 2001. ca.10')

"Des cercles sur les eaux" (for harp, ensemble (8 instruments) and live electronics. 2002. ca.15')

"Icarus" (mini opera for six voices and flute. 2004. ca.15')
commissioned by Muziektheatercollectief Walpurgis

"Dans l'eau du songe" (for bass clarinet, cello and piano. 2005. ca.13')
commissioned by Het Collectief

"La hora de la luz" (for countertenor, ensemble (7 instr.) and live electronics. 2005. ca.20')
commissioned by the Spectra Ensemble

"Comme un flocon de neige" (for flute and ensemble (8 instruments). 2007. ca.12')
commissioned by the Ictus Ensemble

"Trinity songs" (for soprano, clarinet and live electronics. 2007. ca.20')
commissioned by Muziektheatercollectief Walpurgis

"Que l'aube apporte la lumière" (piano quintet. complete version 2008 (1° version: 2006). ca.20')
commissioned by the Danel string quartet

"Après la pluie" (for piano and live electronics. 2008. ca. 12'.)

"Le sourire infini des ondes" (for ensemble (9 instruments). 2009.ca14')
commissioned by the Spectra Ensemble

"Danse de la terre" (for orchestra (3,3,3,3/6,3,2,1/5perc,pno/9,9,9,9,9). 2010. ca.12')
commissioned by "Festival van Vlaanderen" (Flanders Festival)

"Un souffle de l'air que respirait le passé" (piano quartet. 2011. ca.15')

"Danse du feu" (for large orchestra (4,4,4,4/4,4,3,1/6 perc,pno,hrp/16,14,12,10,8). 2012. ca.13')

"A l'image du monde… originel" (for piano. 2012. ca.6')

"A l'image du monde… double" (for piano. 2013. ca.6')

"Danse de l'eau et de l'air" (for orchestra (4,3,4,3/4,3,3,1/4perc, pno(&cel),hrp/12,12,10,8,6). 2014. ca.12')

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Chromatic Interval Group Serialism
The Development of an Atonal, Dissonant, and Amotivic Composition Technique

(Chromatische-intervalgroepserialisme
De ontwikkeling van een atonale, dissonante en amotivische compositietechniek)

Bart Vanhecke

In deze scriptie wordt beschreven hoe een artistieke zoektocht naar een systematisch atonaal, dissonant en structureel amotivisch klankidioom resulteerde in de ontwikkeling van de compositietechniek die door de auteur **chromatische-intervalgroepserialisme** (CIG-serialisme) werd genoemd. Het vertrekpunt hierbij wordt gevormd door aan de ene kant de erfenis van Arnold Schoenbergs dodecafonie, en aan de andere kant de opvattingen van Reginald Smith Brindle over atonaliteit en dissonantie binnen de context van de seriële compositie. Het CIG-serialisme gaat niet—zoals dat het geval is in de meeste seriële technieken—uit van reeksen van toonhoogteklassen, maar vertrekt vanuit de idee van intervalklasse. CIG-reeksen zijn dan ook samengesteld aan de hand van chromatische intervalgroepen, en niet van toonhoogteklassen.

Na de muziektheoretische beschrijving van het CIG-serialisme en de manier waarop deze techniek in de praktijk wordt gebracht, wordt ze vervolgens binnen een esthetisch kader geplaatst. De auteur gaat hierbij op zoek naar mogelijke antwoorden op de vraag wat het is om kunstenaar te zijn, wat het voor hem betekent om kunst te maken, en welke drijfveren hem hierbij leiden. Hierbij wordt het begrip van het **esthetisch universum** van de kunstenaar als centraal idee geïntroduceerd. De ontwikkeling van het CIG-serialisme wordt hierbij gezien als de zoektocht van de auteur naar een procedure die het mogelijk maakt om de ideeën uit het idiosyncratische deel van zijn persoonlijk esthetisch universum uit te drukken. Op deze manier wil hij een bijdrage leveren tot het verrijken en verruimen van de esthetische cultuur waar hij deel van uitmaakt.