UNIVERSITY OF CALIFORNIA, SAN DIEGO

The Radif as a Basis for a Computer Music Model: Union of Philosophy and Poetry through Self-referentiality

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Music

by

Shahrokh Yadegari

Committee in charge:

Professor Miller Puckette, Co-Chair
Professor Nancy Guy, Co-Chair
Professor F. Richard Moore
Professor Masao Miyoshi
Professor Adriene Jenik

2004

The dissertation of Shahrokh Yadegari is approved, and it is acceptable in quality and form for publication on microfilm:

____

____

____

____
Co-Chair

____
Co-Chair

University of California, San Diego

2004

To My Parents, Sorour and Yadollah

حدیث مطرب و می گوی و راز دهر کمتر جوی
که کس نگشود و نگشاید به حکمت این معما را
حافظ

"Tell us more of minstrels and wine
And let us leave mysteries of universe behind
For no one did or ever will
Unlock this secret with wisdom alone."

Hafez

"Without music life would be a mistake."
Nietzsche

TABLE OF CONTENTS

LIST OF FIGURES

Preface

Science and religion both give us certain perspectives regarding our origins. However, the story of neither one can rationally be accepted. Based on theories of evolution, we have to accept the emergence of something out of nothing, and based on creationism we have to accept the presence of a creator, whose creation cannot be questioned. I have found that the story which the poetry of Omar Khayyam implicates regarding our origins, rationally more acceptable. After reading Douglas Hofstadter's *Gödel, Escher, Bach* (Hofstadter 1979) many years ago, I came to understand that the concepts found in Khayyamic materialism could be expressed in precise mathematical terms. Self-referentiality is the common theme in *Gödel, Escher, Bach* and the poetry of Omar Khayyam. One of the precise mathematical manifestations of self-referentiality can be found in the studies of non-linear dynamics.

I remember an evening at Massachusetts Institute of Technology in 1991 while working on a problem as part of a graduate mathematics course I was taking on non-linear dynamics, that my understanding of scientific truth and the paradigm attached to it changed fundamentally.[1] I concluded that the process by which we acquire knowledge, or in other words epistemology, is also a non-linear process, and therefore, the result of it changes based on our approach towards it. In other words, I understood that the question of origins is a self-referential question which depends on the process which studies it. Thus, the scientific view, which based on the representationist doctrine is

[1] Specifically I had learned that numerical solutions to differential equations of third order and higher, which characterize the behavior of systems with three or more degrees of freedom, could substantially differ form each other according to the accuracy of initial conditions and the values used to specify the quantization of passage of time (Δt). (Refer to (Lorenz 1963) for one of the first published articles on precise mathematical reasons for this phenomenon.) Here I would like to thank Prof. Steve Strogatz who presented the material in such clear form throughout the course.

to reduce matter to atomically signified parts, transformed for me from specific studies on specific objects, to understanding and studying the space in which the structures I perceived in the world operated and interacted with each other, without any dependency on existence of a level where matter could no longer be divisible. This approach explains many paradoxes of set theory, whose author, Georg Cantor, wrote:

> I am so in favor of the actual infinite that instead of admitting that Nature abhors it, as is commonly said, I hold that Nature makes frequent use of it everywhere, in order to show more effectively the perfections of its Author. Thus I believe that there is no part of matter which is not—I do not say divisible—but actually divisible; and consequently the least particle ought to be considered as a world full of an infinity of different creatures.(Dauben 1979, p. 124)

At the time, I was working on a computer aided composition system, in which a rational and mathematical model is used as a generative process for synthesis. This system makes no distinction between form and material in the synthesis process—in other words sound and music are treated similarly. I found such an approach in tune with one of the dialectics used for explanation of Western tonality, in which the tonal form was related to the tonal material. By blurring the distinction between form and material, we also blur the boundary between the object and the action which produces it. Through my research at the time, I concluded that music was not just an object which we created by using sonic structure, but it is an element present in our actions. Thus, my research transformed from studying an epistemologically bounded subject into a non-linear approach to the steps I would take in my life. Shortly after my studies at MIT I arrived in Los Angeles, and as a musical act, I co-founded Kereshmeh Records, a label dedicated to preservation and dissemination of Persian new and traditional music—a musical culture which seemed to be under heavy oppression at the time.

When I arrived at UCSD, I learned that similar conclusions regarding epistemology had been made within the poststructural theory as well. Originally, based on such conclusions, I meant to write this dissertation in a non-linear form, meaning that I would allow my subject, music, to direct the form of the studies. However, I learned that epistemological establishments are not yet prepared to engage with such an approach. Thus, in this dissertation I have done my best to define specific epistemological bounds for the subjects I discuss, even though one of my arguments within the dissertation is that such boundaries cannot exist.

I find it relevant to mention my level of engagement with a few of the subjects I have discussed in this dissertation. I have completed the Radif of the santur (Persian hammered dulcimer) with Esmaeel Tehrani, and have studied the various parts of the vocal Radif on the ney (Persian cane flute) with Hossein Omoumi. I have studied Western harmony and counterpoint up to college level courses, and I have studied non-linear dynamics (which specifically relates to mathematical applications of the concept of self-referentiality) up to introductory graduate level mathematics.

Acknowledgements

I would like to sincerely thank my dissertation committee members, Professors Miller Puckette, Nancy Guy, F. Richard Moore, Masao Miyoshi, and Adriene Jenik for their support and guidance in preparation of this dissertation. Special thanks are also due to Professor George Lewis who supervised the early stages of this work at UCSD. I would also like to thank my previous adviser, Prof. Tod Machover at MIT, who supported the original development of the synthesis method discussed in this dissertation. I am grateful to my teachers, Esmaeel Tehrani and Hossein Omoumi, who have generously shared with me their vast knowledge of the Radif and Persian traditional music.

Many friends and colleagues, including Michael Dessen, Saied Kazemi, Mammad Zadeh, Keyavash Noura'i, and Teresa Fiore painstakingly read the early drafts of the manuscript and provided many helpful comments. Michael Dessen's engagement with the material during the past years at UCSD played an important role in the formation of the epistemological explanations of the ideas. I would like to thank Rocio Giraldez for having deeply cared for this dissertation and providing many useful literary sources and suggestions. Saied Kazemi's help in regards to Persian poetry and its nuances was indispensable to the work. I am grateful to Bijan Mottahedeh for providing refined and beautiful translations for many of the Persian poems used in the last chapter. Parvin Javadi provided much help in my search for the new Persian poetry and in finding historical sources in regards to Persian music.

My short conversation with Jacques Derrida resolved a number of my struggles with some of the concepts discussed by him, and I am deeply grateful to him for having listened to my words and having responded to them openly. I would like to thank Abbas Milani who kindly provided me a copy of his latest book prior to its publication.

I am also thankful to Ahmad Karimi-Hakkak for having taken the time to talk to me regarding the new poetry of Iran. The Persian poems were typeset with the *arabtex* package; thanks are due to Klaus Lagally for authoring the package and for providing technical support when needed.

The works of Dariush Dolat-Shahi, the first pioneer in applying electronics to Persian music, has continued to inspire me since 1985 when his work *Electronic music, Tar and Setar* (1985) was released by Folkways Record. My close contact and collaborations with many wonderful scholars and artists such as, Muhal Richard Abrams, Hossein Omoumi, Vibeke Sorensen, and Peter Sellars, have been deeply influential and inspirational in my work and my thought.

The musical energy and the spirit for experimentation of my colleagues at the deparment of music and the Center for Research in Computing and the Arts (CRCA) at UCSD, transformed my work environment into a supportive and artistically challenging home. I will specially remember musical collaborations with Michael Dessen, Ivan Manzanilla, Aiyun Huang, Dana Reason, Derek Keller, John Mark Harris, and Sean Griffin. I will also remember the good friends at CRCA including Ted Apel, Anthony Burr, Harry Castle, Janice Neri, and Eliza Slavet, for wonderful discussions and for our musical and scientific collaborations.

I want to thank Saman Shodja, who brought me the love and the inspiration I needed to complete the dissertation, and finally special thanks go to my family members, Sorour, Yadollah, Shahriar, Shidokht, Shahyad, Fariba, Faryar, and Fardad for their untiring moral support and care during the past years.

VITA

2004	Doctor of Philosophy in Music University of California, San Diego 2004
1992	Masters of Science in Media Arts and Technologies Massachusetts Institute of Technology 1992.
1982	Bachelor of Science in Electrical Engineering Purdue University 1982.

PUBLICATIONS

"A General Filter Design Language with Real-time Parameter Control in Pd, Max/MSP, and jMax". *Proceedings, International Computer Music Conference*, Singapore. San Francisco: International Computer Music Association. 2003."

"Chaotic Signal Synthesis with Real-time Control: Solving Differential Equations in Pd, Max/MSP, and jMAX". *Proceedings of Digital Audio Effects* (DAFx-03). London, UK: September 2003.

Shahrokh Yadegari, F. Richard Moore, Anthony Burr, Harry Castle, and Ted Apel 2002. "Real-Time Implementation of a General Model for Spatial Processing of Sounds". *Proceedings, International Computer Music Conference*, Goteborg, Sweden. San Francisco: International Computer Music Association. pp. 244-247, 2002.

Introduction to Persian Traditional Music. Published on the web by Pubic Broadcasting Services (PBS) (http://www.internews.org/visavis/culture_mstr.html, as supplement to the *Vis a Vis: Beyond the Veil* program produced and aired in 1998.

"Using Self-Similarity for Sound/Music Synthesis". *Proceedings, International Computer Music Conference*, Montreal, Canada. San Francisco: International Computer Music Association. pp. 424-427, 1991.

ABSTRACT OF THE DISSERTATION

The Radif as a Basis for a Computer Music Model:
Union of Philosophy and Poetry through Self-referentiality

by

Shahrokh Yadegari
Doctor of Philosophy in Music
University of California, San Diego, 2004

Electronic/computer music is often associated with Western traditions. This dissertation is an epistemological explanation of my approach towards my computer music designs, which are based on the system of improvisation in Persian traditional music (the *Radif*). The Khayyamic materialism and its form of ontology, play important structural roles in the design of the tools and the presented musical designs. The ontology found in Khayyamic materialism does not depend on metaphysics, and thus, is related to the concept of unity of form and material.

I present a comparative study of the approach towards metaphysics in post-structural theory and in Persian poetry. I also give a detailed reading of an article by Jacques Derrida, namely "Structure, Sign, and Play in the Discourse of the Human Sciences", which discusses structuralism and Lévi-Strauss' musical model of unity of form and material, in relation to the concept of self-referentiality. In this paper, Derrida problematizes the assumed separation of philosophy and poetry within epistemology. This dissertation establishes that self-referentiality is a central point in Derrida's argument for "the loss of the center" or "noncenter" in epistemology, and proposes an alternative solution to that of Derrida's, based on the union of philosophy and poetry, for continuing to engage with the concept of metaphysics (or lack of it) within a scientific context. I also briefly discuss the relations of this approach with the theory of *autopoiesis*.

The concept of unity of form and material plays an important role in the scientific dialectic for rationalizing Western tonality. I discuss the role of metaphysics in the theories of tonality by Joseph Fétis (1784-1871) and Hugo Riemann (1849-1919), and in the theory of atonality by Schoenberg (1874-1951). I discuss the theory of atonality in relation to the concept of self-referentiality and establish that the ambivalent approach by Western musicology towards the concepts of 'tonality' and 'harmony' has provided the context for Western musical paradigms to economically dominate the musical markets all around the world. I suggest a new definition for tonality based on the concept of self-referentiality, in which the listener plays a structural role.

This dissertation establishes that the presence of atomic elements, such as the metaphysical construction of chords, in a system which attempts to implement the concept of unity of form and material can prove problematic. I present an explanation of the Radif, in which definitions of atomic elements are aesthetically negotiable, and discuss the design and implementation of two computer music tools, namely *Recursive Granular Synthesis* (RGS), and *Lîla*, in which no metaphysical musical constructs are assumed.

Chapter 1

Introduction

The subject of this work is “Persian electronic/computer music” in which two very different musical traditions, along with their different social, political, and philosophical context, are presented as complementary musical materials.[1] The work is a highly personal and, I hope, critical statement about how I make music as a composer. My understanding of music as an abstract entity, and not necessarily as a distinct object, plays an important role in setting the foundations of this work. For that reason I shall also present various elements which have formed my understanding of music, however, in a critical context.

1.1 Persian Music and Poetry

Persian traditional music has been formed mainly by oral tradition through many generations with complex social, economic, and political histories in which, among other influences, those of the Westerners and the Arabs are the most dominant. The Arab invasion of Persia in the 7th century resulted in the establishment of theocracy and

[1]The words ‘Persian’ and ‘Iranian’ are interchangable in this work. The word Persian is used to refer to the current and past cultures of Iran and the language Persian (as opposed to Farsi). The word ‘Farsi’ is the Arabic form of the name of the language in Parsian which is ‘Parsi’. As Yarshater has pointed out, the use of the word ‘Farsi’ in the English language seems incongurous and wrong. For more details refer to the following articles by Ehsan Yarshater:
Ehsan Yarshater, "Zaban-i Nozohur" IrnianShenasi: A Journal of Iranian Studies, IV, I (Spring, 1992), 27-30; "Iran Ra dar Zabanha-ye Khareji Cheh Bayad Khand?" Rahavard: A Journal of Iranian Studies, V & VI, 20/21 (Summer & Fall, 1988), 70-75;
and http://www.iranian.com/Features/Dec97/Persian/ by Kamran Talattof.

acceptance of (the Shi'ite sect of) Islam by the Persians. Music suffered strongly under the religious Islamic regimes especially during the Safavid Period (1499-1736). During such periods of pressure, one of the most socially comfortable and well accepted forms of music was singing the verses of the Koran without any instrumental accompaniment. Many believe that this is one of the reasons why the vocal repertoire became the core element of Persian traditional music, hence, the highly monophonic nature of the music. It was at the end of this period that European music, offered by the European rulers as gifts, began its influence in the courts in Persia. (Sepanta 1990, p. 32-35)

Improvisation plays an important role in Persian traditional music, and therefore, the musical expressions are in constant flow of change. However, the musical language within this tradition has barely changed in the past few centuries, observed by Sassan Sepanta who writes: "the traditional music of Iran has been conservative towards change and evolution." (Sepanta 1990, p. 12). Improvisation in Persian music involves many performance rules and structurally, it is often based on a body of ancient melodies. The theoretical classification of this body of melodies in its current form (called the *Radif*) was organized only about a hundred years ago and during the past seventy years or so there have been numerous attempts at notating the Radif with Western musical notation. This form of notation is not an efficient tool for notating free form music. Even though there are rhythmical figures in the Radif, structurally they are less important than the free form and highly ornamented melodic figures. The arrangements of these melodic figures in both verse level and word level are, one may say always, subservient to the content of the poems. Even in instrumental sections or at times that no poetry is used, the music needs "to speak". Thus, it is no wonder that it is commonly agreed by musicians and scholars that the Radif is based on, and is highly coupled with, classical Persian Poetry. (Hajarian 1999)

An immense movement, attributed to Nima Yushij (1895-1959, a.k.a. Nima), began in the 1920s (or before) in Iran among young poets. This apparent revolution in the poetic form found a relative acceptance in the literary circles in the 1940s. In the preface to Karimi-Hakkak's *An Anthology of Modern Persian Poetry*, Yarshater writes that: (Karimi-Hakkak 1978, p. xiii)

> His [Nima's] poetry became known only when a group of gifted younger poets

> proclaimed him the leader of their movement and set out to exemplify his principles in their own work. .... In their poetry not only were the traditional meters and rhyme patterns were thrown overboard, but more important, the whole world of medieval imagery. A new culture, which represented a profound transformation of traditional Persian society, was at last claiming its own poetical form and rejecting the venerable ways of the past.

As Karimi-Hakkak points out, Nima formulated his approach based on his familiarity with French literature and attributing "the alleged artificiality of classical Persian poetry to the fact that it has [had] evolved in close association with Iranian music." (Karimi-Hakkak 1995, p. 247) After Nima, Persian poetry was changed not only in its form, but also in its content and the sentiments it conveyed. The "new poetry", as it was called, marked a transformation not found in the one thousand years history of Persian poetry, which is one of the most passionately loved art forms of this culture revered by the specialist and commonly interested alike. Even with such strong separation from the past, many poets preferred to call the new form "today's poetry" rather than "new poetry". (Refer to the interview of Iraj Gorgin with Forough Farrokhzad where she argues this fact and says: "Poetry cannot be old or new".[2])

In Iran, other than displaying linguistic mastery or beauty in sonority and imagery, poetry needs to have a strong philosophical, spiritual, or in some cases, ethical content for people to hold it worthy of survival through the passage of time. As such, poetry has become an instrument of preserving philosophical, spiritual, political, and social content throughout generations. While the most apparent change in the new form was the absence of the rhyming verses, one could argue that the real change was to open the content of the poetry to a new form of expression which discussed contemporary social and political problems in a direct fashion. Even though not without hardship, especially on the part of Nima, the acceptance of this new form compared to the dimensions of the change it instigated was rather quick.

If we look at tonality as a form in which symmetries are used as formal frameworks, technically speaking, one can find similarities between the birth of the new form of poetry in Iran and the formulation of atonality in the classical music of the West.

[2]Farrokhzad, F. (1984) *Forough Farrokhzad: Seday-e Sha'er* [audio recording], Reseda, California: Radio Omid and C & G Audio & Video Recordings & Duplicating.

Both, rooted in modernity, abandoned the past traditions of forms, which were based on more predictable formal shapes, for freer arrangement of expressions, in which content was no longer tied to predefined formal functions. Even though atonality was originally argued by Schoenberg as the emancipation of the tonic in the language of tonality, as we witnessed later through serialism, the concept is applicable to all established parameters of music. Therefore, the change was a movement in making as little formal assumptions or restrictions as possible in the interest of a freer aesthetic expression. One can argue that in both Persian new poetry and atonality, traditional forms were abandoned and the resulting new expressions were free to choose new forms matching the chosen content. Thus, one can name the unity of form and material as a common factor in the evolution of these two artistic forms in early 20th century.

It is understood that atonality was a direct reaction to tonality and its practice which has about 350 years of history in the West. In contrast the Persian classical poetry has over one thousand years of history whose form of language is still used and understood in Persian speaking countries. Therefore, it seems likely that the birth of "new poetry" in Iran should have faced far stronger resistance than atonality in the West. However, while Schoenberg had hoped for people to be whistling atonal melodies in the street, people in Iran, as it is a customary use of poetry, do often recite the new form in everyday colloquial conversations along with the classical poetry.[3]

While the new free form of poetry became mainstream in Iran in the past century, one may say that Persian music became more metered and classified. Much of the metered forms such as the *pishdarâmad*, were invented or embellished based on Western tonal song forms.[4] Hajarian argues that " ... the *ghazal*[5] can be considered a determining factor in the development of the structure of Iranian *dastgah*[6]." (Hajarian 1999) The

[3]In a letter to Hans Rosbaud of May 12, 1947, Schoenberg writes: "There is nothing I long for more intensely (if for anything) than to taken for a better sort of Tchaikovsky—for heaven's sake: a bit better, but really that's all. Or if anything more, then that people should know my tunes and whistle them." (Auner 2003, P374)

[4]*Pishdarâmad* is a measured instrumental form in slow tempo which often serves as an introduction to a performance. This form has been attributed to Gholam-Hossein Darvish (1876-1927).

[5]"The *ghazal* is a poetic form [originated in Iran] consisting of 7 to 15 verses long." (Hajarian 1999, p. 213)

[6]"A suite or collection of pieces, a technical term to classify the Iranian classical music." (Hajarian

ghazal form, its rhythmical framework, and its established signification schemes[7], can be thought as a basis for Persian classical music. To encompass the new poetry, even at the level of its sentiments, Persian music needs to also consider changes similar or related to those which occurred in the poetic contexts. As mentioned above one can find structural similarities between the passage from classical poetry to new poetry in Iran, and from tonality to atonality in the West.

In my music I approach this matter on a different level where I problematize the concept of tonality not as a Western form but as a common musical concept related to the unity of form and material. The relationship between sound and music, music and poetry, and finally poetry and philosophy is difficult to express without the use of metaphysics. The agency of metaphysics is one of the main focal points in theoretical discussions regarding tonality and the definition of the atomic elements upon which the rational dialectic regarding the music is built. Metaphysics and its nature (or lack of it) is also a main focal point in Persian poetry, both as content in the poetry and in critical studies of the content.

The late Dr. Jafar Mahjub, one of the most respected literary scholars of Iran, believed that among the classical poets, there are six who gained wide acceptance among people, namely Ferdowsi (10th century). Omar Khayyam (1048-1131 AD), Nezami (1141-1209 AD), Mowlana (1207-1273 AD, also known as Rumi in the West), Sa'adi (1207-1291), and Hafez (13th century).[8] Among them, Kayyam, Rumi, and Hafez each portray ceratin lyrical approaches to spirituality and philosophy.[9]

Khayyam's philosophy is based on a materialist approach in which metaphysics play no role. Hafez, mainly by his masterful, mocking, and lively use of *eeham*[10], in his play with both phonetics and semantics, is best known for his notoriously strong

1999, p. 213)

[7]Significations in general and in specific of certain terms, such as wine, love, god, pleasure, and intoxication, play an important role in defining the customary poetical content of Persian classical poetry.

[8]Notes from Dr. Mahjub's Paris lectures in April 1988.

[9]My argument for not including Sa'adi in this circle is that while Sa'adi's mastery of the language is indisputable, his ethical and philosophical approach does not embody the conceptual lyricism of the language of the others.

[10]*eeham* is a quality of statements with multiple and often contradictory meanings; similar to irony.

resistance in his poetic constructions against any classification. Dr. Mahjub argued that Hafez at the end of his life accepted and followed Khayyam's philosophy.[11] Rumi on the other hand abandons the physical and material life and attributes all existence to metaphysics and love. In their extreme application, both of these approaches arrive at the same point of the unity of mind and matter (*vahdat-e vojud* in Persian). The philosophical and spiritual lyricism which can act as a bridge in the continuum between precise philosophy and lyrical aesthetics, similar to what one may find in the language of Kierkegaard and Nietzsche, has been a strong driving force in my own understanding of music.

Khayyam was a poet, mathematician, astronomer, and philosopher. Khayyam devised the *Jalali* calendar currently used in Iran and in the process had to measure the length of the year. In describing Khayyam's contributions to mathematics, O'Connor and Robertson report:[12]

> Khayyam measured the length of the year as 365.24219858156 days. Two comments on this result. Firstly it shows an incredible confidence to attempt to give the result to this degree of accuracy. We know now that the length of the year is changing in the sixth decimal place over a person's lifetime. Secondly it is outstandingly accurate. For comparison the length of the year at the end of the 19th century was 365.242196 days, while today it is 365.242190 days.

In *History of Western Philosophy*, Bertrand Russell writes: "Persian civilization remained both intellectually and artistically admirable until the invasion of the Mongols in the thirteenth century, from which it never recovered. Omar Khayyám, the only man known to me who was both a poet and mathematician, reformed the calendar in 1079." (Russell 1972, p. 423) As a poet what has survived by him, based on different accounts, ranges from 70 to 200 quatrains. Every quatrain is composed of 4 verses in 2 lines. Considering the few lines of poetry left by him compared to his abilities and contributions as a mathematician and astronomer, one wonders what can be said in such few words worthy of such attention and survival? Khayyam's poetry has a consistent scientific view in which intellect and existence are one and the same, and at the same time no power is

[11] Notes from Dr. Mahjub's Paris lectures in April 1988.

[12] http://www-gap.dcs.st-and.ac.uk/~history/Mathematicians/Khayyam.html.

defined as the ultimate center. In almost all his philosophical poetry, Khayyam speaks of the structure of circularity and the connotations of that relating to what we understand as understanding and existence. Neither god nor capital play a fundamental role. What seems apparent is that we are alive and what is sure is that we will die. In such a view, deductively life comes before existence because to perceive existence one needs to be alive; however, at the same time to be alive one needs to exist. Therefore, due to the circularity and subjectivity, one is not able to objectively make any statements except about the nature of the circularity itself.[13] Thus, self-reflection, which is the reflection of life on itself, becomes a premise for cause and effect.

My view of music is directly influenced by such an approach which I consider more consistent as a scientific method than the objective approach. Most scientific methods have not been able to find a suitable definition for life and intelligence based on the objective approach. The problem arises since the objective approach needs to define a process which is separated but derived from the subject, hence, a double standard of mind and body. In the arts this issue becomes a matter of form and material and their relationship. A holistic and uniform view of existence, similar to the approach to epistemology in the works of Constructionists (such as Humberto Maturana (Maturana and Varela 1980), Fransicso Varela (Varela 1991), Heinz Von Foerster (Von Foerster 2003), and Gregory Bateson (Bateson 1979)) provides a suitable and fertile ground for cognitive science, cybernetics, and definition of machine intelligence. In the arts such an approach not only can interestingly model the intimate relationship between form and material, but also can become a theoretically fruitful ground for using logically mechanized instruments, such as the computer, in creative activities. A uniform view of our mental and sensual realities would render itself easily with the use of computers in music in which they can be used for sound production as well as formal control.

[13]This issue is at the heart of understanding non-linear dynamics in which the recorded samples of a non-periodic deterministic flow seems random to us due to the fact that the phase space of the parameters governing the system (which can be thought of as the structure of its behavior) is infinitely detailed (i.e., it is self-similar). Thus, the study turns from observing the behavior of the system itself to studying the structure of of the behavior in various scales in which it operates.

1.2 Computer Music and the West

The computer is the main instrument in my electronic pieces in which it is used as a structural instrument and a performative one. Music made by computers is often thought to have a very specific sound which is normally attributed to the Western musical traditions. The computer, a product of mechanization of logical processes, has always been portrayed as a Western instrument. Thus, computer music has often been produced based on Western ideas. It is often a very difficult task for electronic/computer music to stay in the realm of a certain tradition without misappropriating some aspect of that tradition within the context of the Western frame of mind. Electroacoustic music has about a hundred years of history in the West and their development has coincided with the theoretical end of tonality's exclusive reign as a musical form.

Some of the techniques used in the post tonal period of Western music rendered themselves easily adaptable to the use of the computer. The computer has been used as a tool for sound material synthesis as well as an agent to control the form, both in the architectural and productive part of the score generation, as well as in performative contexts as a musical instrument. Other than their use in the structural matters of music, in the production world the electronics and computers are used for amplification, recording, editing, mastering, diffusion, and broadcasting of the music. In short, computers have been a major factor in the evolution of music in the West both in theoretical and economical grounds. Therefore, the conceptual grounds of computers and technology do not stop at the formation and argumentation about the artistic object but are also ubiquitously present in the formation of the social, political, and economical contexts for reception of music. Even in looking at the musical object itself, if we could define such a thing, using the same instrument for both generation of sonic material as well as organization of the form insinuates a theoretical dialectic in regard to the relationship between form and material in the arts.

Form and material both have meanings in multiple scales. For example, in a musical context, a certain melodic, rhythmic, or even timbral motif could be regarded as material. However, the concept of motif has musical connotations as organization, which itself organizes other forms of material. If we keep deconstructing the formal elements of music to reach some unbreakable atom, we are bound to deal with the domain of sound or the domain of our sensory perception. In certain types of music, this sound material is rather exactly specified. For example, we know that the sound material of piano music is the sound of the piano. Of course, different size and make of pianos have different sounds, however, there is a general category of sounds which is understood and agreed upon among humans within our language to be signified as the sound of the piano. Therefore, the atomic kernel of piano music becomes specified rather precisely.

Pushing the concept of music to the other far end of the spectrum, we could define it as a set of organizational rules and relationships which act upon the material. If the line between form and material is clear, this definition covers an spectrum ranging from large scale structures to the line defining the separation of form and material. In fact, the piano is an interesting case because even in its construction this matter is obvious as the player traditionally has very little power in changing the sound of the piano in how he or she touches the piano (of course 20th-century piano music is a different story where pianos could be prepared or players could play the inside of the piano as well). In contrast, the quality and the shape of the pitch of the sound of some other instruments, such as the violin or the guitar, could be controlled by the player much more compared to the piano. When traditional instruments and traditional music for such instruments are concerned, the lowest level of material could be defined as the sound of the instrument, which also becomes one of the constraints for the free element of "play" in the form of music. Thus, constraint of an instrument define certain atomic elements with which the form elements can play. The 'chord' or the 'tone' could be considered as the atomic element of Western tonality. However, as I shall show in chapter 3 that the ambivalence towards the definition of this matter is related to a metaphysical definition of the concept of music.

Thinking about form and material in ways described above, we need to deal with computers with a more complex approach because the nature of their constraints is not the same as that of the traditional instruments. Computers do not have any sound of their own, but they are capable of generating any sound that could be specified as long as we can acoustically diffuse them. Specification is often understood as a formal element and not as a material constraint. Therefore, one could argue that computers have no constraint or no intrinsic material. In contrast, computers can also be used to mechanize highly formal elements in macro scales either as conceptual instruments in score generation process or as musical instruments during performances. A mechanized process is often understood as a quality or related to the material, or in other words, the common understanding is that a machine does not make music but only sound. Hence, one can see that with computers theoretically the boundary between form and material cannot be a very clear one. There are two ways to look at this situation, (1) either to separate the computer as a completely different type of instrument, which in turn would mean its music is also a completely different type of music, (2) or to revise our paradigm with which we have been separating form and material in a way that we could include their apparent theoretical interconnection in our model.

One of the main goals of this work is to show that it is possible to view the relationship between form and material in general in a way that neither excludes computer and mechanization in music, nor is the paradigm a culturally specific one. One of the problems with the first approach (separating computer music from other types) is that computer music would have to be defined as a music with specific origin and connected to no tradition. If we were to mix computer music with traditional music where acoustic instruments are used, where do we find the common grounds between them? To define an origin implies a rupture with the past which usually brings about the question of ownership of the new origin as well. Viewing the use of electronics in music as a rupture, we can see that this new origin has been appropriated by the West, as electronic sounds are often readily identified as Western in musical contexts.

1.2.1 Tonality and Electronic Music

Many different cultures have used the electronic medium for music in the context of pop music, whose construct is often a mixture of highly simplified regional melodies and rhythms played on regional instruments, and simple tonal harmonies played on Western or electronic instruments (such as synthesizers). This practice can be viewed as the contemporary product of marketing and dissemination of Western culture to non-Western ones. Since around 1650 AD until the early 20th century, especially through the scientific dialectic, the tonal form was actively advertised as a music with universal basis and appeal. In *Tonality in Western Cultures*, Richard Norton notes that:

> This tonal era [from roughly 1600 to 1900], which parallels the ascendance of capitalism and the development of the modern nation-states in Western Europe and North America, produced a great body of musical literature and acquired a cultural hegemony now dominant in the industrialized nations of the world. This era of "classic tonality" contains the major portion of that music which an active public of millions of listeners considers both "popular" and "serious." It is sustained by world media to the point of universality. There is something utterly amazing in the fact that a large music festival, for instance, may draw peoples from dozens of nations, who sit down together and—without speaking with one another because they cannot—listen to a Mozart piano concerto which addresses each person through a common sonic language. (Norton 1984, p. 12)

By the birth of atonality, tonality lost its theoretical claim on universality, however, commercially it continued to be universally successful. Much of the musicological literature today view tonality as a specific form of music practiced in a certain period of history of the West. As such, atonality is defined negatively as a practice of not using the tonal language. The formulation of atonality has been attributed to Arnold Schoenberg, who did not agree with the word "atonal".[14] He writes:

> 'Atonal can only signify something that does not correspond to the nature of tone.' And further: 'A piece of music will necessarily always be tonal in so far as a relation exists from tone to tone, whereby tones, placed next to or above one another, result in a perceptible succession. The tonality might then be neither felt nor possible of proof, these relations might be obscure and difficult to comprehend, yes, even, incomprehensible. But to call any relation of tones atonal is as little justified as to designate a relation of colours aspectral or acomplementary. Such an antithesis does not exist.' (Schoenberg 1975, p. age 283)

Atonality could also be seen as a sense of rebellion against tradition in a general sense. If tonality is seen as a universal form, there are two ways to defy that form; one way is to argue against the universality of tonality, and the other is to defy universality all together. Such issues and their related matters are currently rather ubiquitous in the contemporary philosophy of the West. One of the important elements responsible for the

[14] As we shall see later, words such as 'tonal', 'atonal', or 'harmony', which have grand philosophical connotations, are used in the Western musicological literature freely. The philosophical connotations are often used to legitimize the cultural hegemony of the music as scientific, but when one expects the music to hold the true meaning of the word attributed to it, most theorists argue that the word should only be seen in its technical context.

success of tonal form was the critical verbal and written dialectic which accompanied and advertised it as a universal form. Talking about tonality as a universal form has become severely politically incorrect, but the use of rational dialectic about music, especially within the academia is ever so prevalent now.

1.2.2 Music and Metaphysics

Tonality is a vague term. Historically, there are two seemingly opposing formulation of it, one represented by Joseph Fétis in late 18th century and the other by Hugo Riemann in late 19th century. Fétis viewed tonality as a historical and ethnic production and considered it as a set of rules and conventions. In his model the relationships among various elements of tonality were based on "purely metaphysical principles" (which Carl Dahlhaus interprets as "anthropological principles"). (Dahlhaus 1990, p. 8) Riemann wanted to fit this set into a rational axiomatic model. Dahlhaus write:

> It was from Moritz Hauptmann that Riemann adopted the axiom that perfect fifths and major thirds are the only "directly intelligible" intervals, and from the perfect fifth and major third Riemann deduced not only the structure of chords but also their relationship. (Dahlhaus 1990, p. 8)

By choosing an axiom related to the harmonic structure of the tone, Riemann wanted to claim tonality as the natural and necessary formal result of the structures inherent in the tonal music's material (the tone). Some of the the principles, rules, or conventions of the 17th to 19th century, where also used in earlier music of Europe. In *Studies on the Origin of Harmonic Tonality* (Dahlhaus 1990), Carl Dahlhaus presents an evolutionary image of the passage from the early tonality (pre-harmonic tonality) to the harmonic tonality era. In his presentation he shows that the theories of Fétis and Riemann are not as far apart as they may seem at the first glance, but he also points out that the tension between them as antithesis of each other is not an issue of the past. (Dahlhaus 1990, p. 13) Dalhaus does not discuss atonality in depth, but he points out that even though, depending on how one defines tonality, one could call the pre-tonal practice atonal, one should clearly separate the music of this era from the music of the 20th century.

Schoenberg also argued repeatedly for an evolutionary approach towards atonality and resisted calling his new practice a revolution. He used the same scientific dialectic which was used to position tonality as a universal form, to show that the Riemann's axiom was arbitrarily too restrictive. Riemann's axiom starts with separating consonances from dissonances by declaring only consonances as "directly intelligible". The consonance intervals can be related to the frequency location of the first few harmonics of the tonic, dominant, and subdominant degree tones. Schoenberg writes:

> That is to say, here the musical ear does indeed abandon the attempt at exact analysis, but it still takes note of the impression. The more remote overtones are recorded by the subconscious, and when they ascend into the conscious they are analyzed and their relation to the total sound is determined. But this relation is, to repeat, as follows: the more immediate overtones contribute *more*, the more remote contribute *less*. Hence, the distinction between them is only a matter of degree, not of kind. (Schoenberg 1978, p. age 20)

Thus, he breaks the dichotomy of consonances and dissonances, and by accepting the fact that the tonal form is the result of the structures within consonances, he argues for a spectrum of forms as well. Schoenberg argued against the exclusive validity of harmonic functions and used chords (specifically dissonances) as sonic material without any requisite to follow their traditional functional resolutions. He devised the 12 tone system of composition as an agent of form in which centering around the structures of a certain pitch is not the primary principle. Thus, he emancipated the parameter of pitch from its functional duties. He writes:

> Tonality's origin is found—and rightly so—in the laws of sound. But there are other laws that music obeys, apart from these and the laws that resulted from the combination of time and sound: namely, those governing the working of our minds. (Schoenberg 1975, p. age 259)

Here he connects tonality (form) to the tone (material), but wants to still keep the "humanistic" or "metaphysical" approach to music. Therefore, Schoenberg's argument could be interpreted as saying: Riemann was correct that tonality is a form based on the characteristics of the tone but Fétis was correct at the same time to assume that music is a phenomenon above the sensual. The metaphysical characteristics attributed to music, which separate it from the sensual world into the mental realm, result in seemingly arbitrary dichotomies between certain specific elements when music is analyzed scientifically.

What is understood as 'tonality' in musicological writings is a system of creating a whole by defining the functional relationship of neighboring chords based on a fundamental relationship to the tonic. The product is to be smooth sounding and any surprises (tensions) are conceived with the foreseen resolutions. One could say that the progression of the music is a linear process in which any discontinuities are prepared and resolved based on a fundamental loyalty to the tonic which can be represented as a single number (the pitch frequency of the tonic). The form is to possess a certain continuity which is to model the rational dialectic representing an ideal and pure approach. However, through a certain logical leap, perhaps attributing metaphysical characteristics to music, the form is also to have a vital character in which the whole becomes more than the sum of its parts. Even though tonality in most of its definitions is a mentally constructed concept, in general it is thought not only to be sensual but also to possess a certain metaphysical quality which transcends its material. Norton writes that:

> Attendant on the gradual crystallization of the positivist method in musicology and music theory, and specifically with regard to tonal speculation, these disciplines continued almost unnoticed to carry as baggage at least two other—to me, crippling—philosophic components: idealism and vitalism. Nowhere in the study of music are these notions more entrenched than in our conceptions of tonality. The nineteenth-century concept of historical continuity, derived from the theory of evolution and the metaphysics of Hegelian idealism upon tonality, is critical. Unlike the other arts in that it produces its own material which is totally assimilated by its form, music was easily absorbed by idealism, particularly through Walter Pater's revision of Hegelian aesthetics. Vitalism as a metaphysical doctrine concerning the nature of living organisms was generalized primarily through Henri Bergson into a comprehensive metaphysics applicable to all phenomena. Although I have not seen it stated in these terms, tonal vitalism understands that a passage of music somehow exhibits the presence of a substantial entity that animates and moves the tonal activity experienced there and that this entity imparts powers to the tonal system which are not possessed by the materials of which it is created, that is, musical tones. (Norton 1984, p. 4)

It is important to note that this dependence on metaphysics in not at all just a practice of the past. In the introduction to *A Generative Theory of Tonal Music*, Lerdahl and Jackendoff argue that:

> A number of theorists, such as Rameau and Hindemith, have based aspects of music theory on the physical principle of the overtone series. There have

> also been philosophical bases for music theory, for instance Hauptmann's use of Hegelian dialectic.
>
> In the twentieth century these types of explanations have fallen into relative disfavor. Two general trends can be discerned. The first is to seek a mathematical foundation for the constructs and relationships of music theory. .... The second trend is to fall back on artistic intuition in constructing a theory, essentially ignoring the source of such intuition. ....
>
> All of these approaches downplay the obvious fact that music is a product of human activity. It is worth asking at the outset what the nature of this product is. It is not a musical score, if only because many musical traditions are partially or completely unwritten. It is not a performance, because any particular piece of music can receive a great variety of performances. Music theory is usually not concerned with the "performers" activities, nor is it concerned centrally with the sound waves the performers produce. There is much more to music than the raw uninterpreted physical signal. (Lerdahl 1983, p. 1)

Of course, if examined in its cultural context, music is not just a physical auditory signal. However, as they state, Lerdahl and Jackendoff, as music theorists[15], are not interested in "performers activities" or even the "sound waves the performers produce". It is interesting to note that they cite the music of other cultures which are based on oral tradition, but they fail to realize that in such cultures improvisation plays a major role in defining the musical culture, in which the performance is in fact the focal point. Their last sentence in the above paragraph that "There is much more to music than the raw uninterpreted physical signal", is not a scientific conclusion, but it is set as an axiom which defines their position. This axiom states that there is something more in the physical signal which we communicate to each other as music, and therefore, the music is defined as a metaphysical quality. Their statement that "All of these approaches downplay the obvious fact that music is a product of human activity" does not have a clear message. It could mean that music and certain human activities (namely music making) are related. However, by their following statements, they seem to only think of the mental activity of the composer as a musical activity and for such a definition we once again need to understand music as a metaphysical entity which is separate from "performance activities" and "sound waves". Their statement about music as a human activity could also mean that no other sentient being could generate music. This, of

[15] Fred Lerdahl is a composer and Ray Jackendoff a linguist; however, their book is best characterized as music theory.

course, would be more of a definition for music as an entity which is perceived only by humans. Perhaps it can be argued that such a definition serves their purpose in establishing the grounds for their theory; however, such a definition would restrict the scope of the word "music" too severely. The sounds of nature and those produced by other animals can have profound musical qualities. However, more severely and related to our discussion, such a definition would exclude any sound produced by mechanized processes as music, or in other words, the music made by machines (or computers).

1.3 Overview

Chapter 2 is a detailed and close reading of a paper by Jacques Derrida called "Structure, Sign, and Play in the Discourse of the Human Sciences" which can be considered as one of the main texts defining the poststructural approach to literary criticism. In this chapter I shall present Derrida's approach to the Western tradition of metaphysics, the way he has deconstructed and questioned the concept of epistemology, and the choices he has presented for one to continue to engage with such traditions. I shall show the role of self-referentiality in his arguments and argue that by considering self-referentiality in a more explicit manner one is able to make other conclusions than what Derrida has presented. I shall show that Derrida questions the concept of a universal epistemological truth, however, I shall also argue that Derrida does not acknowledge the self-refentiality of this argument, and in the process resists fully committing to his own arguments. I shall also consider the connotations of application of deconstruction within a communicative context.

The concept of unity of form and material in the arts is in direct relationship with the concept of metaphysics in philosophy. In chapter 3 I shall present Carl Dahlhaus study of the historically opposing theories of Joseph Fétis and Hugo Riemann on tonality, and the theory of atonality by Schoenberg. In this chapter I shall show that the concept of unity of form and material plays an important role in the definition of tonality and I shall argue that the vague approach of musicology toward tonality is partly due to the epistemological problems that the concept of unity of form and material introduces. In this chapter I shall show that the concept of tonality within

Western musicological writing does not cover the complete spectrum which this concept implies linguistically and philosophically. Finally I shall show the relationship between the concept of self-referentiality and tonality, which I argue is an inevitable result of the application of concept of unity of form and material in music. When metaphysics are used for the definition of a concept, the assumptions made based on the formation of the metaphysics define the culturally specific biases of that definition. As such, I shall show the cultural biases of Western tonality in the definition of the chord as a metaphysical atomic construct, and offer a new definition for tonality based on self-referentiality which is not culturally specific and includes the agency of the perceiver in its definition.

When we eliminate metaphysics and accept the unity of form and material in a system, we will be unable to define any atomic elements for the definition of our system. In chapter 4, without claiming any strict epistemological truth in my presentation, I shall discuss my own musical language based on the Persian musical improvisation repertoire, the Radif. Persian music and Persian poetry are deeply connected to each other. I shall present some examples from the classical and the new Persian poetry and argue that the Khayyamic materialism plays an important role in defining the Persian ontology towards poetry and music. I shall also argue that the Khayyamic materialism not only includes the modern metaphysic-less approach, but it also accommodates the non-centric approach of poststructuralism especially in the poetry of Hafez and Rumi. In chapter 4, I shall also present the design of two of my computer music tools, *Recursive Granular Synthesis* (RGS), and Lîla, in which design the above principles have played fundamental role. With these tools no atomic elements need to be defined specifically in a musical design.

Chapter 2

Structure, Sign, Play, and Self-referentiality in the Discourse of the Human Sciences: Contemporary Metaphysics in the West

In the West metaphysics is understood as an irrational but historically legitimate concept within a rational axiomatic model. Thus, when examined within the rational system, it is not possible to find the source of such phenomena; however, at the same time, in order for one to be able to accept such phenomena within the model, the metaphysics need to become the source of the rational model itself.

2.1 Metaphysics in the Enlightenment Period

The enlightenment philosophers such as Locke and Hume attacked metaphysics. Kant brought the perceiver to the equation but still maintained that metaphysics is impossible. Lavine writes:

> "Metaphysics is worthless as knowledge and even meaningless, according to Hume. The statements made by metaphysics fail to pass the empiricist's

> test of knowledge and meaning—to show from what sense impressions these statements are derived. Hume's second argument against metaphysics raised again the point that metaphysics attempts to go beyond the limits of human understanding, which is confined to sense impression. Therefore metaphysics is impossible. Commit it to the flames, says Hume, for it contains only illusion. But then Western philosophy moves on to Kant, who fights back against Hume's skepticism and defend the certainty of science by pointing to a priori categories of the mind as the necessary and universal conditions of scientific knowledge. ... We cannot know things-in-themselves, things as they are in reality, independent of the categories by which we have to understand them. Metaphysics, however, is precisely the attempt to know things, as they are in themselves, it is precisely the study of independent reality. (Lavine 1988, p. 205-206)

However, it is with Hegel and his absolute idealism that metaphysics finds its way back in the philosophical dialectic of the West. Hegel wanted to explain and unify all forms of human knowledge and experience within his philosophy. Lavine writes:

> He also wishes, to bring into his philosophy Romantic opposition, conflict, irony, contradiction, paradox, and to express the new sense, after the French Revolution, of the turnabouts of historical change. To achieve these and also to incorporate the truth embedded in rationalism and empiricism, Hegel has to construct a new theory of reality as the heart of his metaphysics. (Lavine 1988, p. 207)

In his own words, Hegel believed that "The real is the rational and the rational is the real." (Lavine 1988, p. 208) Thus, he connects the human thought and mind to something absolute and unified and to "incorporate within it [i.e. his philosophy] the unending creative destruction, conflicts, reversals, unintended consequences, reconciliations, renewed conflict, which appear to be the enduring traits of all these aspects of reality", he devised his theory of *dialectic.* (Lavine 1988, p. 205) And thus, Hegel created a philosophy which supposes the existence of an absolute but unreachable unity, and in the meanwhile explains, and so allows and justifies, the conflict among individuals within his model.

Kierkegaard, rebelling against the hegelism of his time, takes a different route. He encompasses Kant's accounting of the role of the perceiver, but does not give in to some imaginary construct as the absolute. Thus, he has to define metaphysics self-referentially and defines the concept of repetition which today we understand as recursion. In *Repetition* (Kierkegaard 1983), he writes:

> Recollection is the ethical [*ethniske*] view of life, repetition the modern; repetition is the interest [*Interesse*] of metaphysics, and also the interest upon which metaphysics comes to grief; repetition is the watchword [*Løsnet*] in every ethical view; repetition is the *conditio sine qua non* [the indispensable condition] for every issue of dogmatics. (Kierkegaard 1983, p. 147)

Adorno believes that the concept of metaphysics is one of the most fundamental questions of philosophy. He writes:

> It can undoubtedly be said that the concept of metaphysics is the vexed question of philosophy. On the other hand, philosophy owes its existence to metaphysics. That is to say that metaphysics ... deals with the so called 'last things' on account of which human beings first began to philosophize. On the other hand, however, the situation of metaphysics is such that it is extremely difficult to indicate what its subject matter is. (Adorno 2000, p. 1)

Adorno is noting a self-referential relationship between philosophy and metaphysics—that philosophy is not able to define its origin, which is to say to define the origin of human thought. Therefore, accordingly philosophy is forced to accept a metaphysical source which cannot be defined within the model. After explaining how he came across the treatment of metaphysics by Nietzsche, Adorno writes:

> I mentioned Nietzsche. In his work the concept of metaphysics often crops up in the form of a joke, which, however, contains a first approximation of what actually is to be understood by metaphysics. He talks of the *Hinterwelt*—the 'back-world'—and calls those who concern themselves with metaphysics, or even practice or teach it, *Hinterwlter*—'backworldsmen'—an allusion to the word 'backwoodsmen' (*Hinterwälder*) commonly used at that time, which, of course, was shortly after the American Civil War. It referred to those living in the backwoods, that darkest province of the Midwest, from which Lincoln, a highly topical figure at the that time, had emerged. This word implies that metaphysics is a doctrine which assumes the existence of a world behind *the* world we know and can know. (Adorno 2000, p. 2)

In short, metaphysics is a concept outside of the rational axiomatic model of knowledge, but since it needs to be discussed within the rational dialectic in a scientific setting, we either need to accept that metaphysics is the source of philosophy and human knowledge, or accept the construct of self-referentiality as an innate and "indispensable condition for every issue of dogmatics" of science. Within a linear system of thought any discussion of the origin of the system will become self-referential, since the discussion has to rationalize the birth of itself (the discussion) as well. In that sense the discussion becomes a meta-discussion (creating recursively constructed discussions about the discussion) as well. Therefore, to accept metaphysics as the source of philosophy and human knowledge will itself bring about a self-referential construct if we were to discuss the subject within the system of philosophy and human knowledge, no matter how that system is set up.

2.2 Modernity

The Modern era in the West could be looked at as an attempt to follow the enlightenment periods' beliefs and doing away with metaphysics all together with an eye toward representing the eternal by grand narratives based on scientific principles. By abandoning metaphysics, the work of art would become directly related to the material it is made of. With this mentality came the license to throw away the pre-established forms and let the material define its own form. Kandinsky wrote: "The form is the outer expression of the inner content." (Chipp 1968, p. 152) Schoenberg used the relationship between form and material to argue that tonality is not the only musical form. The traditional forms had defined the language with which the works of arts where to be perceived or understood. Innovation in form also meant innovation in language and, thus, every work of art needed to carry with itself not only a content but also the language in which the content was to be deciphered. In such a situation, since arriving at an atomic element which we could call material is not possible, form and material become so intertwined that it will not be possible to tell them apart from each other, *unless* metaphysical elements are introduced in their characterization. While the idea of abandoning metaphysics could be perceived simply, its connotations are far reaching, and that is perhaps why humans have felt the need to hold on to such concepts within epistemology.

Viewing the work of art in isolation (and not in relation to the author) by the Moderns transformed the work into a self-referential entity which, socially and politically speaking, made the work to be self-centered and self-absorbed. In *The Condition of Postmodernity* (1990), David Harvey writes:

> As Baudelaire was very quick to see, if flux and change, ephemerality and fragmentation, formed the material basis of modern life, then the definition of a modernist aesthetic depended crucially upon the artist's positioning with respect to such processes. The individual artist could contest them, embrace them, try to dominate them, or simply swim within them, but the artist could never ignore them. The effect of any one of these positionings was, of course, to alter the way cultural producers thought about the flux and change as well as the political terms in which they represented the eternal and immutable. The twists and turns of modernism as a cultural aesthetic can largely be understood against the background of such strategic choices. (Harvey 1990, p. 20)

Perhaps Modernism had started with liberating social and political change in mind. However, with its heavy concentration on the artistic object and separating it from the author, Modernism ended up flowing against what it meant to do—rather than being engaged with the social and political issues, the modern artist became fascinated with his own image in his work as an original entity. Harvey continues:

> But how to *represent* the eternal and the immutable in the midst of all the chaos? To the degree that naturalism and realism proved inadequate (...), the artist, architect, and writer had to find some special way to represent it. Modernism from its very beginning, therefore, became preoccupied with language, with finding some special mode of representation of eternal truths. Individual achievement depended upon innovation in language and in modes of representation, with the result that the modernist work, as Lunn (1985, 41)[1] observes, 'often willfully reveals its own reality as a construction or an artifice,' thereby transforming much of art into a 'self-referential construct rather than a mirror of society.' (Harvey 1990, p. 20)

Including many others, works by such writers as Foucault, Horkheimer, Adorno, Kafka, Barthes, etc., have shown the repressive and hegemonic nature of Modernity and its claim of liberation through scientific means. These works questioned the objective science itself, and argued for the necessity of seeing science as just another type of narrative. A rupture resulted in reactions against or towards Modernity in a current social, political, and economical period known as Postmodernity. As far as critical theory is concerned, one can trace the origins of Postmodernity in Post-Structuralism which can be considered to be based on, or heavily influenced by, the notion of *deconstruction* by Derrida.

[1]Lunn, E. (1985):*Marxism and modernism.* London.

2.3 Derrida and Postmodernity

To question the validity of metaphysics within a rational model is a rather simple task; it is possibly one of the first reactions of a curious and sensitive child when learning about such concepts. However, to question metaphysics in a rational model which heavily discusses itself as the product of metaphysics, is a task which needs to carry the original simplified content, but at the same time formally be able to deal with the complex textual and political backdrop which engulfs the question. It is widely agreed that Derrida did just that in his lecture titled "Structure, Sign, and Play in the Discourse of the Human Sciences" delivered at John Hopkins University in 1966 published in *Writing and Difference* (1978), and in doing so he brought the complete history of Western philosophy and knowledge under question. It is understood that this lecture was one of the most influential factors in putting the Postmodern movement in motion in the United States.

In this lecture, Derrida considers Structuralism, mainly attributed to the works of Claude Lévi-Strauss, and speaks of an "event" whose "exterior form would be that of a *rupture* and a redoubling." (Derrida 1978b, p. 278) Derrida opens the discussion by showing the "structurality of structure", and the signification of the word "sign". In other words, he shows the self-referential nature of these words and the infinite "play of substitution" which they bring about in discourse. He states:

> It would be easy enough to show that the concept of structure and even the word "structure" itself are as old as the *epistēmē*—that is to say, as old as Western science and Western philosophy—and that their roots thrust deep into the soil of ordinary language, into whose deepest recesses the *epistēmē* plunges to gather them up and to make them part of itself in a metaphorical displacement. Nevertheless, up until the event which I wish to mark out and define, structure—or rather the structurality of structure—although it has always been at work, has always been neutralized or reduced, and this by a process of giving it a center or of referring it to a point of presence, a fixed origin. The function of this center was not only to orient, balance, and organize the structure—one cannot in fact conceive of an unorganized structure—but above all to make sure that the organizing principle of the structure would limit what we might call the *play* of the structure. By orienting and organizing the coherence of the system, the center of a structure permits the play of its elements inside the total form. And even today the notion of a structure lacking any center represents the unthinkable itself. (Derrida 1978b, p. 278)

Thus, Derrida shows that a "structure" is not composed of fixed elements at the center but it is a structure of structures, and hence, infinitely detailed. Treating the infinite is not an easy task for the linear rational model in which the structure in the center (or in other words the axioms or the principles) are taken as unbreakable atoms and in which perceiving such atomic elements as compound ones is not allowed. He continues to state that:

> At the center, the permutation or the transformation of elements (which may of course be structures enclosed within a structure) is forbidden. At least this permutation has always remained *interdicted* (I use this word deliberately). Thus it has always been thought that the center, which is by definition unique, constituted that very thing within a structure which governs the structure, while escaping structurality. This is why classical thought concerning structure could say that the center is, paradoxically, *within* the structure and *outside* it. (Derrida 1978b, p. 279)

One could restate the above by saying that in a (classical) axiomatic model the center (or the set of axioms) is a choice while through reasonings we prove a hypothesis as a conclusion; however, at times, and depending on how we objectify the rational axiomatic model, the choice of the center becomes more important and more instrumental than the process of reasoning about a subject and therefore the center which was originally at the center of the work could be perceived as the outer conclusions. For example, in regard to my discussion of tonality in in chapter 3 it could be perceived that the assumption of the presence of metaphysical entities, which I will show is at work in the theories of both Fétis and Riemann, defines the nature of their theories more than what the theories attempt to state. In other words, one can argue that it is the choice of the assumptions that characterizes the theory more than the construct that the theory builds using these assumptions.

Finally Derrida in a very simple and classical form of self-referentiality shows the self-referentiality of the idea of "center".

> The center is at the center of the totality, and yet, since the center does not belong to the totality (is not part of the totality), the totality *has its center elsewhere*. The center is not the center. (Derrida 1978b, p. 279)

This is the jewel of the text to be understood, that "The center is not the center." If we were to take this statement outside of its context, we could hardly attach any meaning to it. It is a self-referential statement which negates itself. However, there is a very delicate *play of substitution* happening here. We could interpret the sentence "The center is not the center", as "*The center* is not the center"; meaning that what was originally designated and thought to be the center, and had the signifier "*the center*" assigned to it, escapes centrality the moment it is signified. This happens because the process of signification itself depends on the center. Note that now the same arguments about the signifier "the center" can be applied to the two previous statements and this statement as well. Hence, the process of signification becomes an infinite play which renders the center ephemeral.

In showing that much of the destruction of metaphysics has been based on metaphysics, Derrida demonstrates that the word "sign" is itself also within an infinite space of signification through the "play of signification". He writes:

> ... the metaphysics of presence is shaken with the help of the concept of the *sign*. But as I suggested a moment ago, as soon as one seeks to demonstrate in this way that there is no transcendental or privileged signified and that the domain or the play of signification henceforth has no limit, one must reject even the concept and word "sign" itself—which is precisely what cannot be done. For the signification "sign" has always been understood and determined, in its meaning, as sign-of, a signifier referring to a signified, a signifier different from its signified. If one erases the radical difference between signifier and signified, it is the word signifier itself which ought to be abandoned as a metaphysical concept. (Derrida 1978b, p. 281)

Thus, Derrida argues that the fixed structuralist view of meaning cannot hold because of the inescapable self-referentialities which never allow us to reach a fixed atom or origin in the process of our discourse.[2]

[2] I left this sentence in a linear form as I have tried to avoid using self-referential logic in this work unless absolutely necessary. It is possible to continue this text without interjecting a self-referential construct, however, by doing so, I have not presented my complete understanding of the subject and would allow the text vulnerable to problems about which it is being critical. In other words, any explanation of "deconstruction" within a linear and axiomatic model of knowledge could "deconstruct" itself. We shall talk about this quality of deconstruction in more detail later. If I were to write the above sentence with the full implication of "deconstruction" in mind, I would allow self-referential constructs to be interjected and the sentence would become: "In this paper Derrida argues that the fixed structuralist view of meaning cannot hold because of inescapable self-referentialities which never allow us (and are caused by not being able) to reach a fixed atom or origin in the process of our discourse." That means that if we had a fixed origin we would not have self-referentialities which in turn would mean that we would have fixed origins. If we were to look at the sentence within an axiomatic model, by adding the extra phrase "(and are caused by not being able)" we set a self-referential construct between a cause (self-referentialities) and an effect (not having a fixed origin). Within a logical system we would write

Derrida argues that throughout the history of the West, the concept of metaphysics or transcendental signifiers have always tried to reduce structure into fixed elements, and that:

> ... one could perhaps say that the movement of any archeology, like that of any eschatology, is an accomplice of this reduction of the structurality of structure and always attempts to conceive of structure from the basis of a full presence which is beyond play.
>
> If this is so, the entire history of the concept of structure, before the rupture of which we are speaking, must be thought of as a series of substitutions of center for center, as a linked chain of determinations of the center. Successively, and in a regulated fashion, the center receives different forms or names. The history of metaphysics, like the history of the West, is the history of these metaphors and metonymies. Its matrix ... is the determination of Being as *presence* in all the senses of this word. It could be shown that all the names related to fundamentals, to principles, or to the center have always designated an invariable presence- *eidos, archē, telos, energeia, ousia* (essence, existence, substance, subject) *alethēia*, transcendentality, consciousness, God, man, and so forth. (Derrida 1978b, p. 279-280)

Derrida argues that once we understood the structurality of structure, "it was necessary to begin to think that there was no center, that the center could not be thought in the form of a present-being, that the center had no natural site, that it was not a fixed locus but a function, a sort of nonlocus in which an infinite number of sign-substitutions came into play." (Derrida 1978b, p. 280) He argues that at this moment "language invaded the universal problematic" and that in "absence of a center or origin, everything became

---

that as follows:

$$\begin{aligned} A &= \text{"self-referentialities"} \\ B &= \text{"not having a fixed origin"} \\ A &\Rightarrow B \qquad (2.1) \\ B &\Rightarrow A \qquad (2.2) \end{aligned}$$

In a linear model of logic in which the concept of inference (which when applied to physical world becomes "cause and effect") plays a fundamental role, statements (2.1) and (2.2) could not make sense; however, if we assume that self-referentialities are the origins of inference (in other words self-referentialities infer inference), and not assume the concept of inference with a fixed origin, then (2.1) and (2.2) could be statements, not about knowledge and truth themselves, but about the space in which we humans interact with such constructs as knowledge and truth. Discussed in mathematical terms, this is the fundamental difference between a linear and non-linear dynamical systems. In a linear model we study the signal itself, but in a non-linear model we study the variable space which is governing the progression of the signal. The structure of the variable space of a system capable of generating chaotic signals is self-similar, or in other words infinitely detailed. (Self-similarity is a structural quality of a perceived self-referential construct.)

discourse"; however, he qualifies this assertion, and in a sense gives in to what he is arguing against when he continues as follow:

> ... provided we can agree on this word [discourse]—that is to say, when everything became a system where the central signified, the original or transcendental signified, is never absolutely present outside a system of differences. The absence of the transcendental signified extends the domain and the play of signification infinitely. (Derrida 1978b, p. 280)

As such, he admits that he is part of the system he is attempting to be objective about. After all, he is talking about discourse within discourse. In other words, just like the center, Derrida himself is *inside* and *outside* of the system at the same time. Derrida continues to talk about the history of philosophy in the West, the role of metaphysics, and the discourse of its destruction within its own language—how the destruction of metaphysics (for example by Nietzsche, Heidegger, and Freud) is dependent on metaphysics itself. He states:

> But all these destructive discourses and all their analogues are trapped in a sort of circle. This circle is unique. It describes the form of the relationship between the history of metaphysics and the destruction of the history of metaphysics. There is no sense in doing without the concepts of metaphysics in order to attack metaphysics. (Derrida 1978b, p. 280)

In his reasoning, we think of Derrida to have become objectified about philosophy and the process of becoming objective. Perhaps we can agree that Derrida himself is also part of the tradition he is talking about (i.e., that engulfing Nietzsche, Heidegger, and Freud among others), and therefore we could assume that he is speaking in the language of that tradition as well. He continues: "We have no language—no syntax and no lexicon—which is foreign to this history; we cannot utter a single destructive proposition which has not already slipped into the form, the logic, and the implicit postulations of precisely what it seeks to contest." Therefore, he demonstrates a circle about whose structure he makes statements using the language of the elements by which he defines the circle. In other words, he is in inside the circle and outside of it at the same time. Here I aim to demonstrate that with geometric figures. Derrida takes a number of elements as atoms and creates a circle, for example as follows:

Figure 2.1 could represent the big picture that Derrida is painting for us. However, since we also can become objective to what Derrida is proposing and as we are also able to

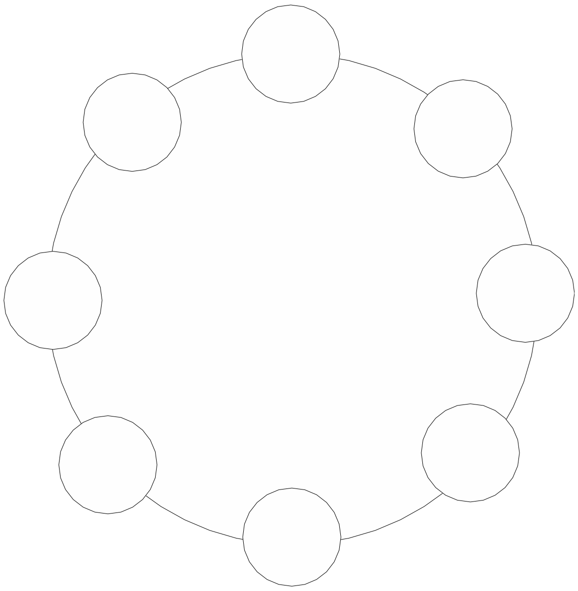


Figure 2.1: Derrida's Circle of Philosophy and Metaphysics in which every small circle is representative of some form of Western philosophical tradition

see Derrida's circular arguments, we should be able to see this circle in the scale of a single tradition (e.g., that of Derrida) as well as in Figure 2.2. As Derrida stated, he is

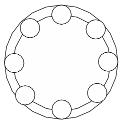


Figure 2.2: Derrida's circle of Philosophy and Metaphysics in the scale of a single philosophical tradition

not really saying anything new, he does not even have a "language—no syntax and no lexicon—which is foreign to" the history of what he is discussing. Therefore, the content of his philosophical arguments and those of which he is speaking, is not that different. In other words we could replace all the small circles in Figure 2.1 with the shape in Figure 2.2 and come up with Figure 2.3. Now one can extend Figure 2.3 in both micro and macro directions; meaning that one could think of the complete picture as part of

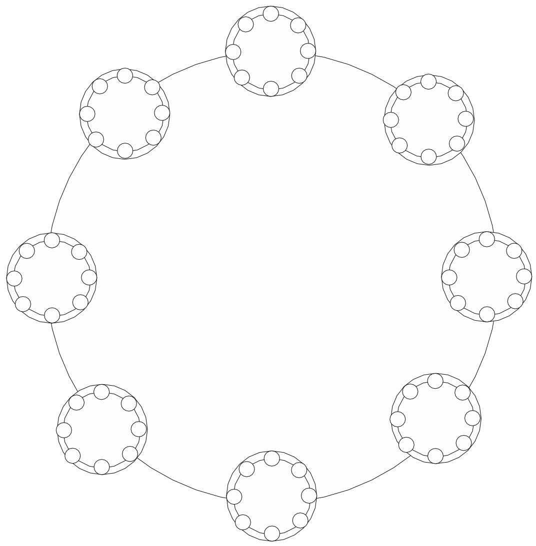


Figure 2.3: Derrida's circle of Philosophy and Metaphysics combined in two different scales

yet another bigger circle or replicate the picture within one of the smaller circles. The complete picture is infinitely detailed, and if the process of a linear rational discourse is defined as traversing a path on this shape going from one point to another where adjacent points are available, we can start at any point on the circle and continue on any path we wish—any time that we are objective towards a circle (or a philosophical tradition) we traverse the path and treat the circle as an atomic point and when we become subjective to that tradition we would be traversing the details of that circle.

Derrida shows how the "structurality of structure", the signification of the word "sign", and the infinite "play of substitution" of the center (through signification of structurality of structure) prevent us from attaining the totality which we may set out to achieve with any axiomatic method we may choose. Having set this theoretical backdrop, he turns to the field of ethnology (and specifically the work of Lévi-Strauss on mythology) and wants to show the unavoidable biases which engulfs this practice. He writes:

> ... ethnology—like any science—comes about within the element of discourse. And it is primarily a European science employing traditional concepts, however much it may struggle against them. Consequently, whether he wants to

> or not—and this does not depend on a decision on his part—the ethnologist accepts into his discourse the premises of ethnocentrism at the very moment when he denounces them. This necessity is irreducible; it is not a historical contingency. (Derrida 1978b, p. 282)

Through illuminating unavoidable self-referentialities in discourse, Derrida has shown that in any attempt of ethnology, no matter how one attempts to be objective, subjectivity is born through the unavoidable need for standards—for lack of any better alternatives, those one understands—as the bias of the work. He is aware that his own work is not immune to this exposition, meaning that a discourse on "the discourse of ethnology" is as vulnerable to the same deficiencies as the discourse of ethnology itself may be. He understands that from this point on whatever a discourse sets out to do, it needs to be with the awareness that the process of objectivity is itself subjective. In other words, no discourse can have an absolute authority.

Up to this point there may be little contention about the material we have presented. So far, Derrida, one may say, has linearly, or axiomatically shown that no objective model which sets out to attain totality is possible, and therefore, such a model cannot have any absolute assertion. The question now is how we continue from here and according to whose standards do we live out the standardless awareness. In other words, the issue transforms from an objective philosophical issue to a social and political issue. Derrida continues that:

> But if no one can escape this necessity, and if no one is therefore responsible for giving in to it, however little he may do so, this does not mean that all the ways of giving in to it are of an equal pertinence. (Derrida 1978b, p. 282)

It may not be apparent that based on what reasoning Derrida at this point can make the claim that some approaches have more pertinence than others. He is possibly implicitly invoking another request for agreement as when in his quote on page 27 he says: "... provided we can agree on this word [discourse]". If there are no standards that we could assume to be absolute, how could we set standards to judge any discourse to be more relevant than others. We may agree that communication is one of the main concerns of discourse. We may also agree that with absolutely no standards, communication will prove to be impossible. However, we need to be careful not to shortchange the implications of the conclusions we have arrived at so far. We may question Derrida's conclusion that "if no one can escape this necessity," "no one is responsible for giving in to it." The only way one can make such a conclusion is to assume a totality. This totality, which is a form of humanism, has the same construct that other humanistic (or in other words *humancentric*) traditions, such as the biblical traditions, Enlightenment's traditions, or Modernity, may have had. Logically speaking, if the issue of responsibility is simply a relative matter among the position of only humans towards discourse, then if all humans are in the same position, the position itself will not be distinguishable from any other, and thus, the position becomes part of being a human. To make such a statement, other than assuming that the concept of meaning is only related to humans, one also needs to assume a totality towards humans, that one understands all humans at all times. That itself is a huge responsibility, which becomes a grand narrative and an essential approach. If in fact this totality existed, that the issue was so natural to our existence, and that through the vanishing of the position as anything specific we would be released of any responsibility, then how in the first place could we become aware of the position? Based on a rational reasoning, Derrida makes the conclusion that "the ethnologist accepts into his discourse the premises of ethnocentrism at the very moment when he denounces them." However, from accepting that we have a profound problem at hand to which nobody is immune, to washing our hands from the responsibilities the problem creates for us is a logical leap.

The construct of the ethnologist accepting something right at the moment of denouncing it is self-referential; it is a construct that Derrida shows to be instrumental in the works of Lévi-Strauss. If we consider the self-referentiality we become aware of a process with infinite details. Any self-referential statement negates any truth value that is assigned to it, which means that when such statements are used in a reasoning, our cognitive logical processes could infinitely follow logical reasoning without reaching any definite irrefutable conclusion. Since we cannot make any conclusions within such a discourse, we cannot make any statements about the content of it either; however, we are able to make statements about the structure in which such a discourse operates. Due to the self-referentiality of structures of structure we can never get to an absolute atomic level in regard to the content. This means that in such a research we study the invariant organization and relations among the components of a certain structure without regards to composition of the elements themselves. This is in fact how the so called soft sciences, such as medicine, study their subjects.

While the construct of self-referentiality may be apparent and simple to see, the implications and connotations are complex. As long as we look at language and discourse as a fixed, or in other words essential element, separate from the humans who are using it, in a deconstructive process, we are forced to go back to the same susceptible language and constructs which we deconstruct to continue our mental movement about them.[3] In his explanation of the connection of Lévi-Strauss' work and his paper, Derrida states that his subject is "critique of language" and a "critical language" at the same time. (Derrida 1978b, p. 282)

Most often cognitive action is understood as a human activity. Through our cognition we can conclude that a cognition based on absolute assumptions is not a possibility (it is important to note that the act of concluding itself is an act based on an absolute system or assumptions). Through their universality, absolute assumptions find theological relations, and therefore become a different type of truth in contrast to the truth that is obtained through deduction or induction. The construct of self-referentiality dissolves this dualistic nature of meaning and through such an approach we can dissolve the dualistic nature of the perceiving mechanism which is in relation to such truth. Dissolving the dualistic nature of absolute truth and relative truth implies that their difference is a matter of degree and not of type. If absolute truth is related to an all encompassing entity, (which may have various signifiers, such as god, spirit, love, nature, etc.), and relative truth is one that we humans can logically relate to, the idea of relating these two truths in matter of degree, relates humans to an all encompassing entity in a matter of degree as well. However, note that this connection is not an absolute one, which means that there are infinite amount of detail in arriving at a theological construct from a human one. Therefore, in such an approach the relationship between human and the theological entity, which we may call god, is similar to the connection they had when metaphysics governed the relationship; however, by the definition of a spectrum between human and an all encompassing entity, we can become aware of constructs that

[3]Humberto Maturana, a biologist whose work will be discussed later, says "one can say with a given language what the language permits." (Maturana and Varela 1980, p. xiii)

are situated between these two dualistic poles. In other words if the theological entity is an all encompassing entity and the individual is the atomic element of such a totality, then in the same way that we become aware of the physical elements which compose the individual we can become aware of organic constructs (such as crowds of humans) which are composed of the individuals.

By the awareness of an innate inability to be fully objective, especially when this awareness has made us understand our inability to attain the totality which is a requirement for achieving the objectivity in the first place, we could open the horizon of our language to arrive at another rational conclusion different than what Derrida may be apparently suggesting. “No one being able to escape this necessity”, logically could mean that “no one is therefore responsible for giving in to it”; however, it could at the same time mean that all of us, at least those who choose to engage themselves in the process of ethnology, are responsible for it. This contradiction of the whole being responsible without any of the parts holding responsibility can be logically resolved if we recognize the collective entity as a unity by itself. When we recognize a collective responsibility we can become aware of the collective entity which bears the responsibility as well. The question is the interpretation of the phrase “all of us”. If we see the world limited to “all of us” or in other words assume an innate totality for the word ‘all’, through the inability to become objective about the totality we have called “all of us”, every one of us would be subject of it. However, by using what we have understood by now, which is that we are not able to arrive at any totality, if we assume that the collection of any of us could be an entity by itself, then we could become objective about “all of us” as a single entity which is a subjective understanding of “all of us”. In such a model, we need to transform our language so that we could talk about the relationship between human collectives in similar ways that we may talk about human individuals.[4] Derrida recognizes such a collective entity in his first published work “*Edmund Husserl’s Origin of Geometry: An Introduction*” (1962), where he talks about Husserl’s phenomenology and sedimentation of meaning in the consciousness of collectives. Note the self-referential construct in his definition of present (retention of a retention) and the resulting formation

[4]Similarly, this discussion could be carried to to the opposite direction on the micro level of cells as well.

of the communal world's consciousness in the following passage:

> The present appears neither as the rupture nor the effect of a past, but as the retention of a present past, i.e., as the retention of a retention, and so forth. Since the retentional power of living consciousness is finite, this consciousness preserves significations, values, and past acts as habitualities (*habitus*) and sedimentations. Traditional sedimentation in the communal world will have the function of going beyond the retentional finitude of individual consciousness. (Derrida 1978a, p. 57)

If we do not recognize the collective responsibility which we may bear in accepting a necessity, by assuming a certain individualistic ontology about humans, it is possible to ignore the collective being that we may become as crowds.[5] Becoming aware of the nature of the self-referentialities which cause the aforementioned inescapable ethnocentrism can be grounds for reflection on a paradigm change in our awareness and language; as such the process of producing objective knowledge, as Derrida shows in the end of his paper ("Structure, Sign, ..."), becomes a process of "becoming" for the producer of knowledge. It is important to note that this by no means is a magical, fantastical, or theological argument based on any kind of metaphysical arguments. In fact, as we shall see later, this is a plausible and fruitful approach (specifically recognized in neuroscience and cybernetics) in defining our ontology without any dependency on metaphysics. Therefore, once we have questioned the world of metaphysics as hegemonic, the responsible way to go back to deal with the content is with the awareness of a higher level of consciousness of a different degree, and not of different kind in a way that metaphysics is defined. In his paper "Structure, sign, and play in the discourse of human sciences", Derrida continues by saying:

> The quality and the fecundity of a discourse are perhaps measured by the critical rigor with which this relationship to the history of metaphysics and to inherited concepts is thought. Here it is a question both of a critical relationship to the language of the social sciences and a critical responsibility of the discourse itself. It is a question of explicitly and systematically posing the problem of the status of a discourse which borrows from a heritage the resources for the deconstruction of that heritage itself. A problem of *economy* and *strategy*. (Derrida 1978b, p. 282)

[5]For example, entities such as those that Elias Cannetti discusses in *Crowds and Power*, 1962 (Canetti 1962).

Again, at this point if we continue to assume a linear approach to reasoning, it may not be clear that on what criteria can we use the words "quality" and "fecundity". Based on what standards do we decide if we are fecund towards a cancerous thought or not? In an arena where we have rigorously demolished the concept of rigor and system in what they set out to do in their birth, and where we argue against the quality or any fecundity towards blind rigor and systems, how can we speak of "critical rigor" and systematical questioning? For a politician or a business person this may be a simple "problem of *economy* and *strategy*" with little awareness towards the collective entities we are part of which include our environment. However, how could we understand this contradiction in form of a philosophical discourse if we are to follow the arguments only in linear fashion? Jameson has argued that postmodernism, which one can argue is based on poststructuralism, has become the cultural logic of late capitalism. (Jameson 1991) As I have argued above, accepting the rule of economy over philosophy is a choice (and therefore an essential axiom) and not an apparent conclusion or a rational necessity.

2.4 Post-structuralism, Form, and Continuity

I shall continue with the discussion of Derrida's paper "Structure, Sign, and Play in the Discourse of the Human Sciences", unveiling the musical concerns of this work as well. Derrida has used the work of Lévi-Strauss as a practical example of the theoretical issues he has discussed in his article. Lévi-Strauss' writings had been a major influence on the contemporary theoretical and critical discourse at the time Derrida presented his paper; however, Derrida states that he used the work of Lévi-Strauss as an example "above all because a certain choice has been declared in the work of Lévi-Strauss and because a certain doctrine has been elaborated there, and precisely, *in a more or less explicit manner*, as concerns both this critique of language and his critical language in the social sciences." (Derrida 1978b, p. 282) Derrida shows that this choice has a number of far reaching implications, namely:

1. Erasing or questioning the opposition between culture and nature. (Derrida 1978b, p. 283)

2. Preserving "as an instrument something whose truth value he [Lévi-Strauss] criticizes".

(Derrida 1978b, p. 284)

3. Turning discourse into *bricolage* and questioning the concept of originality. (Derrida 1978b, p. 285)

4. Producing a discourse which reflects on itself and criticizes itself. (Derrida 1978b, p. 286)

5. Making the form grow out of the material; i.e., the discourse on myth becoming *mythomorphic*. (Derrida 1978b, p. 286)

6. Through the musical model of the unity of form and material the ethnographic *bricolage* becoming mythopoetic, thus making a center to appear mythological. (Derrida 1978b, p. 287)

7. Problematizing the philosopheme/theorem vs. mytheme/mythopoem opposition. (Derrida 1978b, p. 288)

8. Making totalization useless or impossible. (Derrida 1978b, p. 289)

The content of the work of Lévi-Strauss is not discussion, however, his conclusions and Derrida's discussion of them play an important role in understanding the post-structural movement. To be more specific, I present Derrida's explanation of Lévi-Strauss' starting point. Derrida writes:

> Despite all its rejuvenations and disguises, this opposition [nature vs. culture] is congenital to philosophy. It is even older than Plato. It is at least as old as the Sophists. Since the statement of the opposition *Physis/nomos*, *physis/technē*, it has been relayed to us by means of a whole historical chain which opposes "nature" to law, to education, to art, to technics - but also to liberty, to the arbitrary, to history, to society, to the mind, and so on. Now, from the outset of his researches and from his first book, (*The Elementary Structures of Kinship*), Lévi-Strauss simultaneously has experienced the necessity of utilizing this opposition and the impossibility of accepting it. (Derrida 1978b, p. 282-283)

The difference between nature and culture is simple and complicated at the same time. This opposition is a rather old idea and it is an instrument of understanding; however, if understanding does not depend on metaphysics there is no way to draw a clear line between the two. We have found physical laws which act on matter and energy in our physical world. Our bodies are made of the same elements which are subject to these laws. The concept of culture, which is connected to human cognition, as an entity different from nature in type cannot be upheld without some form of metaphysics. However, if we treat nature and culture as the same entities differing in degree and not in kind, it would mean that our understanding is situated somewhere within a spectrum whose poles are on the one hand the pure material world and on the other the pure metaphysical (symbolic).

Derrida notes that "... in *The Elementary Structures* he [Lévi-Strauss] begins from this axiom or definition: that which is *universal* and spontaneous, and not dependent on any particular culture or any determinate norm, belongs to nature. Inversely, that which depends upon a system of *norms* regulating society and therefore is capable of *varying* from one social structure to another, belongs to culture." (Derrida 1978b, p. 283) Derrida continues that:

> These two definitions are of the traditional type. But in the very first pages of the Elementary Structures, Lévi-Strauss, who has begun by giving credence to these concepts, encounters what he calls a *scandal*, that is to say, something which no longer tolerates the nature/culture opposition he has accepted, something which *simultaneously* seems to require the predicates of nature and of culture. This scandal is the *incest prohibition.* (Derrida 1978b, p. 283)

Incest prohibition seems to be a cultural concept; however, by its uniform and *universal* presence, it needs to be considered natural. Derrida turns the argument around here and becomes objective about the content of what is being discussed within a system of discourse that is implicitly accepted. Yet by declaring that: "Obviously there is no scandal except within a system of concepts which accredits the difference between nature and culture" (Derrida 1978b, p. 283), Derrida continues to show that by beginning with a fact which seems to insinuate a logical contradiction, Lévi-Strauss questions the very concept which gave rise to the philosophical logic. Derrida Writes:

> By commencing his work with the *factum* of the incest prohibition, Lévi-Strauss thus places himself at the point at which this difference, which has always been assumed to be self-evident, finds itself erased or questioned. (Derrida 1978b, p. 283)

Lévi-Strauss shows that a study of the myth in a classically scientific form is impossible, and as such any study of the myth needs to be a myth itself. In *The Raw* *and the Cooked* Lévi-Strauss writes: "It follows that this book on myths is itself a kind of myth." (Derrida 1978b, p. 287) Derrida shows that the work of Lévi-Strauss is a self-referential *bricolage* in which the discourse criticizes itself. Derrida Writes:

> But Lévi-Strauss's [sic] remarkable endeavor does not simply consist in proposing, notably in his most recent investigations, a structural science of myths and of mythological activity. His endeavor also appears—I would say almost from the outset—to have the status which he accords to his own discourse on myths, to what he calls his "mythologicals." It is here that his discourse on the myth reflects on itself and criticizes itself. (Derrida 1978b, p. 286)

It is this structural quality which led Lévi-Strauss to assume a uniform model for the content and form of his work. Derrida writes:

> Everything begins with structure, configuration, or relationship. The discourse on the acentric structure that myth itself is, cannot itself have an absolute subject or an absolute center. It must avoid the violence that consists in centering a language which describes an acentric structure if it is not to shortchange the form and movement of myth. Therefore it is necessary to forego scientific or philosophical discourse, to renounce the *epistēmē* which absolutely requires, which is the absolute requirement that we go back to the source, to the center, to the founding basis, to the principle, and so on. In opposition to *epistemic* discourse, structural discourse on myths—*mythological* discourse—must itself be *mythomorphic*. (Derrida 1978b, p. 286)

Therefore, it seems that the unity of the form and material follows from the restraint against imposing violence on the subject. This unity results when we eliminate metaphysical elements in defining constructs. Metaphysics always start with some position of power defining its nature and therefore is prone to be violent.

The concept of center and totalization are related to each other. Once we have a center we can define the rest in relation to that center and, thus, attain totality. If the subject is infinite in its nature, neither totality nor designating a central focal point becomes possible. Derrida, quotes from Lévi-Strauss that:

> The study of myths raises a methodological problem, in that it cannot be carried out according to the Cartesian principle of breaking down the difficulty into as many parts as may be necessary for finding the solution. There is no real end to methodological analysis, no hidden unity to be grasped once the breaking-down process has been completed. Themes can be split up *ad infinitum*. (Derrida 1978b, p. 287)

However, Derrida argues that: "nontotalization can also be determined in another way: no longer from the standpoint of a concept of finitude as relegation to the empirical, but from the standpoint of the concept of *play*." (Derrida 1978b, p. 289) While the operations of the "concept of *play*" are finite, through a recursive application of it, one can continually produce new variations of the myths, and make totalization impossible. Lévi-Strauss chooses to unify the form and content of his studies in a musical approach in which the nontotalization and infinite play of the myths can be accommodated non-violently (i.e., without the use of metaphysics) within the form of the discourse. Derrida quotes from Lévi-Strauss that:

> ... the myth and the musical work are like conductors of an orchestra, whose audience becomes the silent performers. If it is now asked where the real center of the work is to be found, the answer is that this is impossible to determine. Music and mythology bring man face to face with potential objects of which only the shadows are actualized. (Derrida 1978b, p. 287)

Derrida continues that:

> The musical model chosen by Lévi-Strauss for the composition of his book is apparently justified by this absence of any real and fixed center of the mythical or mythological discourse.
>
> Thus it is at this point that ethnographic *bricolage* deliberately assumes its mythopoetic function. But by the same token, this function makes the philosophical or epistemological requirement of a center appear as mythological, that is to say, as a historical illusion. (Derrida 1978b, p. 287)

Having questioned the scientific legitimacy of ethnology and in turn the whole history of metaphysics in the Western world, and realizing that a mythomorphic discussion cannot be judged within a philosophical tradition, once again Derrida invokes his common sense question that:

> Nevertheless, even if one yields to the necessity of what Lévi-Strauss has done, one cannot ignore its risks. If the mythological is mythomorphic, are all discourses on myths equivalent? Shall we have to abandon any epistemological requirement which permits us to distinguish between several qualities of discourse on myth? A classic, but inevitable question. It cannot be answered—and I believe that Lévi-Strauss does not answer it—for as long as the problem of the relations between the philosopheme or the theorem, on the one hand, and the mytheme or the mythopoem, on the other, has not been posed explicitly, which is no small problem. (Derrida 1978b, p. 288)

Derrida quickly acknowledges the self-referentiality of the argument and admits that this is a problem which his text has to consider as well. He continues: "For lack of explicitly posing this problem, we condemn ourselves to transforming the alleged transgression of philosophy into an unnoticed fault within the philosophical realm." It may seem that what Derrida is postulating is an end to philosophy; however, he continues with warning that: "What I want to emphasize is simply that the passage beyond philosophy does not consist in turning the page of philosophy (which usually amounts to philosophizing badly), but in continuing to read philosophers *in a certain way*." (Derrida 1978b, p. 288)

The logical judgment on the validity and legitimacy of propositions is an important step in the epistemological process. When we argue for a text to be mythomorphic within the philosophical tradition, we still need to have ways of judging a text. However, since we have just questioned the logical jurisdiction of philosophy over ethnology, we are left with aesthetical judgments; this transition from logical judgment to aesthetical judgment is in fact in accord with the musical model that is chosen by Lévi-Strauss. It is perhaps in this context that we could understand Derrida's use of the subjective word "bad" when he judges some form of philosophizing as bad, especially when it is followed by re-establishment of the legitimacy of those whose work we just deconstructed, namely the work of philosophers.

One can find similarities between Derrida's treatment of philosophy and the treatment of tonality by many music scholars where tonality and philosophy both are initially perceived as totalizing and universal concepts but after being refuted in their strict terms, they continue to impose their universal power, not in their traditional central form but, in a diffused manner, while at the same time being considered Western in their construction, and therefore, being owned by the West. Thus, they continue to hold hegemonic positions in relation to any non-Western culture or, in other words, anything that opposes the source of philosophy.[6] In the next chapter I shall discuss the role of metaphysical constructs in definition of the tonal form and how such constructs become the hegemonic point of reference toward the music of non-Western cultures.

[6] In his essay "Metaphysics and Violence", Derrida traces this source to be Greek. (Derrida 1978c, p. 81)

Derrida shows that the work of Lévi-Strauss is an empirical study within a philosophical context critiquing empiricism and as such, carrying this double postulation throughout the work. Derrida writes:

> I have said that empiricism is the matrix of all faults menacing a discourse which continues, as with Lévi-Strauss in particular, to consider itself scientific. If we wanted to pose the problem of empiricism and *bricolage* in depth, we would probably end up very quickly with a number of absolutely contradictory propositions concerning the status of discourse in structural ethnography. On the one hand, structuralism justifiably claims to be the critique of empiricism. But at the same time there is not a single book or study by Lévi-Strauss which is not proposed as an empirical essay which can always be completed or invalidated by new information. (Derrida 1978b, p. 288)

Derrida continues by introducing the role of *play* within the rewriting practice of "play of substitution". Using this definition and borrowing from Lévi-Strauss' terminologies, he defines his concept of the *supplement* as follows:

> One cannot determine the center and exhaust totalization because the sign which replaces the center, which supplements it, taking the center's place in its absence—this sign is added, occurs as a surplus, as a *supplement*. (Derrida 1978b, p. 289)

Now armed with the concepts of *play* and signification, Derrida discusses the origins of structures, that is how they can appear within a system of evolving elements which are themselves defined as structures. This system of evolving structures could be understood in the framework of physical continuities using linear mathematics and geometry within the scientific axiomatic model. The concept of *play* can be compared to either a random element or the random effect introduced through infinite substitutions using the re-writing rules (in mathematics known as the Lindenmyer's L-System (Lindenmayer 1968)). One can argue that here Derrida is problematizing the concept of creativity, as in creating structures. *Play* brings about new and unknown situations which inherently, by definition, oppose the history of the elements involved. Thus, *play* and history (or continuity) are in tension with each other. Derrida points out that the concept of play is important for Lévi-Strauss and that: "..., the reference to play is always caught up in tension. Tension with history, first of all." (Derrida 1978b, p. 290) It is here that Derrida poses the formal and, as he may admit in the end of his presentation, the algebraic (or mathematical) statement of his study. It is a long but important passage.

> I shall simply indicate what seems to me the formality of the problem: by reducing history, Lévi-Strauss has treated as it deserves a concept which has always been in complicity with a teleological and eschatological metaphysics, in other words, paradoxically, in complicity with that philosophy of presence to which it was believed history could be opposed. The thematic of historicity, although it seems to be a somewhat late arrival in philosophy, has always been required by the determination of Being as presence. With or without etymology, and despite of the classic antagonism which opposes these significations throughout all of classical thought, it could be shown that the concept of *epistēmē* has always called forth that of *historia*, if history is always the unity of a becoming, as the tradition of truth or development of science or knowledge oriented toward the appropriation of truth in presence and self-presence, toward knowledge in consciousness-of-self. History has always been conceived as the movement of a resumption of history, as a detour between two presences. But if it is legitimate to suspect this concept of history, there is a risk, if it is reduced without an express statement of the problem I am indicating here, of falling back into an ahistoricism of a classical type, that is to say, into a determinate moment of the history of metaphysics. Such is the algebraic formality of the problem as I see it. (Derrida 1978b, p. 291)

History defines a continuity within and between the moments of the past. We could interpret Derrida's words as implying that history either needs to be looked at as a single continuous movement (which needs to be defined with teleological origins), or if there are discontinuities within this whole, these discontinuities are related to teleological and eschatological metaphysics. Since we have questioned the concept of metaphysics within epistemology, we cannot fall back to the same old metaphysics, or as Derrida calls it to "an historicism of a classical type, that is to say, into a determinate moment of the history of metaphysics." By the invocation of the concept of play, one could argue that this metaphysics does not have a determinate form or at least it is indeterminate to the subject involved in the play. Derrida argues that in the work of Lévi-Strauss, the concept of original structures "compels a neutralization of time and history" where the concepts of chance and discontinuity are indispensable. (Derrida 1978b, p. 291) He writes:

> For example, the appearance of a new structure, of an original system, always comes about—and this is the very condition of its structural specificity—by a rupture with its past, its origin, and its cause. One can therefore describe what is peculiar to the structural organization only by not taking into account, in the very moment of this description, its past conditions: by omitting to posit the problem of the transition from one structure to another,

> by putting history between brackets. In this "structuralist" moment, the concepts of chance and discontinuity are indispensable. (Derrida 1978b, p. 291)

Therefore, the moment of creativity is defined as a discontinuity opposed to the continuity of history. Derrida argues that:

> Lévi-Strauss does in fact often appeal to them [chance and discontinuity] as he does, for instance, for that structure of structures, language, of which he says in the "Introduction to the Work of Marcel Mauss" that it "could only have been born in one fell swoop": (Derrida 1978b, p. 291)

Derrida quotes the following passage from Lévi-Strauss' "Introduction to the Work of Marcel Mauss": (Derrida 1978b, p. 291)

> Whatever may have been the moment and the circumstances of its appearance in the scale of animal life, language could only have been born in one fell swoop. Things could not have set about signifying progressively. Following a transformation the study of which is not the concern of the social sciences, but rather of biology and psychology, a crossing over came about from a stage where nothing had a meaning to another where everything possessed it.[7]

The paradox is that the rupture, if it is to be true to its definition, has nothing to do with the past, at least structurally; in other words, it becomes metaphysical in its relation to the presence of the past. However, if we eliminate the agency of metaphysics and, therefore abandon all points of reference, then we need to define the rupture in accordance with the past; it is here that the concepts of chance and discontinuity play an important role for the structuralists. However, this dependence on chance is a metaphysical dependence itself, as chance has to be defined in relation to some point of reference and this is why Lévi-Strauss is forced to come to the conclusion that signification came about suddenly "in one fell swoop". Needless to say, within a rational discussion, such an explanation is not satisfactory. Derrida does not offer any solution to this problem in this article but points out that:

> This standpoint does not prevent Lévi-Strauss from recognizing the slowness, the process of maturing, the continuous toil of factual transformations, history (for example, in *Race and History*). But, in accordance with an act

[7] "Introduction à l'œuvre de Macel Mauss," in Marcel Mauss, *Sociologie et anthropologie* (Paris: P.U.F., 1950), p xlvi.

> which was also Rousseau's and Husserl's, he must "brush aside all the facts" at the moment when he wishes to recapture the specificity of a structure. Like Rousseau, he must always conceive of the origin of a new structure on the model of catastrophe—an overturning of nature in nature, a natural interruption of the natural sequence, a brushing aside of nature. (Derrida 1978b, p. 292)

The problem of origin of structures, or in other words creativity, seems to have similar constructs in various scales and contexts, and seems to pose similar questions to a rational mind. Within a rational discourse, biblical accounts of creation pose the same problem as would considering a work of art or a piece of literature as original structure. Derrida does not attempt to solve this problem, however, in his conclusion, he offers a new approach towards structure and center through affirmation of play. He discussed another tension, namely that between play and presence, in which play disrupts the status of presence. He says that: "Being must be conceived as presence or absence on the basis of the possibility of play and not the other way around." (Derrida 1978b, p. 292) One may interpret this line as arguing that the concept of life comes before existence, meaning that life should not be explained based on physical existence, as much of the classical thought is obliged to do, but to define the existence of the material based on the play resulting from life. Derrida acknowledges that Lévi-Strauss recognizes the element of play, play of repetition, and repetition of play—which, one could argue, is only possible through the musical model of unity of form and material—but Derrida does not accept that Lévi-Strauss is free from the classical tendencies of leaning toward the center. Accordingly, he characterizes the work of Lévi-Strauss as follows:

> If Lévi-Strauss, better than any other, has brought to light the play of repetition and the repetition of play, one no less perceives in his work a sort of ethic of presence, an ethic of nostalgia for origins, an ethic of archaic and natural innocence, of a purity of presence and self-presence in speech—an ethic, nostalgia, and even remorse which he often presents as the motivation of the ethnological project when he moves toward archaic societies which are exemplary societies in his eyes. (Derrida 1978b, p. 292)

In such arguments, one cannot help but notice Derrida's aesthetical remarks, which again I would like to point out is in accord with the model which we seem to have accepted as a legitimate model for text—i.e., the unity of form and material without the need for a specific logical center. He continues to comment on the work of Lévi-Strauss with many other aesthetical remarks and beckons towards a more lively approach, which is that of Nietzsche. He writes:

> Turned towards the lost or impossible presence of the absent origin, this structuralist thematic of broken immediacy is the saddened, *negative*, nostalgic, guilty, Rousseauist facet of the thinking of play whose other side would be the Nietzschean *affirmation*, that is the joyous affirmation of the play of the world and of the innocence of becoming, the affirmation of a world of signs without fault, without truth, and without origin which is offered to an active interpretation. (Derrida 1978b, p. 292)

And following this, Derrida states what characterizes the separating point between the structuralists and the post-structuralists approach. The musical model of unity of form and material—the form seeking to find the structure of the material and at the same time the material affecting the structure of the form—effectively accepts that there is no predefined center; however, Derrida argues that the approach towards this noncenter is important. The two approaches are: 1) we accept there existed a center and we have lost it now, or 2) the center never existed and we do not even lean towards its absence. About Nietzschean affirmation, with his own emphasis, Derrida writes that: "*This affirmation then determines the noncenter otherwise than as loss of the center.*" (Derrida 1978b, p. 292) It is following this glance towards outside, towards care free development rather than analysis, that Derrida frees play from the need for sense of security. He continues:

> And it plays without security. For there is a *sure* play: that which is limited to the *substitution* of *given* and *existing*, *present*, pieces. In absolute chance, affirmation also surrenders itself to *genetic* indetermination, to the *seminal* adventure of the trace. (Derrida 1978b, p. 292)

It seems that Derrida sees a duality between a sure, secure, and determined movement, and what "absolute chance" and real *play* would bring to us. The belief in such a dichotomy had a long history in the sciences and specifically in mathematical modeling of empirical findings. In his arguments, Derrida is emancipating the philosophical discourse from the bounds of scientific structure. However, even in his attempt at questioning the history of philosophy which in turn depends on the concept of duality of truth, he himself, ends up classifying the approach to interpretation of interpretations dualistically. He writes:

> There are thus two interpretations of interpretation, of structure, of sign, of play. The one seeks to decipher, dreams of deciphering a truth or an origin which escapes play and the order of the sign, and which lives the necessity of interpretation as an exile. The other, which is no longer turned toward the origin, affirms play and tries to pass beyond man and humanism, the name man being the name of that being who, throughout the history of metaphysics or of ontotheology—in other words, through the history of all of his history—has dreamed of full presence, the reassuring foundation, the origin and the end of play. The second interpretation of interpretation, to which Nietzsche showed us the way, does not seek in ethnography, as Lévi-Strauss does, the "inspiration of a new humanism" (again from the "Introduction to the Work of Marcel Mauss"). (Derrida 1978b, p. 292)

The dualistic nature of these two forms of interpretation is so strong that Derrida sees them as "absolutely irreconcilable". He continues:

> There are more than enough indications today to suggest we might perceive that these two interpretations of interpretation—which are absolutely irreconcilable even if we live them simultaneously and reconcile them in an obscure economy—together share the field which we call, in such a problematic fashion, the social sciences.

And finally he presents the "question of choosing" between these two "absolutely irreconcilable" approaches.

> For my part, although these two interpretations must acknowledge and accentuate their difference and define their irreducibility, I do not believe that today there is any question of *choosing*—in the first place because here we are in a region (let us say, provisionally, a region of historicity) where the category of choice seems particularly trivial; and in the second, because we must first try to conceive of the common ground, and the *différance* of this irreducible difference. (Derrida 1978b, p. 293)

Even though by definition *différance* escapes definition in linear terms, perhaps we could define it recursively as the differences of differences, not in a simple and single step, but (as Kierkegaard might say in *Fear and Trembling* of faith) in a movement that repeats itself.

As mentioned above, neither Derrida nor Lévi-Strauss discuss the origin of the concept of signification. One could conclude that Lévi-Strauss is depending on metaphysics when he is accepting that "language could only have been born in one fell swoop". Derrida, argues that chance and discontinuity appeal to the structuralist thought for legitimizing such a conclusion. Chance and discontinuity have fairly precise scientific definitions; however, keep in mind that such definitions themselves are made within the axiomatic model of science. Derrida's treatment of epistemology and structurality of structures can cover such a model, in which some elements of science and philosophy are used as definitions or origins for some other elements; however, Derrida, just like Lévi Strauss, is dependent on the concept of signification and he is not able to explain the origin of the concept of signification. Dualistic terms always need some form of metaphysics to draw a clear line between two poles. Since in his paper, Derrida does not explain the origin of the concept of signification, in his conclusion he is forced to resort to a dualistic approach towards the treatment of the concept of *play* as the origin of structures.

2.5 The Birth of Signification

Almost all Western philosophy assume the concepts of the individual and intelligence as axioms—they are assumed as the perceiving mechanism of logical structures. Within the classical concept of natural philosophy, the intelligent cognitive productions of the individuals are dualistically separated in dichotomies, as Derrida mentions, within the concepts of "philosopheme or the theorem" and "the mytheme or the mythopoem" (Derrida 1978b, p. 288).[8] As I have discussed, in his quote in page 39, Derrida argues that epistemology requires us to explicitly express the difference between the philosopheme and the mythopoem. Once this difference is expressed, mythomorphic text can no longer be traditionally (or linearly) judged within epistemological contexts. However, what will happen if we question the duality of the philosopheme and mythopoem?

Philosophy, epistemology, Greek science, and perhaps many other disciplines are based on this separation which can also be related to what Derrida refers as "a system of concepts which accredits the difference between nature and culture." (Derrida 1978b, p. 283) Within a logical axiomatic system we understand the difference between nature and culture as a difference in type; however, it is this assumed difference which defined the concept of "type" in the first place. We have seen that Derrida shows the

[8]Prior to the publishing of Lorenz's paper, "Non-periodic deterministic flow" in 1962 physical sciences treated the signals resulting from physical measurements in dualistic manners as well—structures in signals were understood to be exclusively either deterministic or statistical, in other words a deterministic process was understood to be unable to generate a signal which seemed random to a perceiver.

work of Lévi Strauss to be on the continuum between the philosopheme and mythopoem. However, in our common understanding of these concepts, especially in the West, we do not even have the language to talk about their relation.

The concept of "origin" presents the same type of problem no matter in which discipline or what context it is being discussed. As long as metaphysics defines the rules of communication, "origins" have no choice but be explained by metaphysical reasons. Structuralism realizes that it needs to collude its form with the object (content) of its study, but when it comes to the origin of the instrument of the study, namely language, it is forced to resort to a metaphysical approach (that "'language could only have been born in one fell swoop"). In *Chaos Bound*, where she studies the applications or relations of non-linear dynamics and information theory to literature, Katherine Hayles writes:

> In an early essay, "From Science to Literature" (1967), Roland Barthes distinguishes between science and literature through their different attitudes toward language. Science, Barthes says, regards language instrumentally. For science, language (which is nothing) serves only to transmit concepts (which are everything). In literature, language is not a vehicle transmitting the object, but the object itself. Barthes is interested in what happens to this dichotomy between literature and science when structuralism is injected into it. Structuralism prides itself on being a science but has its roots in linguistics. Derived "from linguistics, structuralism encounters in literature an object which is itself derived from language"[9] The question Barthes posed is whether structuralism will (like a science) pose itself above its object or recognize that it is itself composed of the language it would take for its object. Anticipating the advent of deconstruction and other post-structuralist theories, Barthes predicts that structuralism "will never be anything but one more 'science' ... if it cannot make its central enterprise the very subversion of scientific language ... [It must work to] abolish the distinction, born of logic, which makes the work into a language-object and science into a meta-language, and thereby to risk the illusory privilege attached by science to the ownership of a slave language" (p. 7). (Hayles 1990, P34)

She continues to show that even with the success of the post-structuralist thought this matter is still in debate. She writes:

> If structuralism has been superseded, however, the project Barthes set forth has not. The task of understanding how scientific languages are implicated in the concepts they convey remains one of the important problems of literature

[9]Barthes, Roland. 1986. *The Rustle of Language.* Trans. Richard Howard. New York: Hill & Wang. Page 6.

> and science. To this project the study of self-reflexive metaphors can offer distinctive contributions, for at these moments science necessarily confronts the enfolding of language-as-object into its assumed stance as a metalanguage. That is to say, at these moments science confronts its literariness.

As long as the individual and intelligence are considered as axioms within the scientific dialectic, there is no way to reconcile their difference with their objects; meaning that they will have no way of talking about themselves (the individual and intelligence) within their own language. One solution to this problem is to consider "a system of concepts" which does not accredit "the difference between nature and culture". One can argue that the difference between nature and culture is simply a matter of assumption or agreement. "Proof" is a concept which is only meaningful within the logical or cultural domain, even though it may be subjected to the physical realities. As such, the difference between nature and culture is out of the domain of proof; and therefore, it is only an assumption or an agreement.

If we break this agreement, as Derrida may have shown the need for in his paper in regard to the work of Lévi-Strauss, self-referential constructs appear. In such a domain the problem of "origins" takes on a much different nature. Self-referential constructs present us with situations in which reaching atomic level is neither required nor, at times, possible. Of course, such a dialectic does need its own model of discourse. In the same way that linear mathematics was a basis for traditional epistemology, one can argue that non-linear dynamics, in which self-referentiality plays a structural role, can be a defining basis for a different form of reasoning, scholarship, and paradigm of thought. Similar to a deconstructive model, within a model that accepts self-referentiality as an innate quality of discourse, the question of "origins" transforms. In other words, the question of "which came first the egg or the chicken?", changes to "what is the self-referential structure which governs the relationship between the egg and the chicken?"

Language is attributed to a communication between intelligent beings and a certain level of cognitive faculty is required to either produce or understand an object within a language. We could look at language as an essential entity having a presence of its own independent of those who use it, or we could look at it as part of and related to the state of relation between those involved. In the latter case, the parties do not use language to interact, but their state of interaction is called language. As such, the language itself becomes an entity related to those who use it and it evolves in relation to the evolution of those who use it. This model for language is a byproduct of the paradigm change that accepting self-referentiality as a premise for inference brings to us.

The simplest form of self-referentiality is produced when we think of our own thought and use language to describe it. The statement which comments on our thought has to speak about itself and if the comment is about origins, the statement has to define its origin as well. While accepting self-referentiality as a more fundamental concept than inference, the question changes from "where does the intelligence of intelligent individuals, or in other words the way they deal with their environment, come from?" to "what is the self-referential relationship that intelligent beings have with their surroundings?" Relating to our discussion, which is the origin of structures and signification in general within a system that does not depend on metaphysics, the question of "if a structure comes about through evolution in history, or creation through play?" changes to "what is the self-referential relationship that the evolutionary history has with the creative play in regard to this newly found structure or signification?" Similarly, some of the most fundamental questions about origins such as questions about the origin of the universe as we know it changes from "did the universe come about by creation or evolution?" transform to "What is the self-referential relationship which the concept of creation has with evolution?" To understand the self-referential relationship in all the above examples, it is important that you keep in mind the agency of your understanding in your understanding process.

The self-referential relationships discussed in the above examples which could be studied through the concept of play, become the meeting point between what we know as totality—where all that is known are connected through rational connections—and randomness – where structures come to life with no apparent reason. I shall consider this matter in relation to the concept of play in Derrida's paper. He uses the concept of play as an agent of structural creativity. When one says play is an agent of creativity, one is putting play in tension with totality, as the play is bringing something new to the totality. I shall show that this relationship between play and totality is a self-referential one.

2.6 The Tension between Play and Totality

Derrida's paper can be divided into three sections

- A contextual analysis of structuralism
- Discussion of the work of Lévi-Strauss within that context
- Conclusions based on introduction of the concept of play and offering the "Nietzschean affirmation" as an attitude towards it

In the first part, Derrida shows the self-referentiality of such concepts as structure and sign, which therefore, render the concept of center as mythical. In the second part, he shows how such self-referentiality finds its way in the relationship between the methodology and formal elements of Lévi-Strauss' texts. In the third part, Derrida discusses the concept of play as the agent responsible for introducing new structures within our discourse where play comes in tension with history and presence. Derrida argues against the "saddened, *negative*, nostalgic, guilty" (Derrida 1978b, p. 292) and in general backward looking (at the loss of center) approach of the structuralist and offers the "Nietzschean affirmation" (Derrida 1978b, p. 292) as a new approach towards play which is "absolutely irreconcilable" (Derrida 1978b, p. 293) with that of the structuralists. This irreconcilable difference can also be a major deciding factor in how we deal with the nature vs. culture duality. While we conclude that "a system of concepts which accredits the difference between nature and culture" can no longer hold grounds, if we are to return to the old culture of the language and system of signification which we questioned, we will be forced to ignore (or deny) the existence of nature all together, and it is perhaps thus that Jameson writes:

> In modernism, ..., some residual zones of "nature" or "being", of the old, the older, the archaic, still subsist; culture can still do something to that nature and work at transforming that "referent." Postmodernism is what you have when the modernization process is complete and nature is gone for good.[10] (Jameson 1991, p. ix)

[10] It is only fitting that this work is being written in San Diego during the most disastrous fire in the history of Southern California (October 2003), after record heat in Europe (August 2003), and the worst fires in recent history in Western Canada (August 2003, http://news.bbc.co.uk/2/hi/americas/3121851.stm). A recent report leaked from the pentagon predicts that "Climate change over the next 20 years could result in a global catastrophe costing millions of lives in wars and natural disasters." (*The Observer International*, UK, Feb. 22, 2004.)

However, similarly we can also follow the path in the other direction; in other words we could view everything as natural and define culture as a natural product. In the fully cultural model we do not have to deal with self-referentialities in a direct fashion since in that model nature and therefore, the mechanism which perceives the cultural production (or in other words the human mind and its working), is not considered as part of the equation. However, in a model where all there is, the physical world, the human, the human mind, the societies, their cultures, and cultural productions are all considered as constructions deferring in matters of degree and not of kind, self-referentiality plays a structural role. With a fully integrated natural system, we will be able to see the role of play in a creative context without assuming that anything is "born in one fell swoop"; in other words if there is any birth in one fell swoop, it is perceived as such because of the innate discontinuities which exist in self-referential constructs. Let us demonstrate that especially in relation to the concept of play and and totality. If play is thought of as a creative element, it must be in direct tension with totality.

From the tension of play with history and presence, we can also infer the tension between play and totality. History assumes a sense of totality about every moment that it engulfs within it and it is through this totality towards moments that history can build its detour between two moments of it. Without the concept of play, through the totality of all moments and the connection between them, all moments can also be considered as a single moment as well since the role of time is simply functional in the connection between all moments. In other words the totality of history without play is the same no matter in what scale of time the history is perceived.

Once the concept of play is introduced, ruptures are created in between moments of history, the knowledge of which is used statistically within the epistemological process. In such a scenario, history is defined as moments of totality connected through moments of rupture. However, the nature of rupture is that by definition it is not possible to classify it. This means that absolute rupture cannot happen except in a single instantaneous moment, since multiple ruptures create a set in which relation among them results in negating the absolute nature of the rupture. In addition, to understand or to perceive the absolute rupture one needs to claim totalities before and after the rupture, otherwise one cannot claim that a rupture occurred as it could have been the result of the lack of knowledge of totality. Two related issues are at hand in such a situation: first is that totality itself is not attainable, and second is that the concept of two separate totalities negate the concept of totality by definition. Therefore, neither absolute rupture nor absolute totality can be perceived, and thus, play becomes in tension with totality.

In reality we cannot speak neither of totality, nor of rupture in their theoretical characterization. This realization must be of no surprise as we must have understood that, since we cannot attain totality, we cannot speak of any concept in their essential terms. In other words, it should be understood that any perceived totality has ruptures within it, and any rupture must contain bounding totalities inside of it for it to be perceived; in other words such related definitions repeat themselves within each other. Rupture cannot happen in time. It has to be an instantaneous event. However, talking of instantaneous events in human terms is impossible as we do not have infinite precision to sense anything instantaneously, in other words, the concept of rupture and totality are related to the scale in which they are being measurement. Thus, the relationship among the measure of the totality, the nature of rupture, and the scale of measurement is self-referential in nature. Thus, understanding a single moment means understanding its connection with all other moments, as Adorno points out in *Negative Dialectic* in his discussion of the "twofold character of the system" in which he talks about the *l'esprit de systèm* and *l'esprit systèmatique*, that:

> To comprehend a thing itself, not just to fit and register it in its system of reference, is nothing but to perceive the individual moment in its immanent connection with others. (Adorno 1973, p. 25)

2.7 Conclusions

The concept of metaphysics within a scientific or a rational axiomatic discourse will eventually find theological relations no matter how local this relation may be. For example, creativity is understood as an act of originating an element above the physical material—a perceived mental structure. As long as the agency of the perceiver is not accounted for in this process, the source of the newly formed element has to be defined metaphysically because the entity is defined that way. In this chapter I have discussed Structuralism and Post-structuralism in regards to the source of structures and significations mainly based on views of Jacques Derrida. He shows that for the structuralists, and specifically in the work of Lévi-Strauss, the concept of 'center', which is the basis for any linear axiomatic discourse, cannot hold its nature of significations if we are to refrain from exerting the violent authority of the centric model of epistemology on any material outside of its domain. Objective study is one of the requirements of epistemology, thus, the frame of reference in which the subject is studied has to be different than the subject itself. Thus, in relation to the subject, whatever the definition of objectivity is, it has be defined metaphysically as an axiom.

Lévi-Strauss uses the "musical model" of unity of form and material, in which form is not defined as a metaphysical entity separate from the material, to respond to this problem. Thus, he calls his own study a myth as well. Derrida extends this matter and argues that this is a problem which has to be considered within all philosophical and epistemological works when he considers that at the very moment that the ethnologist denounces the premise of ethnocentrism, he or she is accepting it into his or her discourse and that "this necessity is irreducible". (Derrida 1978b, p. 282) The ethnocentrism is represented by the metaphysical definitions of epistemology which go back to the age old Greek separation of philosopheme and mythopoeme. All the functional elements within epistemology need to be of the type philosopheme. What separates the philosopheme from mythopoem is the authority of the center. Thus, when the center itself becomes mythical, the separation of philosopheme and mythopoem comes under question as well.

Even though the text of Lévi-Strauss, which he himself calls a myth, as a whole cannot be accepted within the classical model of epistemology, the inner relationship among the various parts of the text still follow the epistemological and rational rules. Derrida shows that the approach of Lévi-Strauss towards the center is as a lost element, and thus he sees the approach of Lévi-Strauss as "saddened, *negative*, nostalgic, [and] guilty". (Derrida 1978b, p. 292) Derrida defines the other side of that as the "Nietzschean *affirmation*, that is the joyous affirmation of the play of the world and of the innocence of becoming, the affirmation of a world of signs without fault, without truth, and without origin which is offered to an active interpretation." (Derrida 1978b, p. 292) Such an approach could be interpreted as a "laissez faire" attitude, in which no one is responsible for giving in to ethnocentrism, because no one is able to escape the necessity of it.

(Derrida 1978b, p. 282) Derrida fails to recognize the collective responsibility of such a situation and the collective entities which need to bear this responsibility.

While Derrida uses self-referential constructs (such as "The center is not the center." (Derrida 1978b, p. 279)) in his writing, which he uses to define 'deconstruction', he does not specifically present it as a central (sic) element.[11] Derrida problematizes epistemology by showing the self-referential paths which we are faced with when we look for origins. While in his paper, "Structure, Sign, ...", he brings the whole history of Western epistemology under question and argues for a "joyous" and "innocent" approach, in which the strict rules of epistemology could be regarded in a more relaxed manner, Derrida does not offer an answer to the question of origin of language itself posed by Lévi-Strauss and does not try to eliminate metaphysics fully. He only shows that the destruction of metaphysics has been a self-referential process in which metaphysics is used to eliminate metaphysics.

Language is used for expression and communication. The concept of understanding has to be explained in relation to at least two entities. The epistemology of the West defines all its fundamentals based on the concept of individual as the center of cognitive activity, and the other party is defined as "the other". If we do not accept a metaphysical form of communication among individuals, a mental construct has to be carried from one to the other by some physical element. In the same way that the involved parties have to have an agreement, or in other words similar origins, in their physical abilities to exchange the physical element containing the mental construct, they also have to have an agreement in the nature of the frame of signification of the mental constructs as well. As long as we view the mental constructs separate from the physical mediums of communication we are forced to accept, as Lévi-Strauss points out, that language "could only have been born in one fell swoop": (Derrida 1978b, p. 291) As such, the concept of communication is defined metaphysically and is accepted on faith; in other words, it cannot be questioned rationally.

[11]In a short conversation with Jacques Derrida that I had on Apr 23, 2003 in Irvine, California, in response to my question: "Would you say that self-referentiality and Gödel Theorem played a role in the formulation of your ideas in *An Introduction to Edmund Husserl's Origin of Geometry* and 'Structure, sign, and Play ...'?", he responded that: "Self-referentiality of course played a role but I would not say that it was the only and last concept used in these works."

One could argue that prior to Post-structuralism, academic production of knowledge and communication was considered to be based on the axiomatic model of argumentation (i.e., a number of assumptions are presented; a thesis is proposed as a hypothesis based on the assumptions; the thesis is proved using logical reasoning, and finally conclusions are inferred based on that movement.) Within such a system, where, one can argue, the effective success of the system in the purpose of communication is assumed as an axiom, in order for the knowledge to have any validity, the original axioms (assumptions) need to act as eternal truths or grand narratives, however locally, for those who choose to engage themselves with the text—the axioms are not up for questioning. The basic model of having some axioms and developing proposition based on those axioms and rational reasoning is the basic model of academic exchange. However, if a work starts with no axioms, it cannot make a claim to a "thesis", because it has no way of synthesizing the thesis, and having axioms is accepting a proposition as true without any reasoning. By the fact that this assumption should be made by all those who want to understand the "thesis"of the text, the axioms act as eternal truth for the text. The Postmodern discourse has questioned the eternal truths and grand narratives in their cores by formulating a process for continual questioning of the assumptions of all texts.

Attempts to prove the assumptions of the work within an axiomatic model of production of knowledge will have the effect of creating a supplement[12] to the original subject of the work. Since the axiomatic model is not able to close the gap between the need for making assumptions and proving assumptions by its own model, the subject of a work which questions its own assumptions bifurcates into the original tangible subject and an abstract philosophical subject, which upon logical insistence could engulf the original subject. (i.e., no matter what the original intended subject was, the subject could change to the study of "questioning the assumptions of a work within an axiomatic model"). On this matter Francisco Varela in *Understanding Origins* writes:

> The major tool used by Deconstruction is what Derrida calls the *logic of supplement.* As René Girard says in the text that follows, this logic "reflects [the] general human inaptitude to self-centeredness [the] failure of individual and collective narcissism, and the resulting fear of and fascination with

[12]Derrida's definition of the word 'supplement' is in regards to the process of signification (discussed on page 41); however, the process of signification and the process of signifying origins of an element can coincide, and that is why I have not refrained from using the word 'supplement' in this context.

> otherness". This logic is the one through which every philosophical text deconstructs itself. Every time that a term appears in a theoretical text which beckons a Logos, a Concept, as self-sufficient, a vicious circle sets in, which undermines this pretension to autonomy from within.[13] This happens because another term, supposed to be secondary and subordinated, and which should be nothing other than a derivation or complication of the primary Concept (for instance: culture, writing, form, etc.), appears as indispensable to the constitution of the latter. The origin appears as full and pure but, without the supplement which nevertheless follows from it, it would lose all consistency. Thus the secondary term appears at the same time as perfectly dispensable and perfectly indispensable. Even the most apparently perfect totality suffers inescapably from a constitutive lack. (Varela and Dupuy 1992, p. 2)

In other words, the self-referential relationship between the sign and the signified undermines the autonomy of any sign. Thus, if there is no autonomy of concepts, there is no way to communicate, or even define an original concept, if such a thing exists. In other words, if we assume that we can communicate, we have made an assumption which makes us guilty of essentialism, which eventually becomes hegemonic to "the other", and if we do not make assumptions, we are forced to leave the domain of philosopheme to communicate, which within epistemology is not considered communication at all. One can arrive at this same position in regard to communication from two distinctly different angles:

1. If we assume that our communication could be modeled within an axiomatic system, by definition we need at least one assumption to agree upon. Therefore, in such a context, viewing all the communication and production of knowledge of humans, in conjunction with the ultimate law of science (which states that all propositions accepted within the system should hold true for all people, in all times, and in all coordinates of space, unless otherwise stated) we can conclude that all knowledge can be linked to at least one (or more set of) assumption(s). Thus, our logical, and in turn rational, discussion within a scientific dialectic context enters into a religious domain as there are multiple points of views and only a single set of assumptions (accordingly, the scientific dialectic will have to give up its hold on pragmatic truth as well.) Thus, we are dismantling the grand narrative of science in

[13] "The vicious circle" is referring to traversing of self-referential paths.

regard to communication among its subscribers by a grand gesture of objectifying all human knowledge.

2. Deconstruction does not depend on such a central definition of assumptions; however, it can lead us to the same position as well. Deconstruction assumes that one is able to deconstruct the binary oppositions in any text and dismantle any authoritative point of view which would give a definite meaning to that text. Therefore, deconstruction dismantles a unified hierarchy of objects of meaning in the interest of a highly complex network of local connections. However, the application of deconstruction to the concept of deconstruction proves the communication fragile and vulnerable to breakdown under rigorous but legal insistence.

In preparation for application of deconstruction in a musicological context, in her essay "How Could Chopin's A-Major Prelude Be Deconstructed?", Rose Rosengard Subotnik arrives at the conclusion that:

> Of course, the elusiveness of the differences centered in *différance* to definitive resolution does not stop with the relationship between speaker and listener. Poststructuralism goes still further by asserting that even in its initial moment of physical concretization by an author, a text is already distanced from a plethora of its own sources that leave in the text only more or less discernible "traces" of themselves. Thus, even at the moment when I speak to you, my words issue from a complex of cultural, linguistic, and psychological sources over which I have only limited conscious control. And thus even if, by some epistemological miracle, you could recapture in their pristine entirety the meanings I myself could originally have retrieved, what you would posses would be no more than a fragment of the elements inscribed in my text. From this perspective, the very use of the possessive form in connection with a text ("my" text, "your" text) is understood as problematical as is the definition of "[a] text" to mean an object, rather than a process.
>
> Once we come to this point in our account of signification, we have two alternatives. Either we throw up our hands in despair at the impossibility of all human communication, or we resign ourselves more or less good-naturedly to what I would call the "dialectics of text." By this I mean that we accept as unavoidable the contradictory character of discourse. On the one hand we acknowledge the inconceivability of acquiring an exhaustive knowledge of the factors that initially created a text. On the other hand we accept a continuing moral obligation to engage as directly as possible with the configuration of the texts that are offered to us. And throughout the process we make an effort to penetrate each other's "otherness," even as we recognize our inability to do so except within the confines of the structuring capacities on which each

> of us draws to define ourselves. We open up our own modes of understanding to reshaping by someone else's construct or text; yet, as Derrida might say, we have "always already" reshaped that text according to our own modes of understanding. (Subotnik 1996, p. 57)

Rather than throwing up her "hands in despair at the impossibility of all human communication", Subotnik suggests an aesthetical, natural (i.e., "good-naturedly"), and "moral" approach in penetrating each other's "otherness".[14] As most aesthetical decisions are, this is a very delicate point. In such a situation who decides the good/bad value judgment of "good-naturedly", and who sets the "moral" standards? Within academia the requirements of epistemology are the standards; however, now that we have been able to denounce such standards while abiding by its rules, epistemology can either throw its hands up in despair and let power relations within social, political, economical, and academic situations take care of production of knowledge, or it can still keep some form of scientific integrity and academic freedom by allowing recursive constructs, whose structures are studied within the axiomatic model, within its canon. In other words it is more scientifically and epistemologically appropriate to accept communication as a paradox.[15]

Concepts of origins and creativity in any domain relate to each other in their need for their metaphysical definition and their theological relations. In the same way that Derrida has problematized discourse and in the end has talked about the origin of language itself, creativity and theological relations find paradoxical origins in the story of Abraham, the father of faith. Monotheistic models of religion could be viewed as axiomatic models where God and God's words are taken as axioms. If at any moment the individual is faced with questioning the axioms of this model using its own reasoning, the individual arrives at an urgent situation in which communication with other individuals, at least temporarily, breaks down, until the individual can show the sign of creativity and in other words become an authority on the universal. The first accounted instance of this situation is when Abraham is ordered by God to kill his son. At this moment

[14]Note the sexual innuendos in such an approach; in fact the sexual context is one of the most important and physical domains of inquiring about communication and consent.

[15]I have formulated a single sentence as a thesis which is included in Appendix A to serve as an example.

Abraham creates the creator of all beings.

The "impossibility of all human communication" is at the heart of Kierkegaard's seminal work *Fear and Trembling* (Kierkegaard 1983) in which he represents the paradoxical nature of communication. Rather than stopping at simply accepting "as unavoidable the contradictory character of discourse", he exposes the self-referential nature of discourse.[16] Kierkegaard also studies the recursive psychological processes which result from positioning the human being within a self-referential context in relation to the universal structure in *Repetition* (Kierkegaard 1983). A creative moment, which is the moment of tension of play and totality, is modeled in *Fear and Trembling* in Kierkegaard's discussion of the story of Abraham, where he is confronted with killing his child by a request from God. If Abraham's decisions were made within an axiomatic model in which God and his words are taken as axioms, Abraham is left in an urgent situation. According to universal authority, on the one had he is about to commit a murder (and, of all people, of his son) and on the other hand he is celebrated as the father of faith. Kierkegaard, in reaction to the overt Hegelism of his time, writes:

> ... Hegel is wrong in speaking about faith; he is wrong in not protesting loudly and clearly against Abraham's enjoying honor and glory as a father of faith when he ought to be sent back to a lower court and shown up as a murderer. (Kierkegaard 1983, p. 55)

His point is that it is not possible to reconcile the position of Abraham within the linear approach of Hegel, and he continues to characterize Abraham's faith as a self-referential relationship between Abraham as the single individual and the universal.

> Faith is namely this paradox that the single individual is higher than the universal—yet, please note, in such a way that the movement repeats itself, so that after having been in the universal he as the single individual isolates himself as higher than the universal. If this is not faith, then Abraham is lost, then faith has never existed in the world precisely because it has always existed. (Kierkegaard 1983, p. 55)

It is the repeating of the movement, or in other words the recursive structure of the relationship between the single individual and universal, which characterizes the nature

[16]We need to note that this sentence should not be confused with the concept of 'stopping at faith vs. going further' by Kierkegaard, which he profusely discussed in the introduction of *Fear and Trembling*. 'Stopping at faith' is to understand the self-referential nature of it. 'Going further' is how Kierkegaard refers to the Hegelism of his time, in which the individual and his cognitive ability of inference is still assumed as the basis for Hegelian dialectic.

of faith. Kierkegaard equates creativity with the single individual's assertion. As we discussed the tension between play and totality, within an axiomatic system, any creativity will have to be against the system, otherwise it could be derived within the system and is not anything new. On this regard, Kierkegaard says: "As soon as the single individual asserts himself in his singularity before the universal, he sins, and only by acknowledging this can he be reconciled again with the universal." (Kierkegaard 1983, p. 54) In other words, with every creative step any author has to accept that "he or she is wrong". This is similar to Derrida's attitude about philosophy in regards to writing. Varela writes:

> The deconstruction of a hierarchical opposition, it should be remarked, is not the same as its simple removal. The hierarchical dimension must remain present one way or another. And neither does deconstruction consist in simply inverting the hierarchical opposition, in permuting its superior and inferior terms. Take the example, especially important for Derrida, of the hierarchical opposition between philosophy and writing. Philosophy devalues writing precisely because it is written! Writing constitutes a threat to philosophy in the same manner that money does to economics, because it is an obstacle, a barrier in the way of access to meaning and value. Since the ideal of philosophy is to reach the truth without mediation it must therefore deny the only means it has of expressing itself: writing. Bluntly put, philosophy writes W:
>
> W: *This is not writing*
>
> the obvious form of a self-referential paradox. (Varela and Dupuy 1992, p. 3)

In Kierkegaard's model of communication, we need to understand that self-referentiality or what he calls repetition (*Repetition* (Kierkegaard 1983)) is a more fundamental construct than the concept of inference, which is perhaps the most fundamental generative concept in an axiomatic system.

When we say that there exists a self-referential relationship between the single individual and the universal, we are implying that one can be found within another. However, if the recursive process continues seamlessly, the two unify into a single entity. Therefore, the singularity comes into being when there is a rupture in the process, and this rupture has to be related to both the singular and the universal. In *Repetition*, Kierkegaard writes:

> The vigorous and determined exception, who although he is in conflict with the universal still is an offshoot of it, sustains himself. The relation is as

> follows. The exception also thinks the universal in that he works himself through: he explains the universal in that he explains himself. Consequently, the exception explains the universal and himself, and if one really wants to study the universal, one only needs to look around for a legitimate exception; he discloses everything far more clearly than the universal itself. The legitimate exception is reconciled in the universal; basically, the universal is polemical toward the exception, and it will not betray its partiality before the exception forces it, as it were, to acknowledge it. If the exception does not have this power, he is not legitimized, and for that reason it is very sagacious of the universal not to allow anything to be noticed prematurely. If heaven loves one sinner more than ninety-nine who are righteous, the sinner, of course, does not know this from the beginning; on the contrary, he is aware only of heaven's wrath until he finally, as it were, forces heaven to speak out. (Kierkegaard 1983, p. 227)

The concept of "the legitimate exception representing the universal" means that universal totality is related to local totality. In simple words, in such a model, if we know everything about a part, we also know everything about the whole. As such, while customarily we understand that the part can be found in the whole, we should also understand that one should be able to find the whole within the part. Obviously this situation cannot fit within the linear model of epistemology.[17]

Epistemology is based on linear axiomatic system of knowledge in which all propositions are understood and could be judged as either true or false. Gödel's incompleteness theorem argues that formal systems of a certain degree of power are able to produce grammatically legal propositions whose truth value cannot be decided within the system. These propositions are self-referential, where their logical inference negates any assumption one may make regarding the truth value of the proposition. One can argue that the work of Lévi-Strauss, or any work which abandons metaphysical definitions of form, should be characterized as such a proposition.

The elimination of metaphysics relates the two sides of the communication with the communicative entity and as such the communicative entity becomes an undecidable proposition which while it can abide by the rules of epistemological domain it cannot strictly be categorized as a philosopheme or theorem. In other words, no mental construct

[17] As such, if the linear axiomatic model of epistemology is based on geometry and linear algebra, this new model of epistemology could be based on the non-linear dynamics, in which self-referentiality plays a structural role.

is assumed as an essential element, and such entities need to be inferred based on the physical material. As such the concept of self-referentiality comes before inference.

The specific signification of self-referentiality as a concept of origin for the concepts of signification and rationality can provide a solution for understanding the origins of language. Such a model does not depend on any metaphysics and thus makes no differentiation in type among any of its elements essentially. Difference is introduced as a result of perception and not as an innate quality. Thus, language, or in other words, mental constructs are not separate entities from those perceiving them. As such, the separation between mind and body, philosopheme and mythopoem, nature and culture, etc., is no longer needed to be defined as essential qualties.

2.7.1 Music as Myth

The separation between philosopheme and mythopoem can only be supported by metaphysical reasons. The discontinuity brought about by the introduction of metaphysics represent a rupture in the rational flow of thought within a communicative context which ultimately relates itself to positions of power. If discourse is to be the instrument of communication, we accept the rational flow in form within it as a means to guarantee a certain amount of understanding. This flow is ultimately related to logical reasoning. Metaphysics requires us to accept something without proof; needless to say, who sets the standards and who does the accepting defines the positions of power in that relation.

If various sides of a communicative process agree on the definition and location of a certain metaphysical element, this element becomes a concrete signifier which no longer has metaphysical characters. Thus, the idea of conflict, and therefore position of power, becomes an innate issue relating to the use and enforcement of the connotations of the existence of the metaphysical element. The musical form of tonality in the West prior to the 20th century was advertised and rationalized as a form which can be axiomatically related to the harmonic musical material. As I argue in the next chapter, the metaphysical construction of the consonant chord, in which the object is understood as a "directly intelligible" entity in comparison to dissonant chords, was used as the basis for the rationalization of the musical model of tonality. Even though this model is based on the unity of form and material, the rationalization does not fully enforce all the connotations, which is not to accept any metaphysical assumptions in the work. Of course, such an approach would also create epistemological problems. Thus, there are two issues to consider here—one is the authority of analytical text over musical constructs and the other is the use of analytical text to legitimize the Western musical idiom and concept over other forms of musical thought.

Analytical text is often considered superior to music wherever judgment is concerned, because it is understood that analytical text carries some precise form of meaning or truth. In this sense text is thought to be in the domain of philosopheme or theorem while music could be considered in the domain of mythopoem. In a similar fashion to the work of Lévi-Strauss where, in order to avoid committing violence to his subject through metaphysical standards, he is obliged to declare his text on myths mythomorphic, or in other words, accept that his text itself is a myth, we need to understand that it is not possible to talk about music without turning the text into poetry; however, it is important to understand that here we should not be going back to an old system of signification in which analytical text can easily enforce its power over poetry. As such the Western readers need, therefore, to change their frame of reference towards the signification of the word 'poetry'. In the West poetry is understood to be something less compared to epistemological text; in a number of Eastern cultures, including the Persian culture, poetry is a construct which not only can carry a philosophical content, but also, *in addition*, its form has been influenced by its content, in other words, a musical paradigm has been applied to it. The poetry of Omar Khayyam (1048-1131 AD) and Hafez (13th century) are excellent witnesses to this fact. What has been preserved from Omar Khayyam are very few verses; however, his main point in almost all his poems is the introduction of an ontology which does not depend on metaphysical principles. One can argue that his form of thought has been a basis for many other poets and philosophers in Iran to date.

As I have discussed in this chapter, the contemporary Post-structuralist dialectic in the West is a form of problematization of the concept of metaphysics but in an epistemologically uncommitted way. The post-structuralist thought accepts that "there exists no universals", however, it fails to accept that such a statement is a universal declaration itself. As such, even though self-referentiality plays an important role in the definition of the Post-structuralist thought, the concept is not specifically signified. Similarly, the tonal form was refuted as a universal form based on the unity of form and material, however, as we shall show in the next chapter, the project of eliminating all metaphysical elements was not fully implemented. The approach towards separation of philosopheme and mythopoem, or culture and nature helps the Western epistemological process to hold its position of power over any non-Western form of knowledge similar to the form that Western tonality and its metaphysical roots, based on the insistence of many musicologists, has kept its universal economical and social hegemony over other types of music in the world.

When we do not depend on metaphysics, form and material of the artistic object and in turn the activity which creates them become related. The rational dialectic was used in promoting tonality as a universal musical form; however, once that reasoning was refuted, tonality continued to have universal hegemony through economical means; this practice continued to be supported by academic musicological circles. The treatment of 'truth' within the Post-structuralist dialectic is similar to the treatment of tonality within musicological circles. Both approaches defy universal truth universally, and fail to accept the self-criticizing dialectic which, as we have seen in Derrida's paper, is a cornerstone in establishing the poststructural theory. Adorno writes that "metaphysics might win only by discarding itself" (Adorno 1973, p. 364), and he is led to declare:

> If negative dialectics calls for self-reflection of thinking, the tangible implication is that if thinking is to be true—if it is to be true today, in any case—it must also be a thinking against itself. If thought is not measured by the extremity that eludes the concept, it is from the outset in the nature of the musical accompaniment with which the SS liked to drown out the screams of its victims. (Adorno 1973, p. 365)

Chapter 3

Deconstructing Tonality: Metaphysics and the Construction of Tonality in Western Cultures

> Sometimes, in the ceaseless revolutions of the wheel, I caught a glimpse of the nature of the jump which it was necessary to make. To jump clear of the clockwork—that was the liberating thought. To be something more, something *different*, than the most brilliant maniac of the earth! The story of man on earth bored me. Conquest, even the conquest of evil, bored me. To radiate goodness is marvelous, because it is tonic, invigorating, vitalizing. But just *to be* is still more marvelous, because it is endless and requires no demonstration. To be is music, which is a profanation of silence in the interest of silence, and therefore beyond good and evil. Music is the manifestation of action without activity. It is pure act of creation swimming on its own bosom. Music neither goads nor defends, neither seeks nor explains. Music is the noiseless sound made by the swimmer in the ocean of consciousness. It is a reward which can only be given by oneself. It is the gift of the god which one is because he has ceased thinking about God. It is an augur of the god which every one will become in due time, when all that is will be beyond imagination.
>
> Henry Miller, Tropic of Capricorn

3.1 Introduction

From approximately 1650 to 1910, tonality was one of the most fundamental techniques for creating form in Western art music. In the early 20th century, this practice as the predominant form of classical European music came under scrutiny and as a result other forms in music became acceptable in the Western musical circles. In the process, what came under question was not only tonality as a specific language, but in general any requirement for having a language formed through tradition. The definition of what is and what is not music can always be a strong and religious topic of discussion. The augmentations towards Western tonality widened the spectrum of what was acceptable as music in the West. One can name modernity as one possible source for the questioning of tonality. Tonality can be seen as a concept with musical and philosophical connotations or it can be seen historically simply as a specific practice within a specific period of Western music.

Words such as 'tonality' and 'harmony' have fairly specific technical definitions in Western music literature. I use the words "fairly specific technical definitions" for two reasons. First, almost any idea fundamental to a certain field spoken within its own specific context and among professionals knowledgeable about that concept can become a topic of heated discussions and, in fact, the more fundamental the topic, the more one can find room for discussion. Therefore, in such domains when we say "specific definitions", we actually use such terms only for educational and communicative purposes and not as any concepts that have intrinsic or fundamental truth. Second, the ideas of specificity, technicality, and definition, come from the scientific paradigm which is mostly formed within an axiomatic model. One of the elements used in promotion of tonality in 18th and 19th century was the scientific dialectic; however, as we shall see later, even at our starting point, the word 'tonality' itself misrepresents the tradition of tonality in the Western musical culture. Thus, the concepts of 'tonality' and 'harmony' that are found in Western musical literature and in the mind of most Western musicians are unclear to the lay person or new student of the subject, as well as to those highly educated about the subject. In classrooms, these concepts are presented in extremely clear terms for educational purposes and then for one who earns a relative mastery of the subject the concepts start to become vague again.

Among those versed in Western music theory the word 'harmony' means a specific construction of simultaneously or successively sounding tones; however, this word has philosophical, spiritual, and perhaps political meanings as well. One can commonly hear from musicians that "this music or that music does not have harmony".[1] Within the technical definitions of Western music literature, this is a rather simple statement; however, in general terms and philosophically this is a very grand statement. How could any music not have harmony? Within the technical terms of Western art music, "not having harmony" means that the construction of the chord is not part of that musical language. Today, it will be hard to find any Western musician or musicologist who would try to argue that the word 'harmony' in Western music is directly related to the philosophical and universal concepts of harmony. However, when one looks up the meaning of 'music' in Merriam-Webster dictionary[2] which is supposed to cater to a general readership and not just musicians, one of the definitions is: "vocal, instrumental, or mechanical sounds having rhythm, melody, or harmony", and when one looks up the word 'harmony', other than the musical definition, one also gets the following definition: "a: pleasing or congruent arrangement of parts <a painting exhibiting harmony of color and line> b : CORRESPONDENCE, ACCORD <lives in harmony with her neighbors> c : internal calm : TRANQUILITY". Thus, the proper noun 'harmony', which is supposed to have a specific meaning within the Western music literature, gets connected to the common noun 'harmony', which has universal philosophical appeal. The ideas of "CORRESPONDENCE, ACCORD, and TRANQUILITY" and in turn 'harmony' also have political connotations because it is through such concepts that we define peace in social relations in regard to the tension between "the self" and "the other". Tonality is a form which defines a certain form of polyphonic coexistence of sound, both in the domain of instantaneously sounding tones and in progressive development of them, to create a linear form called tonal music. Most non-Westerners who have not studied music do not know the specific meaning of the word 'harmony' within the Western musicological

[1] As an example Laudan Noushin in the liner notes of the CD *Without You* (2002) by M.R. Shajarian, H. Alizadeh, and K. Kalhor, published by World Village, writes: "The complex detail of the solo melody line is of utmost importance in Persian classical music—there is no harmony as such ..."

[2] http://www.m-w.com

literature and often do not even know that this word has a specific technical musical signification. Therefore, when they hear that their music does not have 'harmony' from a specialist of their own music, all they can imagine is the common meaning of the word 'harmony'. So, even though it may not be meant in this way, from the statement "Persian music does not have harmony", based on common meanings of the word 'harmony', one can conclude that "Persian music does not have internal calm or its parts do not correspond to each other."

One can argue that if we do not consider the universal implications of the word 'harmony', the way this word is used in the Western musicological literature is almost directly opposite of its common meaning, in a sense that the use of the word is so specific to a certain cultural context that has no harmony with how the word is understood by others. The scientific dialectic played an important role in legitimizing and disseminating tonality as a universal musical form in the world. One can safely say that for the past 300 years, the tonal form has been the most dominating form of music, especially when it comes to economic matters. Even though the scientific focus on tonality is no longer a viable subject, the use of scientific dialectic and computers in music plays a major role in defining the position of a musician within the Western musical circles, especially in academia. One can find many instances in which the "talk about the music" seems to become more important than the music itself. This is perhaps so, because within textual contexts where the axiomatic system enjoys an enormous power, propositions about the self and one's music (property) can be shown to be consistent with a certain system of signification. In contrast, aesthetical judgments are not understood as scientific or critical and, therefore, are considered personal or subjective within academia. In an environment in which power relations, mediated through text, govern the relationship among individuals, aesthetical values, and those who hold them, can become the object of major violences. Aesthetical objects and a discourse in tune with their values, which inevitably needs to come from a personal sphere, need the protection of a community. As such, the artistic objects become the product and the cornerstone of a community. One can find many such relationships between the Western society and the tonal form, including its object and the discourse around it.

The scientific discussion of music can also come under scrutiny through the post-structuralist rhetoric as an essentialist approach. As such, the post-structuralist dialectic resists essentialism on two different fronts, first against the structuralism and the modernism in the West, and second against any other culture or form of thought which may choose the scientific paradigm to examine its own culture. In the latter case, post-structuralism, ends up defending the hegemonic system that it opposed in the first place, and it does so especially through economic and political means.

Tonality is now not just a theoretical question within musical contexts, but it is a major economical force in the music market. The ambivalence toward the construction of tonality, similar to the ambivalence towards the metaphysical constructions in the philosophy of the West, serve as token resistances against violence while being subordinate to a more global violence involving the defeat of any attempt to question the hegemony of Western economic domination. This dissertation has faced similar resistances, specifically against its discussions on two subjects, metaphysics and tonality. Both of these subjects have universal implications, but the musical and philosophical discourse of the West, while enjoying the economical benefits of it universally, does not allow the universal discussions about them.

In the previous chapter we briefly discussed the concept of metaphysics in the West and its connotations regarding epistemology. In this chapter we shall study the concept of tonality and its relation to metaphysics in its Western musicological context and in conclusion offer a more general definition of tonality which does not depend on metaphysical sources while being more in harmony with the meaning of the word 'tonality' itself.

The concept of tonality is related to this work on two different grounds—first in regard to computer music, where scientific matters are concerned in the production and construction of the form and material of the music, and second in relation to the context which the other traditional musics of the world are contextualized in relation to tonality, both in theoretical and political terms.

3.1.1 Tonality and Electronics

Tonality is a concept which grew out of non-electronic music. Even though, as we shall see later, metaphysical reasons can be named as the source for tonality, the harmonic tone plays a structural role in shaping the tonal form. Tonality not only defines a specific combination of tones as musical or intelligible, and therefore, a specific sound, it also defines a specific grammar for the progression of those sounds. With computer music we are able not only to specify sounds which are not bound by acoustical sound production constraints, but also to define and automate the progression of such sounds. In much of the musicological literature today, tonality is considered as a specific practice of Western music during a certain period isolated from the scientific dialectic which advertised it during its exclusive reign. However, tonality can also be seen as a form which grows naturally from the material of the music based on the harmonic sound according to the concept of unity of form and material. About the relationship of form and material in the work of Lévi-Strauss, Derrida writes:

> Everything begins with structure, configuration, or relationship. The discourse on the acentric structure that myth itself is, cannot itself have an absolute subject or an absolute center. It must avoid the violence that consists in centering a language which describes an acentric structure if it is not to shortchange the form and movement of myth. (Derrida 1978b, p. 286)

Similarly, one can see the approach of defining tonality as a musical form arising from its material as a form of resistance against doing violence to sound, which can be seen as an 'acentric structure', within a musical context. If we view music as an entity separate from sound, we would have to define music based on metaphysical descriptions, and thus, the metaphysics become a center for the structure we define as music which we are imposing on the acentric sound material.

It is a much easier task to come up with a model which draws a clear boundary between form and material in acoustic music than it is in electronic music. The unity of form and material instigates a certain amount of vagueness at the boundary between the form and the material. However, when there are constraints, be they physical or defined by any kind of mental representation, the constraints act as clear boundaries between form and material. For example, the constraints defined by the acoustical properties of an instrument, no matter how elaborate the extended techniques are, draw a certain layer of distinction between the form and the material of the music played on that instrument. Computers can almost be considered as instruments which do not have any specific constraints as far as material production is concerned.[3]

The tonal form and much of the culture of composition in the West considers music as a communicative object. If we were to view music as some form of information exchange in the same way that text is considered to be the carrier of meaning, as Schoenberg often said, one can argue that the function of form in such a communication is to guarantee some level of comprehensibility. In other words, form becomes an essentially unchanging and predictable element for both sides of the communication upon which the communicative message is overlaid. Thus, what is being communicated becomes a moving foreground against the stable formal background. Of course, this metaphor can be applied to many levels of the formal elements as we can define material not only as sound level but also in any kind of combination of sounds simultaneously or successively as well. Such multi-layered interrelation between form and material defines a plexus for the music to have a certain level of coherence which in turn could be perceived as communication or could facilitate the process of communication. In such a context the constraints often act as starting points in a creative activity.

Investigation and questioning of tonality as an exclusive musical form can be extended to questioning of language in general. If we view tonality as a specific practice in Western music, the object of scrutiny is rather small and specific, but if we question tonality in general as language in the same way that we have questioned the metaphysical constructions in language in the previous chapter, we end up pulling the rug from underneath our feet anytime a stable standing point is woven; in other words, traditional forms often facilitate the process of music making, but if we start questioning the use of traditional forms in general we could end up in a paralyzing state where we could not make any definite move. This exercise in music, and especially with the use of electronics, has a much wider field of inquiry than it would in the domain of text. The questioning of language stops at the word boundary, however, with music and electronics we can not only extend the field of our inquiry to the microstructures of sounds, but also we can

[3]Note that computers are not able to represent all numbers, such as constants (e.g. the value of π), and if we were to broaden the field of our inquiry we would have to consider such constraints as well; however, in regard to our current discussion relating to the interaction between form and material in relation to 'tonal' and non-tonal music, we can safely consider computers as instruments with no constraints for all practical purposes.

problematize mechanized structures in highly macrodomains as sound material.

Any time we deal with an object in which the unity of form and material is discussed, we inevitably have to deal with self-referential constructs. I shall show that it is the logic of this self-referentiality which provides Schoenberg with a basis for his declaration of unity of consonances and dissonances as far as their types are concerned (when he says: "Hence, the distinction between them is only a matter of degree, not of kind." (Schoenberg 1978, p. 20)). With electronics, where we practically have no constraint, the self-referentiality becomes more abstract in the sense that the constraint becomes "not having any constraints". In other words, the form and material become one rather than just being related, and as far as language is concerned, pieces considering this constraint of "not having constraints" have to communicate not only a message but also the language in which the message is inscribed.

The definition of tonality in the Western musicological literature is a specific relationship between form and material within a very specific musical practice. However, it is possible to view this definition of tonality as an instance of a much broader quality resulting from the balance in the relationship between form and content. The factor which separates these two approaches to tonality is the role of metaphysics in definition of musical structures. A comprehensive study of tonality, which to most musicologists and Western musicians is to study the way the rules of tonality are used in the common practice period, is neither the aim nor in the context of this work. What I shall study are the metaphysical assumptions used in defining tonality and how such assumptions were treated in the passage from tonality to post-tonality periods. We shall discuss the role of metaphysics in the theories which characterize Western music in the pre-tonal period and the theory of Schoenberg who formulated what has been known as atonality.

3.1.2 Tonality and non-Western Music

Today we have accepted that tonality is not the only form for music making; however, considering that almost all types of Western music and so many varieties of popular music of the world are somehow related to the concepts of tonality, one wonders if that conclusion has carried any truth. If we were to define tonality as only the practice of Western classical music during for example 18th and 19th century, then by definition the construct of that music does not have anything to do with any other music. However, the pre- and post-tonal periods of Western classical music as well as almost any other music in the West relate to concepts of tonality on some level. One of the main building blocks of the practice of tonality is the construction of the chord. In his book *Harmony* (1978), which is one of the more popular books of instruction for tonality, Walter Piston writes:

> The combination of two or more harmonic intervals makes a *chord*. The simplest chord is the *triad*, a chord of three tones obtained by superposition of two thirds. The triad may be said to be the basis of our harmonic system, a place it still holds despite numerous radical developments in tonal music. (Piston 1978, p. 12)

It is possibly a challenge for most people to try to find some music, on the radio, in a concert, in one's own music collection, or even on the Internet in which the chord does not play an important role in defining the sound of the music. The strange thing is that due to the role of tonality in pop music and pop music's overt cultural dominance, this phenomenon is as strong in non-Western cultures as it is in the Western ones. The issue does not stop at pop music either. The tonal form, its definitions, its culture, and the way it had been advertised have also affected the understanding of non-Western musicians about their own music to the point that rules of harmony and counterpoint are understood as some universal rules for music. For example, without fully contextualizing the content of the report which arises from a complex social and political situation, let us look at an excerpt by Hossein Alizadeh, Hossein Dehlavi, Mostafa Pourtorab, and Ali Mohammad Rashidi in their 1990 objection to the approved curriculum for the bachelor degree in music in Iranian universities set by the Iran's Ministry of Culture and Higher Education. In their objection they write:

> A student who has not learned *solfege* and has studied harmony and counterpoint only passingly in a semester, cannot become familiar with principles of composition, and more importantly, one cannot compare the Western classical music with the [Persian] traditional music.
>
> Four centuries of evolution and change in regard to form, content, technique, and instruments of expression separate classical music from traditional music of Iran. Due to historical and social reasons, the traditional music of Iran was not able to gain the necessary evolution, and it is only in the past

> half century that some attempts have been made.[4] (Alizadeh, Dehlavi, Pourtorab, and Rashidi 1991, p. 12)

The authors are among the most influential composers and scholars of Iran.[5] A number of questions can readily come to mind. Is it true that principles of composition, if such principles exists at all, are so intertwined with rules of harmony and counterpoint? And if Western classical music—note that in the text in the second reference, the term used is not "Western classical music", but just "classical music", meaning that even the word classical, which is another term appropriated by the tradition of tonality, can only be Western—is so much more advanced in "form, content, technique, and instruments of expression" compared to Persian traditional music, can these advancements somehow be applied to Persian traditional music? And are the concepts responsible for the advancement purely Western?[6]

The above quoted passage seems to imply that the concept of 'composition' as a whole depends on the Western concepts of harmony. Does this mean that one cannot compose a piece of music in a tradition which is not based on Western tonality? Of course, we know that is not true; however, we may not notice that the underlying current of such preconceptions may form the understanding of many musicians, and non-musicians alike, in a much greater degree than we may realize.

This hegemonic form of thought about the nature and ownership of structures in such constructions as composition is not confined only to the Western vs. non-Western dialectic, but it can also be found within various Western traditions as wells. In his article "Improvised Music After 1950: Afrological and Eurological Perspectives", George Lewis

[4] I have tried to be exact in my translation while risking some points to stay vague, which is the quality of the original text.

[5] I need to note again that I am using this passage in passing, since much more context is needed for one to understand the exact situation the passage is referring to; however, the wordings and the approach towards Western music and the personal imposition of the hegemony of Western classical music over Persian traditional music in this passage can epitomize the understanding of many musicians and scholars in Iran.

[6] For similar discussions regarding the influences of Western music on Arabic music see (Racy 1991), and on Chinese music see: Wong, Isabel K. F. (1991). "From Reaction to Synthesis: Chinese Musicology in the Twentieth Century." In Bruno Nettl and Philip Bohlman, eds., *Comparative Musicology and Anthropology of Music: Essays on the History of Ethnomusicology.* Chicago: University of Chicago Press. Jiang Jing (1991). "The Influence of traditional Chinese Music on Professional Instrumental Composition." *Asian Music*, vol.22, no.2, pp. 83-96. and Guy, Nancy (2001), "Brokering Glory for the Chinese Nations: Peking Opera's 1930 American Tour." *Comparative Drama*, vol. 35, pp. 377-392.

shows how the Eurological dualistic concept of composition vs. improvisation is used by Eurocentric composers and scholars to appropriate the notion of real-time music making within a Eurocentric frame of mind. He also presents the view of Carl Dahlhaus on composition that:

> According to Dahlhaus, a composition is, first, an individually complete structure in itself (...). Second, this structure must be fully worked-out (...). Third and fourth, it is fixed in written form (...) in order to be performed (...). Finally, what is worked-out and notated must constitute the essential part of the aesthetic object that is constituted in the consciousness of the listener.[7]
>
> That these five characteristics identify the very notion of composition as European in nature is asserted by Dahlhaus at several points. The dialectic between composition and notation, according to Dahlhaus, is critical to the notion of composition itself. Compositions that are worked-out without being notated, in Dahlhaus' view, are neither compositions nor improvisations[8]. Dahlhaus, however, does not present his own view about just what such a hybrid might be called or how, given his definitional stance, the nature of such music might be accounted for theoretically. (Lewis 1997, p. 96)

In discussing the difference between Afrological and Eurological views, Lewis also shows that structured improvisation, which is a more complex construct than both pure compositional or improvisational constructs, is shunned as a more mundane form of music making compared to compositional practices in Eurocentric circles. In defining the role of the "improviser", he also argues for the agency of personal narratives in the process of music making and that:

> Working as an improviser in the field of improvised music emphasizes not only form and technique but individual life choices as well as cultural, ethical, and personal location. In performances of improvised music, the possibility of internalizing alternative value systems is implicit from the start. The focus of musical discourse suddenly shifts from the individual, autonomous creator to the collective—the individual as a part of a global humanity. (Lewis 1997, p. 110)

The separation of the author from the work is an old European paradigm which perhaps could be traced back to Cartesian separation of mind and body. Lewis writes:

[7]Dahlhaus, Carl. 1979. "Was heisst Improvisation?" In *Improvisation und neue Musik: Acht Kongreßreferate*, edited by Reinhold Brinkmann, 9-23. Mainz: Schott. Pages 10-11.

[8]Ibid. p21

> In some respects the distancing of personal narrative updates the concept of a post-Kantian "autonomous significant structure" identified by Subotnik in her essays on contemporary Eurological music. This autonomy is based on the assumption that "humans can build structures or domains that are complete and meaningful within themselves." Moreover, according to Subotnik[9], "the recognition of validity in such a structure is not thought to depend on the particular identity, power, habits, or values of those who create or receive the structure in question. Rather, validity is supposed to inhere in the ability of a structure to carry out its own laws with consistency."
>
> Subotnik believes that this ideal of autonomy is a fiction; the popular understanding of Gödel's theorem concerning the impossibility of a logical system's self-description in its own term would seem to provide some corroboration. (Lewis 1997, p. 118)

Similar to many Eastern musical cultures, improvisation plays a fundamental structural role in Persian traditional music. However, the extent of this structural role is rarely understood, or one may say is not understandable, based on Western systems of significations. Western logocentric systems of thought are based on systems of signification in which signifiers point to specific signified objects. The Radif, which is the core basis repertoire for improvisation in Persian traditional music, is understood by many as an specific body of melodies with ephemeral and malleable qualities. There are a number of versions of the Radif and one of the most precisely notated versions of it is by Mohammad Taghi Massoudieh based on the vocal recordings of Mahmood Karimi (Massoudieh 1995).

As far as the five criteria of Dahlhaus are concerned, one may argue that these notations fail all five requirements for composition, not because of any lack but because they transcend these requirements. Every one of the notated melodies is complex and one can say complete structures by itself, however, it can also be easily connected to other parts of the Radif. So, one may be able to argue that these structures are both individually complete and easily part of larger structures at the same time. The structures in the Radif have gone through perhaps over one thousand years of refinement, therefore, one can say they are "fully worked out". However, they have also been refined in a way to provide a fertile ground for new changes to be applied to them. As mentioned above, the notations of Massoudieh are considered to be very precise notation of the

[9]Subotnik, Rose Rosengaard/ 1991. *Developing variations: Style and identity in Western music.* Minneapolis: University of Minnesota Press. Page 266.

vocal recordings and they are based on Western forms of notation. However, it would be hard to find anybody who would claim that the notation has captured "the essential part of the aesthetic object that is constituted in the consciousness of the listener", because, one can argue that, the evolution and refinement of the Radif as an object has been centered exactly to move in the opposite direction of that form of thought. As such, the Radif contains objects with essential qualities not owned by a specific person but by members of a community who engage themselves with the material. This element is a strong and fundamental structural quality which such an object possesses *additionally* in comparison to a compositional construct. In such context, one does not look for specific objects in the Radif, but one learns from musicians who are considered as references within that musical culture.[10]

Of course, in the purely sonic realm of music it may not be that important what a certain construct is called; however, in economical terms what is and is not called a composition can have serious monetary and social implications in terms of, for example, mechanical royalties or perceived prestige as an author. Furthermore, the Western compositional culture, which in the common-practice period of tonality becomes in tune with capitalism in terms of how it is marketed, instigates specific power relations within its own inner working of operations and towards the masses who are its audiences. It assumes a one-way communication from the composer to the listener, with all those in the middle, such as the performers and the conductor as the servants of the music. The power that the composition culture assigns to a conductor is so strong that in *Crowds and Power* Elias Canetti writes:

> There is no more obvious expression of power than the performance of a conductor. Every detail of his public behavior throws light on the nature of power. Someone who knew nothing about power could discover all its attributes, one after another, by careful observation of a conductor. The reason why this has never been done is obvious; the music the conductor evokes is thought to be the only thing that counts; people take it for granted that they go to concerts to hear symphonies and no one is more convinced

[10]Hossein Omoumi, one of the well respected references of Radif, once recounted the story of when he was teaching one of the *gousheh*s (melodic patterns) of the Radif to one of his Italian students. To convey the communal quality of the Radif, in one of the very first lessons, he tells him that: "there is no specific version of a *gousheh*. I just taught you my version, but now you can make it your own and have your own version." (private conversations in January of 1998 at UCSD).

> of this than the conductor himself. He believes that his business is to serve music and to interpret it faithfully. (Canetti 1962, p. 394)

Cannetti describes the role of the conductor as the police of the orchestra and leader of the audience. All his gestures are subtle but effective within the power relations in which he is situated. Cannetti concludes that:

> Thus for the orchestra the conductor literally embodies the work they are playing, the simultaneity of the sounds as well as their sequence; and since, during the performance, nothing is supposed to exist except this work, for so long is the conductor the ruler of the world. (Canetti 1962, p. 396)

For George Lewis, much of the power relations within the compositional paradigm of *musicking* stem from racial biases in which *whiteness* plays a central role. However, whiteness is careful not to define itself as the center because then it could be studied, interrogated, and finally deconstructed. Using the words of John Fiske, Lewis argues that:

> For Fiske, whiteness is "not an essential racial category that contains a set of fixed meanings, but a strategic deployment of power ... The space of whiteness contains a limited but varied set of normalizing positions from which that which is not white can be made into the abnormal; by such means whiteness constitutes itself as a universal set of norms by which to make sense of the world"[11] Fiske identifies "exnomination" as a primary characteristic of whiteness as power: "Exnomination is the means by which whiteness avoids being named and thus keeps itself out of the field of interrogation and therefore off the agenda for change ... One practice of exnomination is the avoidance of self-recognition and self-definition. Defining, for whites, is a process that is always directed outward upon multiple 'others' but never inward upon the definer"[12]

"Exnomination", a term coined by Roland Barthes, can be thought of as a strategy to diffuse an ideological signification directed on oneself in the interest of appropriating "the other" by the same ideology. One can see this process in the approach towards tonality in much of the Western musicological scholarship. By defining tonality as a set of rules used in a certain period of Western history divorced from the scientific dialectic

[11] Fiske, John. 1994. *Media Matters: Everyday culture and political change.* Minneapolis: University of Minnesota Press. Page 42.

[12] Ibid. p42

which empowered and legitimized it, the dominant Western ideologies, which now hold the hegemonic cultural and economic powers, use a vague concept of tonality to define a vague theory of form, protected against any scrutiny, to appropriate the 'atonal' world and any rationally explained music that is not based on Western tonality, as Western as well.

3.2 Pre-tonality and Post-tonality

Arbitrary assumptions can be characterized as metaphysical, anthropological, or historical. What I shall study in this chapter is the location of metaphysical definitions in the musical construction of tonality. One of the most characterizing elements in theories of tonality is the issue of metaphysics. This issue is related both in general to music in regard to a cognitive quality, and to tonality in regard to musical forms in the specific. In other words, metaphysics is often used to define music as an entity which is above the sensual, or as the extra element in the whole object which is perceived as more than the sum of its parts. Similarly, the discussion of origin of form (as opposed to music), and tonal form in the specific, can also assume such metaphysical characteristics. What I shall discuss in this section is the perceived location of this metaphysical quality—the construct in which this metaphysical quality is perceived—and the role that the discourse about this metaphysical quality had in the transition from tonality to atonality or post-tonality.

3.2.1 From Pre-tonality to Tonality: Origins of Harmonic Tonality

In *Studies on the Origin of Harmonic Tonality*, Carl Dahlhaus speaks of two views of tonality, one by Fétis (1784-1871) and the other by Riemann (1849-1919). (Dahlhaus 1990) By looking at tonality as a cultural, historical, and ethnic production, Fétis acknowledges that one can find many tonalities in the world; however, his studies are concentrated on the set of rules which comprise *tonalité moderne* practiced in Europe. Dahlhaus writes:

> In 1844, F. J. Fétis defined "tonality," a term borrowed from Castil-Blaze, as the "set of requisite relationships, simultaneous or successive, among the tones of the scale". A result of mankind's historical and ethnic diversity

> would, of course, be a multiplicity of tonalities (*types de tonalités*). But the theory that Fétis developed was restricted to *tonalité modern*. (Dahlhaus 1990, p. 3)

He continues to present Rienmann's theory as follows:

> In contrast to Fétis, Hugo Riemann was convinced that the many *types de tonalités* could be reduced to a single *natürliches System*, that of the tonic, dominant, and subdominant chordal functions. The comprehension of tones as representatives of the tonic, dominant, or subdominant was to be taken as an innate norm of musical perception. But historians and ethnologists, shunning the forced constraints of systematization, rejected Riemann's thesis as empirically unsubstantiated. So "tonality," the phenomenon whose theory Riemann had developed, had to be more narrowly defined as "harmonic tonality" and removed from other *types de tonalités*. And in consequence, Riemann's "tonality" became a historical phenomenon whose origin could be described. (Dahlhaus 1990, p. 3)

Thus, Fétis and Riemann have two seemingly opposing approaches. Fétis looks at the rules of modern tonality as an aggregate or a "set of requisite relationships, simultaneous or successive, among the tones of the scale," and Riemann wants to unify all forms of tonality within a single axiomatic system based on a delicate assumption stated above (i.e., "The comprehension of tones as representatives of the tonic, dominant, or subdominant was to be taken as an innate norm of musical perception.") According to this assumption the innate norm of musical perception is to hear tones as signifiers of certain elements, namely tonic, dominant, or subdominant, within a certain system of signification, namely tonality. As long as we accept that there is no other music than tonal music, and there are no other sounds that could have musical effects on us other than what tonality defines as the tone, there is no problem with this assumption. However, by the fact that Dahlhaus presents Riemann's *natürliches System* as an antitheses to that of Fétis who argues that tonality is simply a historically produced artifact, one can suspect that what Riemann is discussing is tonality as a way of defining the system of form based on the "harmonic" content of the tone. As such, this idea finds certain universal appeals as the generator of a mental entity, such as form (or even music), derived from sensual qualities of sound. However, if we accept such a definition we have to interpret the words of Dahlhaus when he implies that Riemann's tonality, which is "harmonic tonality" "... became a historical phenomenon whose origin could be described" (Dahlhaus 1990, p.

3), as defining origins for a universal idea. If seen that way, such definition of tonality would be appropriating a universal idea within a specific culture.

Other than being hegemonic, this idea has another epistemological problem. The connection of form and material supposes that the formal elements are related to the sensual ones, and therefore, the process of their cognition must also be a biological process as well. We do not usually think of listening to sound as a cognitive process, but we think of listening to music as a cognitive one. As we discussed in the previous chapter, the concept of cognition and the axiomatic system themselves depend on the age old separation of culture from nature.

It is a common belief that a cognitive entity needs to be made by a process capable of cognitive actions. The production of knowledge in academia is based on an axiomatic model where a set of axioms are defined, and based on logical processes one who is capable of cognitive actions can discuss the truth of possible theorems generated from these axioms. Form organizes material, and if material influences the form, one will not be able to point out which part of the perceived entity is an essential axiom and which part a causal effect. Therefore, the connection of form to material removes the possibility of stating the axioms clearly in defining either the form or the material. In the case of our discussion about tonality, if we have a specific and unchangeable idea of the tone, the connection between tonality and the tone would imply that music is governed by the physical attributes of the tone while the tone is generalized by the mathematical sense of the harmonic relationship as its content.

Riemann wanted to define the system of tonality within a rational and axiomatic model; however, the full implication of his theorem, which is the connection between form and material, or culture and nature, as we have discussed in the last chapter on Metaphysics, would defeat the basis of the axiomatic system he was using. As such rather than taking the tone (a natural element) as the axiom, he takes a complex construction (formulated by humans), namely the chord, as the axiom or assumption of his system. Dahlhaus writes:

> Tonal harmony rests on two assumptions: first, that a triad constitutes a primary, direct unity; and second, that the progression of a chordal roots establishes the key. (Dahlhaus 1990, p. 3)

Thus, we can conclude that the axiom, or the basic building block of tonal harmony according to Riemann is the triad and not the tone. By considering the chord as a human construction or one that is "directly intelligible" and using it as the basis for defining a rational system for tonality, Riemann preserves the metaphysical separation of the cognitive elements of form and the sensual qualities of the tone. He chooses the construction of the chord as his assumption after Hauptmann's. Dahlhaus writes:

> It was from Moritz Hauptmann that Riemann adopted the axiom that perfect fifths and major thirds are the only "directly intelligible" intervals,[13] and from the perfect fifth and major third Riemann deduced not only the structure of chords but also their relationship. (Dahlhaus 1990, p. 8)

Dahlhaus points out the differences between the theories of Riemann and Fétis, but in the process brings them closer to each other. He writes:

> Hugo Riemann defined "tonality" as "the special meaning that chords receive through their relationship to a fundamental sonority, the tonic triad".[14] Since Riemann termed these chordal meanings "functions," "tonality" is thus the embodiment of chordal function. (Dahlhaus 1990, p. 7)

In a footnote to the above passage, Dahlhaus quotes another definition by Ernst Kurth:

> Ernst Kurth gives a similar definition: " The concept of 'tonality' signifies the unified relationship of chords to a central tonic and hence comprises two different assumptions: first, the existence of unifying factors, and second, the existence of, or at least the hypothetical ability to reconstruct, a tonal center".[15] (Dahlhaus 1990, p. 325)

Western tonality is a set of rules which define the legal simultaneous sonorities and the possible progression of them within the context of loyalty to a central point of reference, namely to the tonic. Dahlhaus shows that in opposition to Riemann who wanted to explain all the rules of tonality within a rational axiomatic system based on mathematical or acoustical rules, Fétis wants to look at 'tonality' as a set of rules which may or may not rationally be derived from a central point of assumptions. Dahlhaus writes:

[13]Hauptman, Moritz. *Die Natur der Harmonik und der Metrik.* Leipzig, 1853. p 21.

[14]Hugo, Riemann, *Musik-Lexicon*, 7th ed. (Leipzip, 1909), s.v. Tonalität.

[15]Kurth, Ernst. *Romantische Harmonik und ihre Krise in Wagners Tristan*, Bern, 1920, p. 273.

> Riemann took over the thesis that tonality is based on acoustical facts from a tradition of "physicalism" (Jacques Handschin) extending back to Rameau. Thus the dominant tends toward the tonic because the dominant chord is contained within the harmonic series of the tonic chord's root. But Fétis's concept of tonality represents the opposite thesis, the conviction that it is a mistake to explain musical relationships in terms of mathematics or acoustics. (Dahlhaus 1990, p. 7)

Dahlhaus situates the theory of Fétis as an antithesis to that of Riemann.

> As a "purely metaphysical principle" (by "metaphysical" Fétis means "anthropological"), *tonalité* is the antithesis of the "natural principle" to which Rameau had reduced harmony. (Dahlhaus 1990, p. 8)

Therefore, as far as the location of metaphysical elements are concerned, for Riemann it is only the construction of chord which has metaphysical qualities but for Fétis a considerable body of the rules of tonality has metaphysical sources. Dahlhaus continues that:

> In contrast to Riemann, whose theory of tonality is a theory of "affinities between tones," Fétis saw the fundamental factor of *tonalité moderne* (the harmonic tonality of the 17th through 19th century) residing in the contrast between triad and seventh chord, between the "consonant harmony called *accord parfait*, which has the quality of rest and conclusion, and the dissonant harmony, which causes tendency, attraction, and movement ... Thus are determined the requisite relationships among tones that one designates, in general by the name of tonality"[16]. (Dahlhaus 1990, p. 8)

Following a brief discussion of how Fétis characterizes the "governing principle of tonal relationship" as alterations between "rest" and "tendency", Dahlhaus presents the role of the various degrees of the scale with the theory of Fétis that the "Degrees I, IV, V, and vi of the major scale are 'tones of rest' and admit root-position triads", while degrees "ii, iii, and vii, on the other hand, 'cannot be considered tones of rest'". (Dahlhaus 1990, p. 13) He shows that Fétis is not able to include a triad or seventh chord on ii, iii, or vii in his theory. Dahlhaus concludes that:

> Thus, Fétis's concept of tonality does not comprise the totality of chordal relationships that are possible and significant in tonal harmony. Instead it characterizes only a portion of them. (Dahlhaus 1990, p. 9)

[16]Fétis, François-Joseph, *Traité complet de la théorie et de la pratique do l'harmonie contenant la doctrine de la science et de l'art*, Paris, 1844, sec. 70, p iii.

Dahlhaus presents the views of Fétis within the theory of Riemann and vice versa and tries to find a relative reconciliation between the two, however, he states that:

> Nothing could be more wrong than to see the antitheses between Riemann and Fétis—the contrast between a "natural" and a "historico-ethnic" foundation of tonality, between the deduction of tonal contexts from "affinities between tones" and the appeal to the opposition of *tendance* and *repos*, between the claim of a comprehensive theory and the restriction of a theory to a limited range of applicability—as dead issues from the past. (Dahlhaus 1990, p. 13)

The point to notice here is that both these theories depend on some form of metaphysical constructs. Therefore, the thesis and antithesis presented by the views of Riemann and Fétis are not developed in their fullest potentials, especially in regard to that of Riemann. This underdevelopment of the definitions causes confusions in understanding the various elements and functions of the concept of Western tonality as a consistent and definable system, and makes tonality in general a vague term. Dahlhaus continues to present three open questions in regard to the contention between the theory of Fétis and that of Riemann.

> Three important questions remain problematical today: first, whether a "natural" foundation of harmonic tonality is possible; second, whether only chordal relationships, or also pitch relationships not based on chordal associations, should be termed "tonal"; and third, whether the centering of tone or chord relationships on a tonic pitch or triad should be considered an essential or incidental feature of tonality.

He goes on further to state that:

> To avoid misunderstandings, one must differentiate the various aspects of Fétis's thesis that tonality is a "purely metaphysical principle" independent of natural constraints. He would not deny that consonance—more precisely, the ranking of intervals according to their degree of consonance—is a fact of nature and not merely the result of a "convention". (Dahlhaus 1990, p. 14)

Thus, when we get to the point of becoming precise about the origins and definitions, Dahlhaus points out that the system of Fétis cannot stand as an independent system, and thus, the boundary between the theory of Fétis and that of Riemann is blurred more. Quoting from the biography of Fétis, Dahlhaus writes:

> "The mathematical division of a string and the numerical ratios that determine intervallic proportions are powerless to form a musical scale because, in their numerical operations, intervals occur as isolated facts without requisite connections among themselves, and without anything that determines the order in which they should be linked together; whence he (Fétis) concluded that every gamut or musical scale is the product of a metaphysical law born of certain human needs or circumstances."[17] (Dahlhaus 1990, p. 14)

Getting away from mathematics and logic is not as easy as Fétis had imagined. Even disregarding the harmonic rules and the fact that the frequency of scale degrees in most scales can be related to each other by fractions made by small integers, just by the fact that we put a number of entities, such as notes, together to make an aggregate, such as a musical scale, a mathematician or logician could discuss the grouping of them within the concepts of set theory (founded by Georg Cantor who lived from 1845 to 1918, almost at the same time as Riemann). Dahlhaus continues to state (Fétis must believe) that:

> The perfect fifth and major third are facts of nature, but "isolated facts"; the connection of "isolated facts" depends on a "metaphysical law." (Dahlhaus 1990, p. 14)

Dahlhaus repeatedly qualifies that by "metaphysics", "Fétis means nothing more than anthropology" (Dahlhaus 1990, p. 14).

Looking at tonality dualistically either as a universal form growing from a certain metaphysical construction (the chord) made of the sensual material of the tone, or in contrast, as a metaphysical property of the human mind till now has not resolved the theoretical and political questions which surround the concept of tonality. Dahlhaus points out how such an unresolved tension between these two approaches made the concept of tonality ambiguous:

> When Hugo Riemann spoke of tonality, he had in mind the same phenomenon as did Fétis. But in contrast to Fétis, he was convinced that the *types de tonalités* could be reduced to a single principle—the schema of three chordal functions: tonic, dominant, and subdominant. Historians and ethnologists, shunning the forced constraints of systematization, rejected Riemann's thesis as empirically unsubstantiated dogma. And the realization that the validity of the three-function schema was limited to the harmony of the 17th through the 19th century resulted in the concept of tonality losing its firmly

[17] In (Dahlhaus 1990, p. 14) quoting from: Fétis, *Biographie universelle des musiciens*, 2d ed. (Paris, 1862), vol. 3, s.v. Fétis.

> drawn outlines. Scholars could have either reverted to Fétis's term, which included all *types de tonalités*, and abandoned Riemann's interpretation, or, conversely, clung to Riemann's equation of tonality with the three-function schema and designated as "tonal" only the harmony of the 17th through the 19th century. But since neither possibility was dropped, the term "tonality" became ambiguous.[18] (Dahlhaus 1990, p. 16)

As long we are trying to view sound and music as two distinctly different entities, it will be theoretically difficult to argue about any connection between the two. Yet, if we separate them, then it will be difficult to understand music as an art form or expression that happens within the medium of sound. Even as Dahlhaus tries to ameliorate the situation, as he goes further along in describing the theoretical or anthropological basis of tonality, he finds out that he has to carry two contradictory notions of it at the same time. When he explains the concept of modality within tonality he points out how one can encompass the other and be its opposite at the same time. He write:

> If confusion is to be avoided, one must differentiate "melodic" tonality from "harmonic" tonality. Relationships among tones need not be reducible to chordal contexts in order to fall under the concept of tonality.
>
> On the other hand, the tonality defined by melodic categories, which preceded the chordally based, harmonic tonality of the 17th century, can be defined as "modality." And, when intended as the opposite of "modal," it may be permissible to shorten the expression "harmonically tonal" to just "tonal." The concept of "tonality" therefore not only encompasses that of "modality," but can also become its opposite. (Dahlhaus 1990, p. 17)

This confusion arises because we are talking about two musical phenomena which could happen on two different time scales. For example, if we start to consider "melodic tonality", we could have a certain melody within an unchanging harmonic context. However, the harmonic context itself could be part of a sequence of "harmonic tonality", defined for example in phrase boundaries. If by melodic in general we mean a horizontal musical movement in time, then the changing harmonic context itself could be perceived as a form of melody as well. The ambiguity stems from the fact that the single concept of tonality has to define requirements on two orthogonal axis of frequency (i.e., scale values

[18] Referring to: H. Lang, "Begriffsgeschichte des Terminus Tonalität,' " (Ph.D. diss., Freiburg i. Br., 1956); W. E. Thomson, "A Clarification of the Tonality Concept," (Ph.D. diss., Indiana University, 1952).

and sonorities) and time (i.e., melodic and harmonic progressions) in multiple scales of time.

Having explained the duality and the connection between the approaches of Fétis and Riemann, Dahlhaus sets his basis of study as follows:

> The conclusions can be summarized in a few sentences.
>
> 1. The expression "harmonic tonality," synonymous with Riemann's *Tonalität* and Fétis's *tonalité moderne*, signifies the representation of a key by means of associations among chords related to a center—a tonic triad.
>
> 2. It must remain an open question whether, or to what extent, harmonic tonality is based on the nature of music or of man. The theme of this study, the origin of harmonic tonality in 16th- and 17th-century polyphony, can be treated without having to decide whether the "origin" should be interpreted as an exclusively historical occurrence or as the expression of a situation already pointed out by nature.
>
> 3. The centering of relationships on a tonic triad is taken to be an essential feature of harmonic tonality. On the other hand, when it is absent one should not speak of "atonality." The phenomena that E. E. Lowinsky calls "atonal" are, as will be shown, based on a principle that can be defined positively, making the negative characterization superfluous. (Dahlhaus 1990, p. 18)

One of the differences between the tonal and pre-tonal period was the centering principle around the tonic; however, the tuning systems of the two periods were related to each other. Dahlhaus points out:

> It is uncertain, or seems to be, whether the centering of tone and chord relationships around a tonic pitch or triad should be considered an essential or an incidental feature of tonality. Renouncing the defining feature "centering" causes "tonality" to fade into a general designation for relationships among pitches. "Tonality" and "tonal system" [*Ton-system*; can imply only a "tuning system"] become synonymous expressions (provided one does not conceive of "tonality" as an "inner principle," and "tonal system" as its "outward manifestation"). (Dahlhaus 1990, p. 17)

This quote is followed by a quote by Ernst Krenek: "Tonality undoubtedly means that it is possible to establish a system of relationships and interdependencies between the harmonies that inhabit the area of a sound language."[19] Even though Krenek's quote seems to argue for a wide and general meaning of tonality, Dahlhaus does not follow his argument. Dahlhaus finally points out the problem with the word "tonality" in regard to the issue of its relation to the tonic and the idea of centering around it when he says:

[19] In (Dahlhaus 1990, p. 17) quoting from: Ernst Krenek, *Music Here and Now* (New York, 1939), p. 108.

> Yet first, it is superfluous to use a second term to label the circumstance already referred to by the expression "tonal system." And second, renouncing the defining feature "centering" leads to linguistic fussiness: one must supplement the term "tonality" with a postscript expressing that one means contexts of tones and chords based on a center, or instead, following a suggestion by Rudolf Reti, speak only of "tonicality." (Dahlhaus 1990, p. 17)

What Dahlhaus is referring to is the following comment but Reti:

> The *term* tonality seems to have been introduced into music by the Belgian composer and musicologist Joseph Fétis around the middle of the nineteenth century. It was meant to signify a musical state, which had for several centuries already been in general use, according to which a musical group is conceived (by the composer as well as the listener) as a unit related to, and so to speak derived from, a central tonal fundamental, the tonic. This tonal fundament is understood as one note, or, in a more comprehensive sense, as the full triad-harmony of a note, be it major or minor. In fact, the word tonality was probably chosen merely as a linguistically pleasant abbreviation of tonicality (thus also presaging atonality instead of the tongue-twisting atonicality.) (Reti 1978, p. 7)

With this note Reti wants to start with a clear explanation of what he means by tonality. He presents the difference between 'tonality' and 'tonicality' to define his definition of 'form'; he writes:

> To remember this verbal origin is not without importance. For, because people were tempted to use the simpler expression, the meaning of the term often became in later explanations vague, if not distorted. Tonality, according to such semantic uncertainty, was frequently thought to be rooted in relationship to a tone rather than a tonic, in consequence of which the later term atonality becomes, of course, almost meaningless. (Reti 1978, p. 7)

Thus, Reti points out that it does not seem correct to call the form used in the common-practice period of Western classical music as 'tonal' (but it should be called 'tonical'); Using the word 'tonal' in that context, one will not be able to understand what atonality means either. Reti is also interested to define how the concept of 'form', as a musical aggregate is formed within such a context. He continues that:

> In other definitions tonality and atonality were described as denoting the congruence or discongruence of a musical group with an underlying scale—the tonic then simply being the beginning, the end or an important note of the scale, without reference to the gravitational, almost magical attraction by which a true tonic holds a musical utterance together and thus endows it

> with the quality of a group, with "form." All these are more than questions of pure terminology. For owing to the far-reaching role theory plays in the understanding of our art, music terms direct, clarify and sometimes confuse our conceptions of the musical phenomena and may to a certain extent even influence compositional trends. (Reti 1978, p. 8)

However, immediately following this clarification, Reti contradicts himself in defining the vertical and horizontal "form-building" forces of the tonic as he relates the construction of the tonic to the overtone series of the tone. He writes:

> To return to tonality, then, as musical state in which a tonical fundamental exerts a certain form-building force, this force can be observed in two directions: vertically and horizontally.
>
> *Vertically* a note becomes a tonic by combining it with its closer overtones to a chord, a harmony ... (Reti 1978, p. 8)
>
> The *horizontal* Working of the tonical phenomena that we call tonality is similarly rooted in the relationship of a note to some of its overtones. (Reti 1978, p. 9)

The confusion arises since the relationship between the musical aggregate of 'chord' to the physical characteristics of its building blocks, the tone, is not stated exactly. This confusion is present in most theory books discussing tonality since it is neither possible to abandon the relationship altogether, nor is it epistemologically possible to speak of a direct connection between the two. The only book which I have encountered to pay attention to such a matter is *Tonality in Western Culture: a Critical and Historical Perspective* by Richard Norton. About the terminology regarding 'tonality', he writes:

> From a terminological standpoint, of course, the problem has been historically generated and fostered. It has been the successful project of mainstream Western scholarship since Jean-Phillipe Rameau to reserve "tonality" for itself, a project which has been rigorously examined, measured, and argued within the confines of theoretical treatises, academic seminars, music theory courses, books of diverse sorts, and the learned journals. A good portion of current music theorists and musicologists are so committed to the special tonal functions of the "common-practice" period—from about 1600 to 1900—that Norman Cazden could state in 1954,
>
> > There seems no good purpose in stretching the term tonality to cover any and all methods of organizing tones in music, in hope of proving it a universal and eternal principle of the art. For if the definition of tonality be made so abstract and inclusive, it ceases

> to be a useful term, and some other name would still be needed for the tonal system.[20] (Norton 1984, p. 1)

In the next section I shall consider the development of Schoenberg's theory of tonality and what came to be understood as 'atonality'.

3.2.2 Atonality

Responding to inner constraints of the material at a formal level was a major determining factor in the modern approach to art. Schoenberg and Kandinsky wrote profusely about this subject. Kandinsky argued that: "The form is the outer expression of the inner content." (Chipp 1968, p. 152). It was following such an approach that Schoenberg kept insisting that his newly formulated system of form, twelve-tone compositions, or its later generalization as 'atonality', was a logical continuation of the tonal musical form, of whose tradition he was a part. The dialectic Schoenberg used to defy tonality was the same as the scientific dialectic which was used to legitimize tonality as a universal form except that he began his endeavor by trying to employ as little metaphysical constructions in his theory of form as possible. He begins his book *Theory of Harmony* (1978, originally published in 1911), in which he refuted the common concepts of tonality, with a philosophical discussion about theory, system, and music. Towards the end of his philosophical discussions and prior to discussing the practical elements of tonality, Schoenberg writes:

> Let the pupil learn the laws and effects of tonality just as if they still prevailed, but let him know of the tendencies that are leading toward their annulment. Let him know that the conditions leading to the dissolution of the system are inherent in the condition upon which it is established. Let him know that every living thing has within it that which changes, develops, and destroys it. Life and death are both equally present in the embryo. What lies between is time. Nothing, intrinsic, that is: merely a dimension, which is, however, necessarily consummated. Let the pupil learn by this example to recognize what is eternal: change, and what is temporal: being (*das Bestehen*). Thus he will come to the conclusion that much of what has been considered aesthetically fundamental, that is necessary to beauty, is by no means always rooted in the nature of things, that the imperfection of our senses drives us to those

[20] Cazden, Norman. "Tonal Function and Sonority in the Study of Harmony." *Journal of Research in Music Education 2* (1954): 21-34.

> compromises through which we achieve order. For order is not demanded by the object, but by the subject. (Schoenberg 1978, p. 29)

Therefore, he understands that no matter what axioms he uses as his starting point, that selection itself will carry the destruction of his theory (or his system) as well. If atonality is seen as the practice of "not writing in tonal form" and the tonal form would only signify the musical practice of a certain period of the Western music, then the issue turns into an almost mundane historical fact. However, if we look at the concept of tonality as a special relation between form and material and look at the concept of atonality as an approach to break the tonality of today in order to establish a new tonality in the future, with the knowledge that the new tonality will eventually be broken as well, then the discussion of tonality vs. atonality becomes an issue which almost any innovative musician or artist has to deal with in every new work, practice, or performance. In regard to the word 'atonal', Schoenberg writes:

> ... I, who have the hope that in a few decades audiences will recognize the *tonality* of this music today called *atonal*, would not then be compelled to attempt to point out any other difference than a *gradual* one between the tonality of yesterday and the tonality of today. Indeed, tonal is perhaps nothing else than what is understood *today* and atonal what will be understood in the *future*. (Schoenberg 1975, p. 283)

Music as a Natural Product

Schoenberg begins his arguments by declaring that the musical work is an imitation of nature, and thus, he eliminates the metaphysical characteristic of the construction of the chord in his theory of tonality. The central issue to his theory is the treatment of consonances and dissonances. By defining the scale based on the overtones series, and therefore, defining the chord based on the physical characteristics of the harmonic tone, Schoenberg argues that the difference between consonances and dissonances is not a matter of *kind* but a matter of *degree*. Thus, he also argues that Western tonality, which is a form based on the differentiation of the consonances and dissonances in kind, is not the only form of music making but we should be able to find and comprehend music that is written in other forms as well. In *Theory of Harmony*, Schoenberg starts his argumentation based on a natural approach. He says: "Art in its most primitive state is a simple imitation of nature. But it quickly becomes imitation of nature in the wider sense of this idea, that is not merely imitation of outer but also of inner nature. ... In its most advanced state, art is exclusively concerned with the representation of inner nature." (Schoenberg 1978, p. 18) Thus, he considers a highly cultural act in its most advanced form to be concerned with the inner state of nature. Schoenberg argues that the material of music is the tone and we have to pay attention to the physical characteristics of the tone in order to better understand and become innovative in the use of it in music. He says:

> Once again: the tone is the material of music. It must therefore be regarded, with all its properties and effects, as suitable for art. (Schoenberg 1978, p. 20)

The issue is how the tone as sound material is extended to melodies and harmonies—one as a horizontal progression in time and the other as the vertical construction in the domain of frequencies—which eventually are perceived within, and comprise the tonal musical form. About the theory of scales based on overtone series, he writes:

> I can make the attempt with so much the more confidence since, as far as I know, no one has yet refuted the theory beyond all doubt; and since no man is able to examine and prove everything himself, I, too, have to get along with the existing knowledge as long as I may and can believe in it. Therefore, I will proceed in my study from the possibly uncertain overtone theory because what I can deduce from it seems to agree with the evolution of the harmonic means. (Schoenberg 1978, p. 20)

And he continues to explain the fact that the ear hears all the overtones and therefore they all contribute to the construction of the music. The central point here is to determine if any element, such as the tone or the chord, is used as a symbolic entity or a natural one within the musical construction. When we assume that "perfect fifth and major third intervals are the only intelligible intervals" (Dahlhaus 1990, p. 8), then such a combination is perceived as a symbol which can be communicated without regards to the colors of the tones that make up such an interval. The boundary which is examined in such context between the symbolic and the natural entities can be thought to be similar to the boundary between sound and music. The quality of consonances can be explained by the relationship among the first few overtones of the tones which construct the interval or the chord. Schoenberg argues that we have to pay attention to all the overtones, as they are also heard and are part of the music. He writes:

> ... the overtones closer to the fundamental seem to contribute more or more perceptibly to the total phenomenon of the tone—tone accepted as euphonious, suitable for art—while the more distant seem to contribute less or less perceptibly. But it is quite certain that they all do contribute more or less, that of the acoustical emanations of the tone nothing is lost.
>
> ....
>
> The more remote overtones are recorded by the subconscious, and when they ascend into the conscious they are analyzed and their relation to the total sound is determined. But this relation is, to repeat, as follows: the more immediate overtones contribute *more*, the more remote contribute *less*. Hence, the distinction between them is only a matter of degree, not of kind. They are no more opposites than two and ten are opposites, as the frequency numbers indeed show; and the expressions 'consonance' and 'dissonance', which signify an antithesis, are false. (Schoenberg 1978, p. 20)

Similar to Riemann, Schoenberg wanted to fit the concept of tonality within the bounds of an axiomatic rational system. However, by breaking the dichotomy between the consonances and dissonances, Schoenberg questions the principle axiom of Riemann's explanation of tonality. As discussed before, Riemann's system, which took the perfect fifth and major third as symbolic and directly intelligible elements, sits on a double standard. While similar to Schoenberg, he also follows the tradition of physicalism, Riemann does not offer an axiomatically acceptable explanation for the metaphysical qualities attached to the perfect fifth or the major third, hence, their characterizations as axioms themselves.

Questioning axioms can become a process in itself, and if pushed to the limits, the process could take over the original content of discussion. This is so because we communicate, especially academically, based on an axiomatic system. One can argue that Schoenberg is aware of this matter and even though he seems interested in philosophy, he is not willing to abandon his subject, which is music, for his tools of argumentation, which can be thought of as philosophy or science. This is why the first chapter of his book *Theory of Harmony* is titled "Theory or System of Presentation?" in which he makes the point that what he is doing in not defining a theory for music, but devising a system for instruction of music theory. (Schoenberg 1975, p. 7)

One of the most common recurring subjects in Schoenberg's discussion of tonality is the relationship between form and communication. Form for Schoenberg was always an instrument of comprehensibility. Thus, according to him, if consonances are easier to comprehend than dissonances, forms which arise from consonances facilitate comprehension more easily than those resulting from dissonances. Schoenberg believed that a musical work needs to abide by a certain musical logic; however, he thought that tonality is not the only form which could facilitate the communication of the musical message. He writes:

> Music is not merely another kind of amusement, but a musical poet's, a musical thinker's representation of musical ideas; these musical ideas must correspond to the laws of human logic; they are a part of what man can apperceive, reason and express. (Schoenberg 1975, p. 220)

Thus, for him form, communication, and musical logic are intertwined concepts. One may say that in Schoenberg's definition, the musical form establishes a certain logical flow upon which the musical message is inscribed. He also writes:

> Since tonality is no condition imposed by nature, it is meaningless to insist on preserving it because of natural law. Whether, for artistic reasons, tonality must be retained depends on whether it can be replaced. ..., as I have pointed out, the logical and artful construction of a piece of music is also secured by other means, ... (Schoenberg 1975, p. 284)

He believes that one can use other forms, still following some form of musical logic, to communicate a musical idea. The more established the form is, the easier it is for the listener to understand the piece; however, by the fact that the form itself requires a certain sense of formal subordination, it also becomes more difficult to become innovative and communicate the innovation to the listener. It is thus, that Schoenberg says "Tonality does not only serve; on the contrary, it demands to be served." (Schoenberg 1975, p. 256) Thus, he sets up a tension between form, which can be thought as the elements which defines the musical logic, and innovation. If he had pushed his idea of innovation to the fullest extent, he would have to question the musical logic itself. However, even perhaps unconsciously, he understand that such a process would take away his subject at hand, which is music. Similarly, even though he often talks about the fact that no chord or tone should be given any preferences, for *practical* reasons, he stops using consonant chords once he starts composing in the twelve-tone method. He understand that this practice is theoretically against his own ideas. He writes:

> I cannot give a single physical reason justifying the exclusion of consonant chords, but I can give a far more decisive artistic reason; It is in fact *a question of economy.* My formal sense (and I am immodest enough to hand over to this the exclusive rights of distribution when I compose) tells me that to introduce even a single triad would lead to consequences, and would demand space which is not available within my form. A tonal trial makes claims on what follow, and retrospectively, on all that has gone before; nobody can ask me to overthrow everything that has gone before, just because a triad has happened by accident and has to be given its due. (Schoenberg 1975, p. 262)

The discussion of relative reduction of the role of metaphysics by Schoenberg, is similar to the discussion of Derrida on the role of metaphysics in regards to epistemology (discussed in chapter 2). Derrida's argument was that the full logical implication of logical systems results in the breakdown of the system itself; however, he believes that we need to find a way to return to the system. Similar to Derrida, as expressed in his quote in page 34, Schoenberg chooses an economical solution to return to his subject. Had Schoenberg applied his idea fully to the concept of form, he would have had to accept the elimination of the musical logic all together. One may say that this is the approach that such composers as John Cage followed.

Tonality as Form

The question of tonality for Schoenberg is a question of form and its function. He believed that music is a form of communication and a piece of music has to have something original to say. The idea of music as an object and a medium of communication is widely and implicitly accepted within the Western composition culture. In such a context, form acts as a facilitator of communication. Schoenberg writes:

> I have, above all, repeatedly pointed out the *purpose of all forms*: a layout which guarantees comprehensibility. (Schoenberg 1975, p. 316)

Schoenberg comments on communication and comprehension in regard to music in much of his writing, and especially in his *Theory of Harmony* and *Style and Idea.* He never explicitly spells out what the object of communication is; however, he does qualify that this communication is a process which has to abide by 'laws of human logic'. It is thus, that he builds his 'theory', even though he is aware that music cannot have a theory. As mentioned before, in *Theory of Harmony*, he discusses the fact that what he is building is more of a system than theory. However, as it has been customary, musical systems has been thought to be theory. The problem with having a theory for music, is that within a theoretical system, which is based on an axiomatic model of knowledge, any proposition can be judged to be true or false, or at least this was the case prior to Godel's proof of incompleteness of formal systems. It was based on such rational and axiomatic approach based on specific metaphysical assumptions that certain musical constructs (such as consonant chords) were declared as legal and others (such as dissonant chords) not legal. Schoenberg argues that such an approach cannot be applied to the sense of beauty. He writes:

> These judgments, 'beautiful' or 'not beautiful', are entirely gratuitous excursions into aesthetics and have nothing to do with the logic of the whole. Parallel fifths sound bad (why?). This passing note sounds harsh (why?). There is no such thing as ninth chords, or they sound harsh (why?). Where in the system can we find logical, mutually consistent answers to these three 'why's'? In the sense of beauty? What is that? How is the sense of beauty otherwise related to this system? To this *system* - if you please!! (Schoenberg 1978, p. 10)

Schoenberg defined the tonal form as a system which guarantees some level of comprehensibility for the listener based on rational rules which define the system of chordal functions. As we saw in the last section, for Fétis and Riemann the atomic material of the tonal form is the construction of the chord; however, for Schoenberg this material is the tone. One can say that this should be the focal point of understanding Schoenberg's theory. He writes:

> The material of music is the tone; what it affects first, the ear. The sensory perception releases associations and connects tone, ear, and the world of feeling. On the cooperation of these factors depends everything in music that is felt to be art. Nevertheless, even if a chemical compound does have characteristics other than those of the elements from which it was formed, and if the impression a work of art makes does display characteristics other than those which could be derived from each single component, it is still justifiable for many a purpose, in analyzing the total phenomenon, to bring up for consideration various characteristics of the basic components. (Schoenberg 1978, p. 19)

Thus, Schoenberg continues to argue that the tonal form is a quality derived from the characteristics of the tone, but as one can infer from the above passage, he still wants to keep music itself as a metaphysical entity which has "characteristics other than those of the elements from which it was formed" and can affect "the world of feeling". This is perhaps why he follows the above passage by saying: "Perhaps it is indefensible to try to derive everything that constitutes the physics of harmony from one of the components, say, just from the tone." (Schoenberg 1978, p. 19) He also writes:

> Tonality's origin is found—and rightly so—in the laws of sound. But there are other laws that music obeys, apart from these and the laws that resulted from the combination of time and sound: namely, those governing the working of our minds. (Schoenberg 1975, p. 259)

Thus, the form becomes the meeting point of two different forces, one that of the material which in general one can think as sound, and the other the entity called music, which relates to the laws "governing the working of our minds." Schoenberg defines tonality as follows:

> Tonality is a formal possibility that emerges from the nature of the tonal material, a possibility of attaining a certain completeness or closure (*Geschlossenheit*) by means of a certain uniformity. To realize this possibility it is necessary to use in the course of a piece only those sounds (*Kläng*) and successions of sounds, and these only in a suitable arrangement, whose relations to the fundamental tone of the key, to the tonic of the piece, can be grasped without difficulty. (Schoenberg 1978, p. 27)

Schoenberg argues for a certain sense of formal unity in a work but he is convinced that Western tonality is not the only form which assures such a formal unity. He writes:

> There is no reason in physics or aesthetics that could force a musician to use tonality in order to represent his idea. The only question is whether one can attain formal unity and self-sufficiency without using tonality. (Schoenberg 1975, p. 262)

In his theory, Schoenberg first demonstrates the possibility of deriving the tonal form based on the physical characteristics of the tonal material, the tone, and then argues that the concept of tonality in the common-practice period had only implemented a limited portion of this possibility. For Schoenberg tonality is a special form which organizes sound and assures a certain level of comprehension of the music. He writes:

> The effect of tonality lies in this: everything that occurs in the harmony is accessible from the tonic, so its internal relationships are given suitable cohesion; and a piece of music so constructed is sure, in advance, of a certain formal effectiveness, whether or not it is constructed with the same logic and cohesion in respect of its other functions.
>
> Tonality is not an end in itself, then; it is one of the technical resources facilitating (but not guaranteeing) unity in the comprehension of tone-progressions. (Schoenberg 1975, p. 261)

Schoenberg's theory of tonality has certain connotations regarding the origins of musical elements such as scales, tone-progressions, and chords.

Scales, Melodies, and Harmonies

As mentioned above, Schoenberg views art and music as a natural product. As such, he wants to find the origins of all musical elements inside the construction of the natural material as well. He writes:

> If the scale is imitation of the tone on the horizontal plane, that is, note after note, then chords are imitation on the vertical, notes sounded together. If the scale is analysis, then the chord is synthesis of the tone. It is required of a chord that it consist of three different tones. The simplest of such chords is, obviously, that one which most closely resembles the simplest and most evident aspects of the tone, that one which consists of fundamental, major third, and perfect fifth - the major triad. It imitates the euphony of the single tone by omitting the more distant overtones and reinforcing the more immediate. The triad is without doubt similar to the tone, but it is no more similar to its model than, say, Assyrian reliefs are to their human models. (Schoenberg 1978, p. 26)

Thus, Schoenberg argues for the expression of a single entity, the tone, in multiple scales of time and frequency. The tonal form, or more correctly the tonical form, emphasizes the tonic in multiple scales of time. Any diversion from the tonic is expressed in relation to it and diversions happen in multiple scales of time and frequency. The scale becomes the projection of the tonal material in the frequency domain. The chord becomes a construction to emphasize the root of the chord. Chord progressions establishing a key emphasize the tonic chord, which in turn emphasizes the root of the tonic. Melodies centering around the tonic emphasize the tonic. Modulations are done in relation to the tonic and a final return to the tonic is always expected. The return to the tonic happens in multiple scales of time. For example, a chord imitates the tonic instantaneously (or as long it takes for the perception of the listener to relate the chord to the root), a chord played in arpeggio takes as much time as it takes to play the three notes, a key portrays the tonic in as much time as it takes to establish a key (such as a cadence), a melodic figure takes as much time as it takes for a certain sense of phrasing to be established to return to the root of the tonic. In higher scales of time, different elements are combined to reinforce the return to the tonic; for example, melodies within harmonic progressions can jointly reinforce the tonic. As such, the development of the sonic material also affect the development of the practice throughout the evolution of Western tonality. Schoenberg writes:

> It is much more correct to say that the development of harmony was not only essentially influenced by melodic principles, that the development of possibility of voice leading was not only essentially influenced by harmonic principles, but that in many ways each was actually determined by the other. Every treatment, however, that uses the one or the other principle exclusively will run into facts that will not fit into its system. (Schoenberg 1978, p. 26)

Longer melodic or harmonic sections (such as various song forms) establish a sense of the tonic. In larger forms, the theme, which has its own melodic and harmonic character becomes the point of reference. As such, a piece of music becomes connected to a small multi-dimensional structure.

> Anyway, whatever one's views about the pleasure that can lie in conducting each part in polyphony independently, melodiously and meaningfully, there is a higher level, and it is at this level that one finds the question which needs answering in order to arrive at the postulate: 'Whatever happens in a piece of music is nothing but the endless reshaping of a basic shape.' Or, in other words, there is nothing in a piece of music but what comes from the theme, springs from it and can be traced back to it; to put it still more severely, nothing but the theme itself. Or, all the shapes appearing in a piece of music are *foreseen* in the 'theme'. (I say a piece of music is a picture-book consisting of a series of shapes, which for all their variety still (a) always cohere with one another, (b) are presented as variations (*in keeping with the idea*) of a basic shape, the various characters and forms arising from the fact that variation is carried out in a number of different ways; the method of presentation used can either 'unfold' or 'develop'.) (Schoenberg 1975, p. 290):

In *The Classical Style*, Charles Rosen defines tonality as follows:

> There are so many conflicting accounts of tonality that it will be useful to restate its premises, axiomatically rather than historically for brevity's sake.

> Tonality is a hierarchical arrangement of the triads based on the natural harmonics of overtone series of a note. (Rosen 1972, p. 23)

And, in *Sonata Form*, Charles Rosen writes:

> In Haydn, everything comes from the theme, as the composer himself claimed: out of the character of the theme and its possibilities of development arises the shape of the musical discourse. Beethoven carried this a step further: the relation between large-scale structure and them was equally intimate, but both were worked out together, as recent studies of his sketches have disclosed. He not only made sketches for the themes and for individual passages, but for the work as a whole; the conception of the entire work took form gradually and influenced the details of the individual themes. (Rosen 1988, p. 177)

Thus, the theme plays the role of the tonic; however, the theme itself could also have tonal structures within it, and through the loyalty to the key of the piece, the multi-layered forces which could be portrayed in multi-dimensional spaces unite through a central gravitational force. To rationalize his twelve tone method Schoenberg wrote:

> THE TWO-OR-MORE-DIMENSIONAL SPACE IN WHICH MUSICAL IDEAS ARE PRESENTED IS A UNIT.[21] Though the elements of these ideas appear separate and independent to the eye and the ear, they reveal their true meaning only through their co-operation, even as no single word alone can express a thought without relation to other words. All that happens at any point of this musical space has more than a local effect. It functions not only in its own plane, but also in all other directions and planes, and is not without influence even at remote points. For instance, the effect of progressive rhythmical subdivision, through what I call 'the tendency of the shortest notes' to multiply themselves, can be observed in every classic composition.
>
> A musical idea, accordingly, though consisting of melody, rhythm, and harmony, is neither the one nor the other alone, but all three together. The elements of a musical idea are partly incorporated in the horizontal plane as successive sounds, and partly in the vertical plane as simultaneous sounds. The mutual relation of tones regulates the succession of intervals as well as their association into harmonies; the rhythm regulates the succession of tones as well as the succession of harmonies and organizes phrasing. And this explains why, as will be shown later, a basic set of twelve tones (BS) can be used in either dimension, as a whole or in parts. (Schoenberg 1975, p. 220)

As I have pointed out a number of times, Schoenberg did not like the word 'atonal' because he believed that the name ignored that what Schoenberg was arguing against

[21] The capitalization of this sentence is Schoenberg's.

was not the concept and principles which formed tonality, but just the exclusive reign of only one form of it. Schoenberg believed that it is possible to compose pieces which are still based on some form of unity, similar to the way that Western tonality brings unity to a work, without adhering to the dominant form of Western tonality. In other words, he wanted to explain that what he is doing is not negating a form but augmenting it.

> My Two Ballads, Op. 12, were the immediate predecessors of the Second String Quartet, Op. 10, which marks the transition to my second period. In this period I renounced a tonal centre—a procedure incorrectly called 'atonality'.
>
> .....
>
> The first step occurred in the Two Songs, Op. 14, and thereafter in the *Fifteen Songs of the Hanging Gardens* and in the Three Piano Pieces. Op. 11. Most critics of this new style failed to investigate how far the ancient 'eternal' laws of musical aesthetics were observed, spurned, or merely adjusted to changed circumstances. Such superficiality brought about accusations of anarchy and revolution, whereas, on the contrary, this music was distinctly a product of evolution, and no more revolutionary than any other development in the history of music.
>
> In my *Harmonielehre* (1911), I maintained that the future would certainly prove that a centralizing power comparable to the gravitation exerted by the root is still operative in these pieces. In view of the fact that, for example, the laws of Bach's or Beethoven's structural procedures or of Wagner's harmony have not yet been established in a truly scientific manner, it is not surprising that no such attempt has been made with respect to 'atonality'. (Schoenberg 1975, p. 86)

One may suggest that the reemergence of a certain shape, either the tone, the chord, the row, or the theme, in multiple scales of time could be thought as a unifying factor which can apply to tonal and atonal piece alike.

The tonal functions require that the parameters of pitch in melodic and harmonic contexts adhere to the laws governing the resolution to consonances. As such within tonality, pitched sound materials not only carry musical meaning, but also are constrained by the formal requirements of tonality. The concept Schoenberg used to emancipate the concept of dissonance, which in turn itself could be seen as emancipating the parameter of the pitch from having to always act as the only parameter for formal unification, could be applied to other parameters of music. Emancipation of all the traditional parameters of Western tonality can be seen in the tradition of Serialism, in the music of such composers as Pierre Boulez. One can also see the conceptual evolution of this application in works of John Cage, and the extension of this idea into the domain of production of the timbres in the work of Karlheinz Stockhausen.

Stockhausen not only started building timbres using electronics, he also extended the concept of sound to include musical structures in higher scales of time. In ".....how time passes...." (Stockhausen 1959), he discusses a system of composing "phase-durations" according to structures of pitch composition. He establishes the relations between beats in the same ways the overtones of harmonic sounds are related to each other. He also recognizes the fact that rhythms are perceived as textures, and from the idea of tone-colors devises a system for composing rhythm timbres which he calls "formant-rhythms".[22] In his piece *Mantra* (1970) he uses a single formula for multi-layered definition of all the musical parameters. About it he writes:

> I can give an example of a more recent concept of sequential form, my composition MANTRA for two pianos and electronic modulation. In this work I use a 13-note formula, and nothing but this formula throughout the whole duration of the composition. The formula is expanded and compressed in its pitch and time intervals, but it is always the same formula. Each note of the original statement of the formula has certain characteristics: a periodic repetition, an accent at the end of the note, an ornament, and so on, these characteristics are seeds of later development. The structure of the whole composition is an enlargement in time of that one small formula to more than 60 minutes, and the sections of the composition correspond to the notes of the original formula, and their characteristics. The form is sequential, but with an overall development. (Stockhausen 1991, p. age 57)

Thus, one may conclude that if the unity of a piece is assumed, with that assumption a certain self-similar structure is implied to exist within the piece. Self-similarity is a scientific concept which is naturally observed in the phase-space of certain non-linear dynamical systems; the popular understanding of this science is called Chaos Theory. A self-similar entity has a self-referential structure. It was suggested by Voss and Clarke that music exhibits properties which could be modeled by an interesting class of mathematical signals called the $1/f$ noise, or pink noise, which has a self-similar

[22]Stockhausen used such ideas to compose *Zeitmasse* (1955-56), *Gruppen für drei Orchester* (1955-57), *Klavierstück XI* (1956), and *Carreé* (1959-60). In *Gruppen*, three orchestras surround the audience, with each orchestra having its own conductor, each playing in a different tempo. We can analyze these pieces based on the idea that every orchestra is a single instrument whose sound-quality (timbre) is created by the musical structures played by the musicians of the orchestra using the sounds of their individual instruments.

structure.[23] (Voss and Clarke 1978)

As discussed in chapter 2, abandoning metaphysics introduces the need for acceptance of self-referential structures within epistemology which in turn blur the boundary between the theorem and mythopoem. Even though music can at times figuratively speak, we do not think of music as a system which could carry symbolic information in the form of theorem; however, we can use an axiomatic system or theorems to discuss the construction of music. Music can be seen as a construct which is situated at the boundary between theorem and mythopoem where, the form of the music can be rationalized in some form of dialectic, and the content could be characterized as a mythopoem which is carried within the theorem (or the rational dialectic).

3.2.3 Summary

What I have presented in this section is the role of metaphysics in the two seemingly opposing theories of Joseph Fétis and Hugo Riemann on tonality, and in theories of Schoenberg on 'atonality'. Fétis claimed that musical relationships should not be subjected to mathematics or acoustical rules and suggested that the relationship found within musical structures are based on metaphysics. Dahlhaus shows that at some point Fétis is forced to accept the agency of the physical structures of the tone in defining the structures of the chord. In contrast, Riemann wanted to fit the rules of tonality within a rational axiomatic system. While Riemann's theory can be thought of as being based on "a tradition of physicalism", he does not base his axioms on the natural construct of the 'tone', but he uses the construction of the 'chord' as his starting principle. This he does based on the assumption that the "perfect fifth and major third intervals are the only intelligible intervals." (Dahlhaus 1990, p. 8) Thus, chords constructed by combination of these intervals are defined as consonances, and tonality is defined as the functional requirement that such chords imply before and after their occurrence in the context of a relational loyalty to a central chord—the tonic. Had Riemann pushed his theory to the fullest extent and eliminated metaphysics altogether in his construction of tonality, he would not only have epistemological problems, the process would have been

[23] For a more detailed discussion of the $1/f$ noise as it relates to music please refer to (Yadegari 1992, p. 79).

against his understanding of music as well. Dahlhaus points out that:

> The fundamental idea of Hugo Riemann's theory of functions is "that the act of listening to music is not a passive sufferance of the effects of sound on the organ of hearing, but is much more a highly developed application of the logical functions of the human mind"[24]. (Dahlhaus 1990, p. 47)

In his book, *Studies on the Origin of Harmonic Tonality*, Dahlhaus presents a common ground between the theories of Riemann and Fétis, and characterizes the passage from pre-tonal period to the tonal period as evolutionary. Technically speaking if we assume that the word 'tonality' should only refer to the common-practice period of Western Classical music, then the word 'atonal' would apply to any music that is not written in that form—this includes Western music not from that era and all music from the East. Dahlhaus discusses renouncing of "centering around the tonic" requirement in order to separate the pre-tonal and post-tonal music theoretically. However, in the process he also shows that the word 'tonal' itself can become vague if pushed to its limits, especially in relation to its opposite 'atonal'. He writes:

> The renunciation of "centering" is, of course, not as unmotivated as it seems. It is negatively based: in the aversion toward naming "atonal" those tone and chord relationships that do not group themselves around a center. To avoid having to speak of "atonality," one stretches the concept of tonality until it means no more than that tones form an association and are not randomly juxtaposed. (Dahlhaus 1990, p. 17)

He also points out tonality is not a clear term and other than considering its theoretical meaning, we should also pay attention to it as a historical term as well. He writes:

> If Edward E. Lowinsky characterizes the harmonic technique of many 16th-century madrigals as "triadic atonality,"[25] and means by the term that chords were linked together without being related to a center, then there should be no logical objection to his usage. Lowinsky, however, fails to recognize that "tonality" is not only a theoretical, but also a historical category. The tonality of the 16th century and that of the 19th century are stages in a coherent development. But the "atonality" of the 16th century is in no way connected with that of the 20th century. (Dahlhaus 1990, p. 18)

[24]Riemann, Hugo. "Ideen su einer 'Lehre von den Tonvorstellungen,' " *Jahrbuch Peters* 21/22 (1914/15), p. 1.

[25]Lowinsky, Edward. *Tonality and Atonality in Sixteenth-Century Music* (Berkeley, 1961), pp. xii and 39.

As discussed in this section, linguistically speaking, the word tonal does not represent the formal procedures of the common-practice era of tonality. Since all the definitions and developments were based on the definition and the loyalty to the tonic, as Reti had suggested the word 'tonical' would have been a better choice.

Schoenberg also thought that his theory which led to what became known as 'atonality' was a natural evolution of the tonal form. In regard to his theory and his compositions he says: "I was never *revolutionary*." (Schoenberg 1975, p. 137) Schoenberg uses the overtone series theory to explain the construction of the chord and the requirements of the tonal form. He argues that the separation of consonances and dissonances in type is an unfounded dichotomy and that their difference is in their degree of comprehensibility. Schoenberg argued against the metaphysical quality of the chord which was the source of the separation of consonances and dissonances; however, he still believed that music is a metaphysical quality.

For Schoenberg, form always functioned as an instrument of comprehensibility and he thought a piece of music has to have something to communicate. For him, Western tonality was only one form of assuring comprehensibility. From much of his writing one could conclude that what Schoenberg meant by comprehensibility is the logical and rational flow of material which should be in tune, as he says, with the laws "governing the working of our minds" (Schoenberg 1975, p. 259), or "laws of human logic" (Schoenberg 1975, p. 220). This logical connection of material creates a certain constraint for the way material can evolve within a piece of music. Tonality is the set of rules which characterizes the functional requirement of resolutions to consonant chords based on the loyalty to the tonic. Thus, every chord within tonality acts as a function of form rather than a sonic expression. Schoenberg points out that expressionistic chords such as those used by Debussy and Wagner could not have been explained within the strict rules of the common-practice period. (Schoenberg 1975, p. 216) Schoenberg did not like the word 'atonal' because he believed that in the end all music is eventually tonal, meaning that once the music is understood the tonality of it will be established. He did not attack tonality in general but only the definitions which had emerged from the common-practice period. Thus, he moved the metaphysical location of the definition of tonality from the definition of the chord to a lower level of material such as the tone, or the sound. In my previous writings I have discussed this point in which I propose that the difference between sound and music should no longer be perceived as a matter of *kind* but only as a matter of *degree*. (Yadegari 1992)

Since all chords within the common-practice tonality have functional roles, it is not possible to tell the difference between elements representing tone color and elements which connect the past and the future in a rational manner. In other words, the form and the material in the tonal form are intertwined.

Schoenberg viewed art and music as natural products, and as such all compound musical elements must be imitation of nature as well. For example, the chord imitates the tone, the cadences imitate the tonic, etc. However, according to Schoenberg, in all pieces which achieve communication, a certain gravitational force must keep all the elements together. For him, this force becomes the theme and he declares that "... in other words, there is nothing in a piece of music but what comes from the theme, springs from it and can be traced back to it; to put it still more severely, nothing but the theme itself." (Schoenberg 1975, p. 290)

Schoenberg did not follow his project to the full extent, in the sense that he could have applied his principle of objection to a certain traditional rule to all that could represent tradition. He writes:

> I now find that some of the statements in my *Harmonielehre* are too strict, while others are superfluous. Intoxicated by the enthusiasm of having freed music from the shackles of tonality, I had thought to find further liberty of expression. In fact, I myself and my pupils Anton von Webem and Alban Berg, and even Alois Hába believed that now music could renounce motivic features and remain coherent and comprehensible nevertheless. (Schoenberg 1975, p. 88)

One can argue that this is what happened in the serialist tradition, where the 'theme' was either put away or found a whole new meaning. Schoenberg also writes: "Perhaps it is indefensible to try to derive everything that constitutes the physics of harmony from one of the components, say, just from the tone." (Schoenberg 1978, p. 19) Had Schoenberg followed his initial idea fully, which is to derive musical qualities from the physical characteristics of the tone, he would run into epistemological problems in the sense that he would have to defy the metaphysically characterized musical logic all together.

3.3 Tonality, Metaphysics, and Cultural Hegemony

As noted earlier, the process of relating musical structures to the physical qualities of sound insinuates the existence of self-referential structures in the relationship between sound and music. Attempts at describing such self-referential structures within epistemology undermine the very old concepts which gave rise to epistemology. Thus, one can understand why so many scholars were forced to introduce metaphysical principles in their scientific research. However, by the fact that metaphysics is supposed to be understood without reason, metaphysical principles can turn into instruments of abuse of power. The problem with "metaphysical laws" is that it is hard to agree upon them, and their definition and enforcement define the positions of power. In tune with the nature of metaphysics, such abuses often occur at the edges of one's rational understanding in a rational discourse in the form of a double standard. Dahlhaus quotes from the biography of Fétis (following the quote on page 86 where Fétis is accepting that: The perfect fifth and major third are facts of nature, but "isolated facts"; the connection of "isolated facts" depends on a "metaphysical law.") that:

> "Thus he (Fétis) came to see that the lascivious dispositions of Oriental peoples gave birth to the small intervals of their languorous songs; that the discouragement of enslaved peoples created minor scales among them all".[26] (Dahlhaus 1990, p. 14)

Thus, a "metaphysical law" is defined based upon a Eurocentric mentality which attaches the size of intervals—even smaller intervals than those used in the West, which imply a higher division of the octave and, therefore, based on positivistic attitude toward science should be considered as more progressed—to "languorous songs" resulting from "lascivious dispositions".

Judgments which are characterized as rational, scientific, objective, or logical can be understood by all humans based on certain axiomatic principles. In contrast, aesthetics or subjective judgments are personal. Even though, in real life separation of objective and subjective judgments is not easily possible, if a piece of music gets legitimized solely through rational discourse, one may say that the sedimentation of the aesthetical values are achieved through imposed objective and rational forces. In

[26] Ibid. s.v. Fétis.

contrast, when there is aesthetical choice involved, what a person, a group, or a society, holds as aesthetically valuable becomes a part of the character of that entity. As such, the enforcement of the view of art by one culture over another becomes an efficient tool of colonization and domination. Schoenberg writes:

> Art has long been a most promising export article, particularly so, of course, in the days when craftsmen's great skill still counted heavily. The states most successful in art were not necessarily those still (or at all) in the running for world domination; for those in their initial period of expansion, however, art was a very effective means of propaganda furthering their trading and political interest. Even small defeated states knew how to capture a relatively favorable position by inducing others to adopt their view of art.
>
> Since certain differences between cultures have been ironed out by international contact, it is increasingly true that throughout all the countries that concern us one single view of art is dominant, and one only. In the realm of painting, the French have long since succeeded the Italians in setting the tone; in literature, the English and French were followed by the Germans, then the Russians and recently the Scandinavians—and probably it will soon be the Americans. In music, after the Italians, the Germans exerted the greatest influence, one which is even today is still unbroken. But whatever the changes may have been, the number of alternatives was small, limited mainly to west and central Europe, and the dominant view was dominant throughout the whole field. Accordingly, however great the distinctions between the various styles may otherwise have been, they were not such as to prevent each people's playing a certain creative part within the dominant style, even if it lacked the recognizable originality to reach the front rank. But since these peoples were also the colonizers, and in many ways the rulers of most of the non-European states, and were able to impose the advantages of our culture upon them, the European (mainly west- and central European) view of art is dominant in all these countries too, in so far as they are at all concerned with art in our sense. (Schoenberg 1975, p. 167)

While reading much of Schoenberg's work, it is difficult to imagine that he had any sensibility for the art of non-European cultures. However, he wanted to be a rational person and to compose music which adhered to "laws of human logic" (Schoenberg 1975, p. 220). In a note added to the second edition (c. 1920-21) of *Theory of Harmony* to elaborate further on why he thought the division of the octave to higher than twelve notes could be postponed to a later time, when he writes:

> The fashion of recent years to set off the culture of older, oriental, and exotic peoples against that of Europe seems disposed to encroach also on music. ... Nevertheless, whereas technical achievements can almost always be transferred directly [from one culture to another], spiritual and cultural achieve-

> ments perhaps sometimes, in the field of music the first difficulty to be encountered is the question of the criteria for determining the higher culture. (Schoenberg 1978, p. 424)

Two paragraphs later, right after acknowledging that it is difficult to determine the criteria for determining a higher culture, he goes on to say:

> If we consider, however, that next to the lofty requirements of elegance, uniqueness, and integrity, only intensity can serve as a criterion of true art, then it becomes clear that we can easily disregard those who have recommended to painters and sculptors the imitation of exotic and primitive art—even going as far as Negro carvings and children's drawings." (Schoenberg 1978, p. 425)

In the "high" literature of the West, one can find many instances of such condescending dialectic toward the human body, the social classes, and people of the "Orient". Metaphysical characterizations are used to separate the mental construct of music from the sensual material of sound. Schoenberg argued against the metaphysical quality of the chord in the interest of emancipating dissonances. As in his quote on page 97 (relating to parallel fifths, certain passing tone, or ninth chords sounding harsh), where he asks "Where in the system can we find logical, mutually consistent answers to these three 'why's'? In the sense of beauty? What is that? How is the sense of beauty otherwise related to this system?", one may ask how is he defining "higher cultures"? As mentioned before, Schoenberg did not follow his idea to the fullest extend of its possibilities; one wonders if his culturally and racially biased comments relating to issue at the border of the application of his theory has sprung as a coincidence, or where they formulated strategically because he was interested to look for the supremacy of German music as he declared to one his students in 1921—that he had "discovered something that will [would] assure supremacy of German music for the next hundred years.“ (Norton 1984, p. 242) One can argue that the issue of the division of the octave is at the border of how far Schoenberg pushed his idea. The following passage can possibly show Schoenberg's approach towards the division of octave to higher number of tones in regard to cultures with "imperfect scales" and "imperfect instruments" whose music "has not evolved to such heights as" Europeans.

> The discovery of our scale was a stroke of luck in the development of our music, not only with regard to its success, but also in the sense that we could

> just as well have found a different scale, as did for example the Arabs, the Chinese and Japanese, or the gypsies. That their music has not evolved to such heights as ours does not necessarily follow from their imperfect scales, but can also have to do with their imperfect instruments or with some other circumstance which cannot be investigated here. Moreover, it is not to our scale alone that we owe the evolution of our music. And above all; this scale is not the last word, the ultimate goal of music, but rather a provisional stopping place. The overtone series, which led the ear to it, still contains many problems that will have to be faced. (Schoenberg 1978, p. 25)

It is interesting to see somebody like Schoenberg, who felt alone and ignored within his own society, to talk about "success" of Western music, whose most successful form he rationally criticized. Can this success be measured musically at all? One may think that Schoenberg believed that the definition of 'value' is an extremely difficult task in the field of art, if not impossible. However, one can see that Schoenberg falls into culturally oppressive approaches at the border of his thought in relation to removing the agency of metaphysical elements. The rational explanation of the elements of form being derived from the material is related to a work of art not only technically, but also culturally. The following passage could perhaps show Schoenberg's ambivalence towards the scale of other cultures, in which when he wants to give the other cultures "as much right as" Europeans to explain their "appeal to nature", he ends up calling their scales "incomplete or unusual".

> The way of history, as we can see it in that which has actually been selected by practice from the practicable dissonances, hardly leads here to a correct judgment of the real relations. That assertion is proved by the incomplete or unusual scales of many other peoples, who have, nevertheless, as much right as we to explain them by appeal to nature. Perhaps their tones are often even more natural than ours (that is, more exact, more correct, better); for the tempered system, which is only an expedient for overcoming the difficulties of the material, has indeed only a limited similarity to nature. That is perhaps an advantage, but hardly a mark of superiority. (Schoenberg 1978, p. 21)

As discussed before, even though Schoenberg wanted to see form, which he thought was always an instrument of communication, to be an outer expression of the inner nature of the material, he still wanted to keep music as a metaphysical element.[27] In that sense, in tune with the culture of composition in the West, he still felt as a creator who

[27] Refer to the quote on page 3.2.2.

would inject a certain message on top of the material and would have the right and the obligation to direct the course of the material. He writes:

> I am just reading in a criticism. of my *Georgelieder* that I 'do not shrink from doing violence to nature'. What is meant is doubtless that I do not feel the need to write anything banal, conventional, obsolete. For it must be apparent, in view of what I have just said, that one must, on the contrary, in all circumstances, use force on nature, on the material—sounds: that one must force them to keep to a direction and succession laid down by us. One has to force nature—the material—by means of nature—our way of thinking—to work naturally according to our nature; otherwise we can either not grasp it or else, if one lets the sounds run as they please, it remains a children's game, like electrical experiments with elderberries or tobogganing or the like. Every more developed game comes about because the course of nature is modified by a force from outside. (Schoenberg 1975, p. 253)

The concept of composition, the composer, and the one way communication directed from the composer to the listener may be a uniquely Western construction. While this approach can be found in almost all areas of art, within music the concept finds universal appeal and success in tune with the progress of tonality in terms of its theoretical justifications and economical success. Norton writes:

> The composer, particularly in the nineteenth century, became a vehicle of expression for men and women like himself who expected him to objectify feelings that ran the gamut from their most private yearnings to espousals of public virtue. At the same time, the advantage this individualism provided the composer to pursue his own development as a "natural right" also forced him to produce commodities with exchange value, that is, salable works of art, if he was to maintain his existence. Thus, as he sought to maximize the exchange value of his works, he was also forced to present that music in a universally accepted language or idiom. Nowhere is this more evident than in the realm of tonality, as I hope to demonstrate later in this book. This is to say that bourgeois carries here none of the condemnation frequently associated with that term. My point is not to deprecate bourgeois individualism, but simply to define the culture in which Western music and musical thought have been shaped. (Norton 1984, p. 6)

There is no doubt that Western tonal music is the dominant form of music in the world now. In *Tonality in Western Culture*, Richard Norton argues that tonality is a "culture-bound" economic project. He writes:

> The underlying theme of this book is that mainstream Western musical thought is what social scientists and social historians describe as "culture-bound" and is a product of the culture best described as "bourgeois." The

> term is infrequently used in these chapters to identify the historical growth and development of European capitalism that gradually absorbed a nexus of musical activities—composition, performance, audience consumption, and finally the study of music itself—which formerly had been largely the concern, and therefore under the control, of the Roman church and the nobility. (Norton 1984, p. 6)

The scientific dialectic was used by musicians and scholars such as Rameau and Riemann to establish tonality through rational means. However, what they did is to establish only a single form of it. The vagueness in its definition has been used as a hegemonic double standard to economically dominate the musical arena of other cultures. One can hardly defend tonality as a universal form owned by the West; however, this is how the economic means are currently set up, and as Norton points out, few scholars pay attention to this matter. (Norton 1984, p. 12)

One may argue that Western tonality, which is based on the metaphysical characterization of the major chord, is related to the physiology of human ear. This was a thought that Schoenberg entertained as well when he wrote: "As Schopenhauer shows in his theory of colors, however, a real theory should start with the subject." (Schoenberg 1978, p. 18) However, similar to the fact that he did not push his attempt at eliminating all metaphysical elements in explaining the evolution of form, he did not follow this path either. Perhaps similar to Adorno, Schoenberg also believed that: "Music recognizes no natural law; therefore, all psychology of music is questionable." (Adorno 1985, p. 32) Had Schoenberg pushed his idea of unity of form and material to its fullest possible form, he would have had to also accept the relationship between the author and the work, which would make the theory to be inclusive of the subject as well.

The concept of tonality is a much deeper concept than what most scholars and musicians thought it to be. Among them tonality is not a very clear term, but just a historical one. Currently 'tonality' is also a strong dominating economical force in the popular music world which portrays all that is 'cool' and 'hip' as Western, and what is not Western as backward looking and unscientific. As such the traditional music of other cultures are seen as backward looking, and, to use Schoenberg's terminology, 'exotic', 'unusual', and 'imperfect', not only by Western scholars, but also by the scholars of the cultures in question. At the same time any innovative action, which often is combined with scientific models, is appropriated within a Western frame of mind which in the end results in the West owning the artistic object.

What is tonality? While the concept is used prevalently among musicians and scholars, few, if any, can pinpoint the concept to a set of epistemologically sound definitions. 'Tonality' is understood as a form based on the concept of 'harmony'. One could argue that linguistically in their technical meaning both these words misrepresent the relationship between the common and philosophical meaning of these concepts, and the musical practice of the common-practice period of tonality in the West. However, during the exclusive reign of tonality, it was such a relationship that was used to legitimize tonality as a universal form. When tonality had achieved its dominant power, it was refuted as the only form of music making, thus apparently moving the understanding of the Western musical consciousness from the homogeneous approach to a more heterogeneous one. A complete understanding of the refutal should have questioned the European art as the supreme form of art; however, the main theorist of 'atonality', Arnold Schoenberg, seemed to have understood the issue differently. In 1919 in his "Guide-Lines for a Ministry of Art" after the First World War, he writes:

> The most important task of the music section is to ensure the German nation's superiority in the field of music, a superiority which has its roots in the people's talent. (Schoenberg 1975, p. 369)

And after he had devised his twelve-tone system of form to replace the agency of tonality in his music, as we mentioned above, he thought that he had "discovered something that will [would] assure supremacy of German music for the next hundred years.“ (Norton 1984, p. 242)

In current days, to avoid essentialism, the tonal form is studied in its own frame of reference. As such, atonality in turn is understood as post-tonality. Few people would claim any universality, or in other words essence in tonality; therefore, atonality becomes another form of a "common-practice". Thus, the hegemonic forces of tonality, while still being in full force as dominating cultural ideology, is framed as forgotten in a certain historical period. The Western culture has used the concepts of 'tonality' and 'harmony' as concepts with double, and relatively contradictory meanings, and such contradictions are used as instruments of power for assertion of the supremacy of the West as well as for keeping these concepts out of the reach of other cultures.

Accepting the unity of form and material has certain connotations. The modern approach in the West considered a number of these connotation in relation to the artistic object. Schoenberg can possibly be named as the theorist of the Western modern music, who wanted to remove the agency of metaphysics in formal constructions of music; however, at the same time he wanted to keep music itself as a metaphysical entity. He thought that form is always an instrument of communication. As we discussed in previous chapter on metaphysics, Lévi-Strauss seemed to have been dealing with similar problems. Even though he picked a musical model of unity of form and material for his work, and thus, stepped out of the usual circle of epistemology, in the end he was still not capable of explaining the origin of the language itself and as such accepting it as a metaphysical quality.

As long as we think of individuals as isolated islands, the concept of communication characterized as some form of meaning being transmitted and received through sensory mediums, requires some form of metaphysics in its definition. In other words the interpretation or the transformation of the sensory information to mental constructs, or the implicit similarity of understanding of the language by the individuals involved, needs to be defined metaphysically. Thus, metaphysics becomes the starting point for defining a communicative context—metaphysics becomes the origin of philosophy.

If we were to think of our perception of music deductively, it is not possible to explain how we could perceive something called music separate from the tones that make up the music, unless we accept such a separation of information and medium in the original point of conception. Therefore, as such, we accept as an assumption that humans are able to construct a mental entity called music and communicate that through the sensual medium of sound to another human being. In such a view, there exists a scientifically unexplainable point, which is the separation of the human mental activity from the natural world. While such beliefs, which separate human cognition from nature, could religiously be traced back to the bible, its scientific form in the West would possibly be rooted in the Cartesian mind and body duality. The content of communication, which becomes the object of cognition itself, is separated in Western philosophical traditions dualistically into theorems and mythopoems following an age-old Greek conception. If we do not draw a very distinct line between sound and music, no matter how conceptual, we are implying that their difference is a subjective issue and therefore, we are in some way equating the two, at least as far as their kind is concerned.

Music has often been closely associated with physics, mathematics, and philosophy. In the recorded history of the West, this tradition can be followed as far back as Pythagoras who believed mathematics to be the source of all existence and considered music to be part of the hard sciences.The tonal form plays an important role in legitimizing the Western music as the universal music in non-Western cultures. Tonality is in fact not strictly what its name implies or what it was advertised as. 'Tonality' is a name derived from the adjective 'tonal', which means relating to the tone; therefore, 'tonality' means the state of relating to the tone. However, based on the historical musical practices one can argue that the atom (smallest unbreakable unit) of tonality is the chord whose fundamental tone is the tonic. Thus, conceptually tonality is related to the tonic and not the tone.

Tone and tonic come from two worlds commonly understood as different. Tone belongs to the physical world of sound, while the tonic belongs to the mental world of music. Picked as a "linguistically pleasant" term according to Reti, or one with a strategically encompassing form, tonality found the perfect context to be marketed as a music which was thought to be the only natural and logical product of its medium, the tone. At the same time this contradiction and vagueness in regard to its definition in its form of practice, and its signification in how it was advertised formed a double standard, in which tonal form could claim universality and naturality as well as being a high and serious cultural product of the mind originated in the West. Based on this double standard, tonality could be argued as: 1) a musical form communicating some high mental construct (invented by the composer) to other humans while detaching itself from the sensual world within an hegemonic context of valuing culture over nature, and 2) a musical form with universal basis based on a scientific dialectic due to its natural relation to physical properties of its medium. Thus, tonality dominated non-Western musical cultures within a hegemonic power relation context by claiming the West, a specific culture, to be the sole proprietor of a universal idea. Furthermore the definition of 'atonality' removed tonality from any further scrutiny.

One could argue that this issue is still an open discussion and tonality has really never been defined, but what is clear is that tonality as an economic instrument has been highly successful. As long as we keep using a successful paradigm, especially if it is hegemonic and dominating, avoidance of its definition helps the protection of it for those holding the instruments power. (refer to our discussion of exnomination on page 79).

3.4 Conclusions

Viewing tonality simply as a historical practice in a certain period of Western classical music misses the real technical issues in regard to the construction of the musical object, as well the economical and political issues in regard to the hegemonic power which tonality holds within the global market and social spheres all around the world. Tonality, other than being a historical phenomena, could also be a theory about how musical form is derived from the nature of the musical material. Riemann's explanation of tonality was based on the 'axiom of the chord'. The dialectic that Schoenberg used to argue against the exclusive reign of tonality was based on the concept of unity of form and material. He argued that the use of the construct of the chord as an axiom was too restrictive, and thus, he loosely used the harmonic material of the tone as the axiom of his system. The definition of 'atonality' was a partial implementation of this idea. The full implementation would have been to understand that no matter what axiom we pick as the basis to define a musical system through rational means, it can render itself too restrictive. The linear axiomatic definition of musical structures is based on the concept of music being a mental entity which is constructed and communicated based on, in Schoenberg's words, 'laws of human logic' to other humans. This model does not to take into account the agency of the listener, which may be the composer himself or herself. When Schoenberg says "Indeed, tonal is perhaps nothing else than what is understood *today* and atonal what will be understood in the *future*." (Schoenberg 1975, p. 283) he is not defining tonality based on the construction of the object, but he is defining it based on communication and understanding which should involve the listener as well.

Atonality challenged tonality as a tradition. The change in music and many other arts (Western or non-Western) in the 20th century shows that what happened was the application of this concept as a process to its own output. In other words, no matter what the outcome of the challenge was, we could challenge it again; meaning that once the outcome of the challenge, which is originally conceived as an atonal phenomena, is understood, it becomes tonal again, and therefore can be challenged or defied again. Thus, if we look at tonality as a historical practice in a certain period of the West, as it is commonly understood, atonality, as it is commonly understood becomes the first application of such a principle. However, if we look at atonality as a process, then the repeated application of it problematizes the concept of language in general.

Any pre-established form can be defined as a language upon which the musical message is inscribed. As mentioned above, in a classical definition of communication one needs some form of a metaphysical element which is agreed upon by both sides of the communication, upon which the logic of the communication is built. When we bring the listener into the equation of our definition, we need to accept a certain level of leniency in regards to where the metaphysical axioms of the system are located and the scale in which they are being perceived. For example, in the common-practice tonality, the concept of the chord is the metaphysical agreement between the two sides, and thus, the perceiver listens to the chords and the their progressions as formal functional elements. However, the communication happens in multiple scales of times, in other words, more complex objects such as key changes or phrases serve to convey the same musical information. Thus, the theme becomes a special object whose different manifestations is portrayed in various scales of time and frequency.

When we challenge the tradition we take away an agreement between the two sides of the communication, however, the innovation, which often is the reason for the challenging of tradition, needs to be aesthetically appealing enough to remedy the absence of the tradition. Thus, tradition and innovation come into tension with each other.

If tradition is taken as an agreement among the various sides of the communication, it becomes the element which can be predicted by the listener. Similarly, if innovation is taken as the novel idea in the context of the communication, it becomes the element with the unpredictable character. Anytime that any of these elements, either the tradition or the innovation, are pushed to their limits, the communication either breaks down or it becomes futile. In other words, if there is no innovation in the piece or a performance (be it in form of a musical idea, or the manner or character of the performance), there is little point to listen to it, and if the piece or the performance is all innovation with no tradition, which often act as the element facilitating comprehension, the music ends up sounding like noise to the listener. It is based on this principle which interesting pieces or performances to us seem to have a balance of novelty and predictability. This balance at times with repeated listening not only will not get any weaker, but also could become stronger and more engaging. This relationship between the novelty and predictability of a piece of music or performance comes from the presence and portrayal of a single element (in the case of classical tonality, the theme) in multiple scales of time and frequency. In other words, smaller time frames express the short term manifestation of the shape which help the listener predict the shape in larger scale of time; however, the larger development of the shape changes the context in which the shorter manifestation are portray enough so that the shorter manifestations find new characters in the mind of the listener. It is thus, that every listening of a piece of music could act as an introduction to further listening of the piece. In other words, since the listener could extract new meaning at any listening, the scale in which the piece is listened to can depend on the attention that the listener is giving to to the piece.

If a piece of music is to stand by its own; meaning that the piece would not need any textual explanation, which in turn could act as the transmission of the nature of the metaphysical axiom of the piece, the piece needs not only to define its metaphysical elements, but also to communicate the message which is based on the metaphysical elements to the listener at the same time. In other words, the piece not only communicates a message, but also the language in which the message it is being communicated. This context renders the location and the nature of the metaphysical elements of the communication to become ephemeral in relation to the perception of the various sides of the communication.

A repeated application of the concept of atonality would result in implementing the project which could have possibly been our first impression of the concept of unity of form and material, or in other words abandoning all metaphysics in the definition of the musical object. When we accept that form is derived from the physical characteristics of the material we imply a self-referential structure in characterizing the structure of the musical object—form organizes material but at the same time it is derived from its characteristics. This explanation of musical form would need to encompass the concept of common-practice tonality as well. Norton, borrowing form the words of Adorno defines tonality as follows:

> To comprehend tonality itself, not just to fit and register it in its system of reference, is nothing but to perceive the individual moment in its immanent connection with other moments. (Norton 1984, p. 12)

And in the footnote to this definition, he writes

> By virtue of my definition I regard all musics of all societies as tonal. Music in nonliterate societies may afford absolutely no theoretical speculation as to its creation, but unconscious decisions made against the chaos of pitch are no less important than conscious ones. (Norton 1984, p. 274)

Perceiving the individual moment in its immanent connection with other moments implies the abandoning of all metaphysical elements, because we can make a rational connection between all moments without the agency of any metaphysical elements. However, Norton questions the idea of defining Western tonality solely based on the physical characteristics of the tone. He writes:

> Certain phenomena within the Klang are indeed responsible for the historical development of the notion of consonance and dissonance and timbre, although probably not as responsible as some have wished and others have assumed. The world of musical tone is a durable one, but I do not believe that Western music has followed an inevitable historical development up through the overtone series: if it had, the course of that development would be other than what currently characterizes modern tonality in the form of equal temperament. (Norton 1984, p. 8)

Schoenberg as well, as we noted before, thought it to be "indefensible to try to derive everything that constitutes the physics of harmony from one of the components, say, just from the tone." (Schoenberg 1978, p. 19) Also, in regards to the equal tempered scale he thought that "... the tempered system, which is only an expedient for overcoming the difficulties of the material, has indeed only a limited similarity to nature." (Schoenberg 1978, p. 21)

Similar to many who characterize the equal tempered scale as 'un-natural', Schoenberg and Norton both miss the point that abandoning all metaphysical agencies is not a one-way attribute. When we attempt to explain the connection between the form and material we have to understand that form is derived from the material, but similarly form organizes and in some sense defines the material. The material of music is not the tone only. Material can be defined at any level in any form that we may wish. Especially in computer music where the harmonic relationship is no longer an essential constraint, the material of music could have formal elements in its definition in micro scales. Similarly, large scale structures which often are considered as formal elements, could turn into material in the context of such large structures becoming mechanized. What has to be understood is that musical from and material interpenerate each other in ways that make self-reference inevitable. Such a relationship between form and material defines music as a self-similar object in the mind of the perceiver. A simple manifestation of this is the concept of the theme—that the theme can be seen in the piece no matter in what time scale our perception would be at work. In other words the self-similarity defines a certain grid of scale independence as far as the objects of perception are concerned. In that regard the equal tempered scale satisfies this requirement of the self-similarity of the musical object. In other words, if we record a melody and play it twice as fast, we will hear the melody an octave higher in the same scale and twice as fast; however, if we play the melody 1.5 times faster, depending on the melody, most probably the melody will not match the scale of the original melody. However, if the original melody is in the equal tempered scale and if we play it $(\sqrt[12]{2})^7$ faster (which is the ratio of the interval of a perfect fifth in the equal tempered scale, approximately equal to 1.498307), no matter what the original melody was, all its notes will fall on the equal tempered scale again. Transposition of a melody is changing the time scale in which the tones are vibrating. In musical terms, within the equal tempered scale, no matter by what interval of the scale we transpose a melody, the newly formed melody will still fit the equal tempered scale. In other words the equal tempered scale is a context for any melody to be portrayed to our perception in multiple scales of time.

The function of a single theme (or multiple related ones) in a piece, whose various related shapes in various scales of time and frequency is perceived by the listener, acts as a unifying force to define a certain sense of unity in the mind of the perceiver. As such, the definition of the unity of the piece is defined not only by its physical construction but also by how and in what scale it is being perceived by the perceiver. Thus, even though the perceiver and composer (or the performer) may want to define a metaphysical element in the definition of the form, the presence of this metaphysical element does not play a part in the definition of the tonality which arises from the understanding achieved between both sides of the communication. A new definition for tonality which would not depend on metaphysical constructions and therefore, would neither be culture-bound, nor would it linguistically or philosophically oppose what one might expect from the common meanings of harmony and tonality could be as follows. However, to avoid confusion between when the word is used to signify the Western tonality and when it is used to signify its more general definition, I shall use the word *tonalité* for the more general one.

> *Tonalité* is a perceived self-referential relationship between the material and the form of a musical object which characterizes its unity.

Thus, this definition includes the perceiving mechanism of the observer in itself as well. Similarly, this definition does not separate the material from the form, or the form from the musical message. As such, form is not characterized with an essential quality having its own essence separate from the material which it organizes, or from the musical message, which is inscribed on it and is defined metaphysically as meaning. Western tonality has always been rationalized based on some essential element in the form of metaphysical construction (such as the axiom of the chord).

When we categorize music in our mind, we can create aggregates based on various parameters. For example, even though a composer or a performer may compose or perform different pieces, the specific agency of that individual in the various pieces creates a certain sense of unity in our mind among the pieces related to that individual. Furthermore, pieces composed and performed by different performers versed in a certain tradition also share a common sense of unity. In other words, in contrast to the Western construction of 'a piece of music', the concept of unity does not have to be restricted to just "a single piece of music". Unity is a perceived attribute composed of parts of a whole and the relationship among them, which we can call a structure. Thus, the concept of unity is related to the concept of structure. When we define music as a communicative unity whose definition is not restricted only to what we commonly understand as 'a piece of music', the author and the perceiver of it does not have to be what is commonly understood as a single individual. Note that the definition of the single individual and his or her cognitive capacity within an epistemological context which does not allow self-referential construct, has to be a metaphysical definition; hence the separation of mind and body. When we define form and material related to each other, we also define the perceiving mechanisms related to this entities to be related as well. As such, when we define a concept of unity which for example can be attained by the music of a certain tradition, the author of this unity is no longer a single individual but a society. In pages 33 to 35 in chapter 2 we discussed the logical possibility of existence of entities larger than single individuals who are capable of cognitive action. Humberto Maturana and Francisco Varela, two of the main scholars known as the founders of Constructivism, who have developed a theory of cognition based on mechanistic structures without the use of any metaphysical constructions in their definition, write:

> Our endeavor is to disclose the nature of the living organization. However, in our approach we make a starting point of the unitary character of a living system, and maintain that the evolutionary thought through its emphasis on diversity, reproduction and the species in order to explain the dynamics of change has obscured the necessity of looking at the autonomous nature of living unities for the understanding of the biological phenomenology. Also we think that the maintenance of identity and the invariance of defining relations in the living unities are at the base of all possible ontogenic and evolutionary transformation in biological systems, and this we intend to explore. Thus, our purpose is: to understand the organization of living systems in relation to their unitary character.
>
> Our approach will be mechanistic: no forces or principles will be adduced which are not found in the physical universe. (Maturana and Varela 1980, p. 75)

Through their definition they do not separate the cognition of single individual from the cognition of machines or the cognition of entities emerging from the union of single individuals, such as societies. Maturana writes:

> ... a particular self-referring system may have the circular organization of a living system or partake functionally of the circular organization of its components, or both. The society of bees (the honey producing bees) is an example of a third order self-referring system of this kind; it has a circular organization superimposed on the second order self-referring systems that are the bees, which in turn have a circular organization superimposed on the first order living systems that are the cells; all three systems with their domains

> of interactions are subordinated both to the maintenance of themselves and to the maintenance of the others. (Maturana and Varela 1980, p. 11)

As such, one can understand the concept of an author of a work, or a piece of music, to be a community or a society.

The removal of all metaphysical agencies from the logic which defines the source of the formal structures of a musical object (e.g., deriving tonality from its musical material) is an activity which develops in the same direction, and goes beyond the limits of the same inquiry in the literary domain. When such questions are inquired within textual domain, language itself, and especially the language used in the epistemology of the West becomes a barrier of investigation and that is why, as we discussed in chapter 2, Lévi-Strauss was not able to fit the origin of language within his model of unity of form and material. However, within the musical domain, the relationship between meaning and language can be inquired in both the micro- and macro-scales of formal elements.

One can present the work of Schoenberg in the same light that Derrida presents the work of Lévi-Strauss in his paper "Structure, Sign, and Play in the Discourse of the Human Sciences" (Derrida 1978b). Lévi-Strauss used the "musical model" for unifying the form of his work with the qualities found in his material. Derrida argues that this approach by Lévi-Strauss, whose material of study was the myth, and in which he problematized the dichotomy of the concepts of theorem and mythopoem, caused the concept of "center to appear mythological". (Derrida 1978b, p. 287) Similarly, for Schoenberg when he accepted the unity of form and material and thus broke the dichotomy of consonances and dissonances, the concept of the tonic as the center was no longer viable. Similar to the way that Derrida discusses the nostalgic view of Lévi-Strauss towards the center, Schoenberg as well was looking for some "centralizing power comparable to the gravitation exerted by the root" to act as the unifying force for pieces written in his newly formed twelve-tone method. (Schoenberg 1975, p. 86)

The work of Levi-Strauss, for which he specifically picks the musical model for unity of its form and content, can be described as an object whose internal logic is based on an axiomatic system, however, it is based on a "scandal" or "a contradiction". (Derrida 1978b, p. 283) Levi-Strauss classifies his own work as a mythopoem, but in fact his work is based and conducted according to the axiomatic model; it is only because he is not able to strictly classify his work as a theorem that he is pushed to classify it as a mythopoem. Thus, it is actually more correct to define his work as an undecidable proposition, rather than a mythopoem. Obviously music itself shows a lot more of such characteristics. In specific, tonality is argued as a rational axiomatic model of form in its connection to the harmonic tone, but its unity with the physical world (which itself is described axiomatically) epistemologically makes it an undecidable logical object the moment we attach meaning to it, or in other words accept it as an object of communication.

Lévi-Strauss was not able to discuss the origin of language in his model and was forced to accept that language "could only have been born in one fell swoop": (Derrida 1978b, p. 291) Within a musical context, even though we may accept a form of communication is at work, we do not expect signifiers to signify concrete elements, in the same way that words often do. As such, we are able to "play" with our signifiers in the musical domain within the domain of communication, in similar ways that the "play of substitution"(refer to the chapter 2 and Derrida's paper titled "Structure, Sign, and Play in the Discourse of Human Sciences" (Derrida 1978b)) is at work relating to multiple objects of meanings in the literary world. In simple terms, the play of substitution stops at word boundary or close to it within the literary domain; however, within the musical domain we are able to play with the definition of our content as much as our sense allows for their perception, in either micro or macro scales. When we say that a piece of music has to convey not only the message but also the language in which the message is inscribed, we are speaking about the birth of a musical language between the two sides of the communication. As such, music is no longer a distinct object which is transmitted from one side to the other, but music becomes an ephemeral entity which is born from the state of the relationship among the individuals participating in the musical activity. Thus, the nature of music as we understand it transforms from being a distinct object to one which is born in process of the perception of the relationship among the individuals involved, or into an activity which serves such an ephemeral object.

In *Musicking* (1998) Christopher Small defines music as a concept with "socially constructed meaning" and argues that understanding the evolution of such elements may not be as simple as a single layer of construction composed of conscious or unconscious memories and experiences. (Small 1998, p. 130) He argues that recent neurological research has shown that neural pathways which themselves are responsible for the construction of our conscious and unconscious mind are constructed through a process very similar to natural selection.[28] Small concludes that:

> Thus it is that the very way our brains develop physically depends on what we learn to value, and that the way in which they develop is irreversible.
> ...
> This means that what each of us holds to be reality is not objective or absolute but is, to use the sociologists' term, socially constructed. (Small 1998, p. 131)

Small uses the works of scholars known as Constructionists, such as Warren McCullogh, and especially Gregory Bateson to show that music is an act and not a thing and thus defines the verb *to music.* He writes:

> One of Bateson's fundamental intuitions is a denial of what is known as Cartesian dualism, the idea that the world is made up of two different and dimensions, and a location in space; and mind, which is indivisible, has no mass or dimensions and is located nowhere and everywhere. (Small 1998, p. 51)

The concept of self-referentiality plays a fundamental role in defining the basis for Constructivism, in which one may say, no metaphysical elements regarding cognition are introduced.

When we discuss music as an act, we are also disusing the cultural role that music plays in our societies. While in this work this aspect of music has not been studied directly, one can reach the cultural connotations in a musical context by a rigorous and uncompromising application of unity of form and material. Fredric Jameson writes:

> The moderns ... thought about the thing itself, substantively, in Utopian or essential fashion. Postmodernism is more formal in that sense, and more "distracted," as Benjamin might put it; it only clocks the variations themselves, and knows only too well that the contents are just more images. (Jameson 1991, p. ix)

As we saw in chapter 2, it can be shown that self-referentiality plays an important role in formation of the post-structuralist thought. One can argue that the application of

[28] The term coined is "neural Darwinism" in "Edelman, Gerald. 1992. *Bright Air, Brilliant Fire: On the Matter of the Mind.* London: allen Lane, Penguin Press."

the concept of unity of form and material in its full potential encompasses the concepts discussed under the rubric of Postmodernism as well.

Derrida argues that Lévi-Strauss picked the "musical model" of unity of form and material in order to avoid doing the violence of applying a centric model of epistemology to the acentric material of myth. (Derrida 1978b, p. 286) Such reasoning can be a definition for violence. The rational explanation of tonality can be thought as definition of logical and natural progression of sounds, in which tensions and resolutions are prepared and carried out in loyalty and without violence towards the tonic. The metaphysical element used in the definition of Western tonality is the construct of the chord and it is this construct which has culturally and economically dominated the popular and the high art all around the world.

Chapter 4

A Poetic View of the Radif as a Model for Computer Music

In this chapter I shall discuss some of the principles and tools which I have been using in my musical practice. I do not intend to prove any epistemological truth in the concepts being discussed in this chapter, other than explaining my own understanding and approach to the musical language I have used in the past few years. Chapter 2 on Western metaphysics and chapter 3 on Western tonality are the epistemological rationalizations of a number of concepts which led to development of the principles and building of the tools. One may say that limiting dependence on metaphysics through influences by the form of thought of Omar Khayyam has been one of the strongest elements in the evolution of my work. About 16 years ago I came across Douglas Hofstadter's *Gödel, Escher, Bach* (Hofstadter 1979), whose ideas I found to be a mathematically modern interpretations of the basic principles presented in the poetry of Omar Khayyam. The concept of self-referentiality could be viewed as the common theme in both works.

What is left as poetry by Omar Khayyam, based on different accounts, is a collection of 20 to 200 quatrains. It is not certain if all that is attributed to him are specifically his work or simply inspired by his thoughts. However, the single most elaborated concept repeated among all these poems is the definition of a certain form of human ontology which is not dependent on metaphysics; no definite single authoritative point, such as god or capital, plays a central role in these poems. As such, human physical existence and the mental world would have to be incorporated together. Note that this is not simply the removal of one side of existence, but a unification of the mind and the body. Within the musical domain this idea led me to equate 'sound' and 'music' as far their construction was concerned. The connotations of these principles have played important roles in my musical work and in the computer music tools I have built.

Music is often thought to be a metaphysical quality, and form is used as a template to facilitate the communication of this metaphysical entity to the listener. With computers we are able to define both form and material based on algorithms. The unity of form and material can be used in this paradigm by applying the same algorithm for defining the micro structures of sound all the way to the macro structures of form. Such a model defines the musical object as self-similar. Based on this realization, I devised a synthesis method, called *Recursive Granular Synthesis* or RGS, in which one would be able to use various forms of structures to create new sonic constructs. The assumption was that musical structures would then be inferred based on a selection process through listening. RGS is based on recursive rewriting rules similar to the Lindenmyer's L-System (Lindenmayer 1968).

The teaching and discourse on tonality both sonically and theoretically often insinuate the full unity of form and material, unless a metaphysical element is introduced as an atomic element or as a specific relation which separates form from the material. As such, in RGS I meant to consider the concept of tonality in its general sense (*tonalité* discussed on page 122) to be exactly what the word implied, rather than thinking of it as a system based on the construction of the chord (which should be called tonicality). I consider the computer as the main instrument of my electronic pieces. The unity of form and material not only aligns with the capability of computers in mechanizing the smallest structures of sound as well as the largest aspects of form, but also presents an interesting paradigm for considering machine intelligence. The view of treating the intelligence of machines in the same form as human intelligence can also be seen in F. Richard Moore's commentary on his vision of computer music tools and how he developed the *cmusic* synthesis program. Moore writes:

> Simply stated, computer music is the art of making music with digital computers. Because computers have no fixed function, their role in music-making processes varies greatly. To develop a coherent view of how computers can

> be applied to music, we begin with a bird's-eye-level examination of the processes that constitutes music. In this context it will be convenient to define a process as any agent or activity that transforms information from one form to another. This definition leaves open the possibility that the processor may alternatively be a machine, a human being, or some cooperative combination. (Moore 1990, p. 5)

The discourse used for legitimizing tonality was based on the scientific dialectic of continuity, in which tensions and resolutions in the music could be explained based on the physical construction of the sounds. Acoustic instruments have specific physical attributes which define a certain continuity in their sound and defines the timbre of the instrument. When we consider computer music, because of the fact that every sound parameter has to be defined to the computer, the algorithm which defines the sense of sonic continuity becomes an important factor in the definition of the sound of the instrument we are building with the computer. Much of the music theory and psychoacoustic research that is done in the West is based on Western ideas of music and one can argue that the tradition of Western tonality plays a fundamental role in defining the culture of such research. Similarly tools that are built for computer music are usually based on Western thought. The MIDI protocol and all the instruments which have been built around it are among the most prevailing examples of such developments. Thus, when one attempts to use the computer for a non-Western music, it becomes a difficult task not to appropriate or marginalize the non-Western tradition within the Western frame of mind.

In this chapter I shall explain my attempt at making electronic music that comes from the roots of Persian music. I shall explain my synthesis method RGS and how I adapted it to Persian music. I shall also discuss my real-time interactive computer music instrument, called *Lîla* (developed in Pure Data (Puckette 1996)), to be used for improvisation. Specifically within the context of Persian traditional music, I use this system to interact with acoustic musicians in the same form and through the same language that is implicitly defined in the core improvisation repertoire of Persian music, the Radif. I shall briefly discuss the Radif, my understanding of it, and how I have envisioned to apply computers to this musical language. This will be followed by a technical discussion of the design and functionality of the tools.

4.1 Persian Music

While Iran has many different types of regional musics, its urban music has been theorized and formalized based on a body of ancient melodies classified within an improvisational framework called the Radif.[1] Improvisation plays a fundamental structural role in this music. A musician needs to internalize all the melodic figures in the Radif and be able to improvise on them. Persian music is heavily influenced by Persian poetry to the point that one may say that the music is often subordinate to the meaning of the poetry. This matter can be an extensive subject of study by its own; however, I shall take a personal approach in describing my understanding of fundamental concepts in Persian poetry and the role of metaphysics in it and how such matters relate to Persian music.

4.1.1 Metaphysics in Persian Poetry

Poetry can possibly be called the most advanced and cherished art form in Iran. Poets such as Ferdowsi (10th century). Omar Khayyam (1048-1131 AD), Nezami (1141-1209 AD), Mowlana (1207-1273 AD, also known as Rumi in the West), Sa'adi (13th century), and Hafez (13th century) are known not only for the beauty and mastery of their language, but also for the philosophical, social, or mythical content which they present in their works. One can say philosophically Khayyam plays the most important role in Persian poetry in portraying the human thought and existence in a world without any metaphysical authority, which is often in tension with theological matters. In the 7th century, Persia was conquered by the Arabs and the invasion resulted in establishment of theocracy in Iran. The old Persian language became nearly extinct until Ferdowsi revived the language by his epic work *Shahnameh*, in which he gathered the old mythology of Iran in a poetical language. (Firdawsi 1987) One can argue that the tension between Islam and the old Persian culture has continued untill now and it plays an important role in defining the social and political developments of Iran up to this day. Thus, much of the aforementioned poetry in Iran has been written under the rule of religious regimes

[1] For various descriptions of the Radif see (Farhat 1990), (During 1991), and (Nettl 1987). For an in-depth discussion of the discourse on improvisation vs. composition in the last fifty years relating to Persian Classical (traditional) music, see (Nooshin 2003).

which have often been oppressive towards the Persian culture. Poetry has always been an instrument of social, political, and philosophical dissent in Iran. As such, the discourse on metaphysics has been a central element in defining Persian ontology.

Khayyam's message is simple but it is one with astronomical connotations. He is a materialist and views human to be what s/he is made of in physical terms; Thus, humans come from the soil of the earth and return to it and there is nothing metaphysical regarding our consciousness. He writes:

جامی است که عقل آفرین میزندش   صد بوسه ز مهر بر جبین میزندش
این کوزه گر دهر چنین جام لطیف   میسازد و باز بر زمین میزندش

Then said another — "Surely not in vain
My substance from the common Earth was ta'en,
That He who subtly wrought me into Shape
Should stamp me back to common Earth again."[2]

Khayyam is aware of the epistemological problems that such a view brings. Similar to many other philosophers who problematize the concept of knowledge, such as Socrates who said "The only true wisdom is knowing you know nothing"[3], Khayyam with all his scientific knowledge and accomplishments repeatedly points out that our understanding of our understanding is an ephemeral image, and that the only central point to our understanding is the realization of the self-referential space in which our consciousness operates.

یك چند به کودکی به استاد شدیم   یك چند به استادی خود شاد شدیم
پایان سخن شنو که ما را چه رسید   از خاك بر امدیم و بر باد شدیم

With them the Seed of Wisdom did I sow,
And with my own hand labour'd it to grow:
And this was all the Harvest that I reap'd—
"I came like Water, and like Wind I go".

[2]All translations of quatrains by Omar Khayyam are by Edward Fitzgerald in *The Rubaiyat of Omar Khayyam* (Khayyam 1970) unless noted otherwise. Note that most often what Fitzgerald wrote were not direct translations but verses inspired by the poetry Omar Khayyam.

[3]http://www.quoteland.com/quotes/author/436.html

As such, the temporality of life takes a more fundamental role than what we understand—meaning that in his rationality the concept of life is more fundamental than the concept of existence. He writes:

آنان که اسیر عقل و تمیز شدند　　در حسرت هست و نیست ناچیز شدند
رو با خبرا تو آب انگور گزین　　کین بیخبران بغوره مویز شدند

Slaves turning the millstone of fact and mind
Perish in dead ends of a blind quest
Open your eyes and reach for the wine
For the ignorant just turns from green to gray.[4]

'Wine' is an ubiquitous symbol found in much of the classical and modern poetry of Iran. The word 'wine' does not necessarily signify a single specific element. In the above poem the word 'wine' is used twice. In the third line, Khayyam is suggesting the choice of wine to represent one's passion as a way of life. The literal translation of the forth line would be: "For the ignorant turns into raisins directly after being unripe grapes."In this line 'wine' symbolizes life in which those who become slave of objectivity and specificity do not experience the real process of life to become wine, in other words they turn into raisins, right after their youth as unripe grapes.

The use of 'wine' as a symbol is also a reaction to the rule of religion. Alcohol is forbidden as a drink in Islam. Thus, 'wine' and its intoxication symbolizes the state of resistance and freedom. Thus, Khayyam neither believes in the religious story of genesis, nor does he subscribe to the principle of scientific objectivity. He writes:

قومی متفکرند در مذهب و دین　　جمی متحیرند در شك و یقین
ناگاه برآورد منادی زکمین　　کای بیخبران راه نه آنست و نه این

Some marched to drums of rule and religion
Some swayed in winds of certitude and doubt
A herald appeared suddenly and cried
Fools! Neither this nor that is the way![5]

[4] Translation by Bijan Mottahedeh.

[5] Ibid.

Khayyam understands that with such a view understanding life and existence is a never ending process, and the following can perhaps be his reply to the ultimate question of science. He writes:

اسرار ازل را نه تو داني ونه من   وین حرف معمّا نه تو دانی ونه من
هست از پس پرده گفتگوی من وتو   چون پرده بر افتد، نه تو مانی ونه من

The secrets of eternity, neither will you know nor I
Words of this puzzle, neither will you know nor I
There is a talk about us behind the veil
Once the veil falls, there will be no more you nor I.[6]

In almost all Khayyam's words one can find a dialogue which often becomes more important than the content, because based on his ontology, there exists no content; thus, when we know neither of us will exist, we become more important to each other than any essential truth or grand narrative. What Khayyam reiterates is the circularity of life and the connotations of self-referentiality of the concept of knowledge and existence. The following is one of the most direct explanations of self-referentiality in his language:

خیام اگر ز باده مستی خوش باش   با ماه رخی اگر نشستی خوش باش
چون عاقبت کار جهان نیستی است   انگار که نیستی چو هستی خوش باش

Khayyam, drunk on this wine, delight
In company of the beautiful beloved, delight
since in the end there is but nothing
It is as if you are not, but since you are, delight.[7]

[6]My translarion. Fitzgerald's is as follows:

There was a Door to which I found no Key:
There was a Veil past which I could not see:
Some little Talk awhile of ME and THEE
There seemed — and then no more of THEE and ME.

[7]Translation by Bijan Mottahedeh. Fitzgerald's is as follows:

And if the Wine you drink, the Lip you press,
End in the Nothing all Things end in — Yes —
Then fancy while Thou art, Thou art but what
Thou Shalt be — Nothing — Thou shalt not be less. (Khayyam 1970)

'Wine' and drunkenness are among the many symbols which could be interpreted based on the frame of reference of the reader. Wine becomes the passion for god for the religious, love for the romantic, or just a glass of wine for the realist. The beloved who becomes the ultimate reason for life, is "the other"—god for the religious, the beloved for the romantic, etc. The third verse presents the logic of self-referentiality in looking for sources and endings of the universe. He says: because the end of the world, by definition as it is the end, has to be nothingness—meaning that not even history, time, or space would exist—the current existence bears no truth either—in other words, at that time, since there is no history, the present would not exist either; thus, logically we do not exist, if there is to be an end. The last verse brings us back to reality and reaffirms that logic is not the end of understanding—the communication proves that we do exist, so let's be happy. In other words, let's coexist.

While much of the conclusions of abolition of metaphysics in Persian culture are similar to those found in poststructuralism, the ontology based on coexistence with the other, which eventually becomes based on the concept of "love", is in contrast to the Western approach to individualism, where the individual becomes the center of the universe with the right to exploit "the other", especially within the social Darwinian model. (Darwin 1970, 16)

Generally, it has been accepted that Khayyam did not seem to have had a happy outlook himself. One can argue that, Khayyam, similar to Lévi-Strauss, had realized the loss of the center within scientific epistemology, and, as Derrida characterized the approach of Lévi-Strauss (Derrida 1978b, p. 292), Khayyam as well had a "nostalgic" and "saddened" perspective of life.

Sadegh Hedayat, whom Abbas Milani (borrowing from George Lukacs) calls one of the main Persian authors belonging to the traditions of "tragic vision" (Milani 2004, p. 92), wrote a profound commentary on poems and views of Omar Khayyam.[8] All throughout his book, Hedayat points out the materialism of Khayyam and the absence of metaphysics in Khayyam's work. Hedayat writes:

[8]He actually wrote two different commentaries on Khayyam, one towards the beginning of his life as a writer and the other towards the end. The different approaches to Khayyam in these two works is a commentary on the development of Hedayat himself. What is quoted above is from his second book on Khayyam.

> Khayyam with a materialist and scientific logic does not see himself as the center of universe [*Jam-e Jam*, the cup of king Jamshid in which all future could be seen]. His own birth and death are as unimportant as the existence and death of a fly. [He quotes from Khayyam:] (Hedayat 1963)
>
> آمد شدن تو اندرین عالم چیست؟   آمد مگسی پدید و نا پیدا شد
>
> What is the coming of you into this world?
> There came a fly and disappeared.

One can argue that similar to the way that Derrida proposes a "Nietzschean *affirmation*, that is the joyous affirmation of the play of the world and of the innocence of becoming, the affirmation of a world of signs without fault, without truth, and without origin which is offered to an active interpretation" (Derrida 1978b, p. 292), the philosophy of Khayyam finds passionate expressions in the words of Molawi (Rumi), and utterly "joyous affirmations of the play of the world of the innocence of becoming" in the words of Hafez. However, their approach is still full of thought and rigor, and their search is for the truth. Even though their methods may not be epistemologically favorable, the content of their poetry and their subject of study is not far from that of epistemology. Molawi (Rumi) writes: (Rumi 1991, p. 590)

> از جمادی مردم و نامی شدم   وز نما مردم بحیوان بر زدم
> مردم از حیوانی و آدم شدم   پس چه ترسم کی ز مردن کم شدم
> حملهٔ دیگر بمیرم از بشر   تا بر آرم از ملایك بال و پر
>
> From mineral I passed to plant
> And from plant onto animal
> Animal passed and I was man
> So what to fear when death is never less?
> Next I will leave this human behind
> Lifted to heavens with sacred wings.[9]

Molawi's words, which are similar to words of Darwin (but uttered about 600 years earlier), are based on Khayyam's approach to metaphysics. In *The Essential Rumi*, Coleman Barks writes:

[9]Translation by Bijan Mottahedeh.

> The movement from mineral to plant to animal to human and beyond is often mentioned in Rumi's poetry. The successive "deaths" that are gone through as the soul ascends returning to God do not involve a severing from a lower form and a release into a higher. Rather, each stage is incorporated in the next. In this section [On Evolving] the pronouns widen out to the most inclusive model of identity I know of, from Jelaluddin to the surf and the evening breeze and the night sky to the ultimate *you*. This progression cannot be spoken, and yet Rumi calls into the cosmos, "Say I am you." (Rumi 1995, p. 268)

Khayyam's philosophy not only covers the concept of evolution among animate objects, but it also covers a continuous connection between alive and inanimate objects. In his commentary on the lawlessness and objective-lessness of the universe, Nietzsche writes:

> When you know that here there is no design, you know also that there is no chance: for it is only where there is a world of design that the word "chance" has a meaning. Let us be on our guard against saying that death is contrary to life. The living is only a species of dead being, and a very rare species. (Nietzsche 1960, p. 152-3)

The issue of form and material within art in which a metaphysical entity is considered to be born from the sensual, or in other words lifeless material, can be understood through their self-referential relationship under Khayyam's metaphysic-less approach.

With Hafez, the thoughts of Khayyam have found, one may say, eternal beauty. About Hafez, Michael Hillman writes:

> Then came Hafez, the most popular lyric poet in the Persian language and [Forough] Farrokhzad's [one of the most important modern poets of Iran] favorite traditional author. Hafez combined the aphoristic skepticism of the Khayyamic quatrain, the spiritual integrity and intensity of Rumi, and the stylistic genius of Sa'di in perfecting the ambivalent ghazal, which shimmers with concomitant physical and metaphysical facets. Hafez's Divan remains perhaps the most owned book in Iran after the Koran, and he is still the Iranian poet's poet, even for the most thoroughgoing modernists. (Hillman 1987, p. 19)

Nietzsche calls the "will to *immortalize*" of Hafez, "happily mocking". (Nietzsche 1977, p. 134) Hafez is one of the most difficult Persian poets to be place in a specific philosophical framework; yet his view of life, especially his rendition of Khayyam's ontological views, is the strongest frame of reference for so may people who hold so many different views, such as scholars, conservatives, liberals, artists, religious, atheists, etc. Dr. Jafar Mahjub believed that Hafez went through five different phases in his life, namely young and bohemian, religious, Sufi, Mithraist, and finally Khayyamic materialist which comes towards the end of his life.[10] The following quotes by Hafez are believed to be from his last period of life. However, in almost all his poems he portrays the instability of life, a state similar to what is attributed to the postmodern condition, in a world which does not subscribe to duality. His approach, however one may say, is always positive. Hafez left a single book which is mostly composed of his *ghazal*s. Almost all editions of it (except that of Shamloo) start with the *ghazal* containing the following lines:

الا یا ایها السّاقی ادر کأساً و ناولها
که عشق آسان نمود اول ولی افتاد مشکلها
...
به می سجاده رنگین کن گرت پیر مغان گوید
که سالك بی خبر نبود ز راه و رسم منزلها
...
مرا در منزل جانان چه امن عیش چون هر دم
جرس فریاد میدارد که بر بندید محملها
شب تاریك و بیم موج و گردابی چنین هائل
کجا دانند حال ما سبکباران ساحلها

ARISE, oh Cup-bearer, rise! and bring
To lips that are thirsting the bowl they praise,
For it seemed that love was an easy thing,
But my feet have fallen on difficult ways.

Hear the Tavern-keeper who counsels you:
"With wine, with red wine your prayer carpet dye!"
There was never a traveler like him but knew
The ways of the road and the hostelry.

Where shall I rest, when the still night through,
Beyond thy gateway, oh Heart of my heart,
The bells of the camels lament and cry:
Bind up thy burden again and depart!

The waves run high, night is clouded with fears,

[10]Notes from Dr. Mahjub's Paris lectures in April 1988.

And eddying whirlpools clash and roar;
How shall my drowning voice strike their ears
Whose light-freighted vessels have reached the shore? (Hafez 1995, p. 63)

Unlike Western philosophy, in which the individual is the center of all discourse, for Hafez the relationship with "the other", the love (whose form can be interpreted based on the frame of reference of the reader) becomes the starting point. He knows that the path is not easy. The literal translation of what Gertrude Bell in the above translations refers to as the "Tavern-keeper", would be the "Magian old seer", which is perhaps one of the highest spiritual positions in Persian classical poetry.[11] To pour wine (a forbidden element in Islam) on the prayer carpet is to throw away the dualism that comes with religion or science, and the "traveler" is the one experiencing, as Derrida might say, the "innocence of becoming". Hafez knows that with such an approach, there is no stable place to rest; life is more like traveling by a caravan where the "bells of camels" constantly tell you that it is time to move again, or it is like traveling in a ship in a sea where "eddying whirlpools clash and roar".

The Khayyamic materialist approach allows Hafez to declare that all that we see are images and there is really nothing which we can essentially point to as substance. The only state that can be understood is the state of intoxication, which is the state in contrast to the religious or scientific righteousness. He writes:

حاصل کارگه کون و مکان این همه نیست
باده پیش آر که اسباب جهان این همه نیست

WHAT is wrought in the forge of the living and life —

[11]The word "magic" can be considered as the condescending term for metaphysics. Magic is understood as an element which seems to be supernatural but it is assumed that there must be rational explanation for what seems to be supernatural. Magicians are understood to be skilled performers and entertainers, or charlatans. The Merriam-Webster dictionary defines the etymology of the word "magic" as follows:

> Etymology: Middle English *magique*, from Middle French, from Latin *magice*, from Greek *magikE*, feminine of *magikos* Magian, magical, from *magos* magus, sorcerer, of Iranian origin; akin to Old Persian *magus* sorcerer
> Date: 14th century

It is interesting to note that the sign for one of the highest spiritual positions of Persian poetry, the "Magian old seer", who Hafez accepts as mentor and master, is transformed in the West as a denigrating term. One can speculate that the transformation came about through cultural hegemony of the West towards the metaphysical principles of the Persian culture.

All things are nought! Ho! fill me the bowl,
For nought is the gear of the world and the strife! (Hafez 1995, p. 93)

As such, he sees the creation of humans as an aesthetical act when angels take the clay as the material and mix it with wine in the cup.

دوش دیدم که ملایک در میخانه زدند
گل آدم بسرشتند و به پیمانه زدند

LAST night I dreamed that angels stood without
The tavern door, and knocked in vain, and wept;
They took the clay of Adam, and, methought,
Moulded a cup therewith while all men slept. (Hafez 1995, p. 129)

Hafez is also known for his confidence in the content and form of what he was writing, or in other words, in what he was saying and how he was saying it. If one is not aware of the fact that Hafez holds the highest position an artist could hold in Iran, or for that matter for those who have managed to read him enough, one may find his words arrogant, but he knows that his words talk of the deepest matters of philosophy in most beautiful poetic language.

کس چو حافظ نکشید از رخ اندیشه نقاب
تا سر زلف سخن را به قلم شانه زدند

Yet since the earliest time that man has sought
To comb the locks of Speech, his goodly bride,
Not one, like Hafiz, from the face of Thought
Has torn the veil of Ignorance aside. (Hafez 1995, p. 129)

It is hard to know much about Hafez himself as a person from his words; however, one can make comments about his approach to knowledge and ways of life. Dariush Ashouri, the well respected philosopher and critical theorist of Iran, points out in *Mysticism and Rendy in Poetry of Hafez*, that the adjective of *rend* and the concept of *rendy* has been used by Hafez more than any other Persian poet. Hafez writes:

تا ز میخانه و می نام و نشان خواهد بود
سر ما خاك در پیر مغان خواهد بود

...

بر سر تربت ما چون گذری همّت خواه

که زیارتگه رندان جهان خواهد بود

As long as wine flows
and the tavern stands

My head shall be dust
at the elder Magian's doorstep.

...

When you cross
this mound of earth, my home
ask for a blessing

That soil will be shrine
to the keen eyed [*rends*] of the world.[12]

Of course, Hafez is being a *rend* himself here, where on the one hand he accepts to be "the dust at the elder Magian's doorstep", but on the other hand he predicts that his tomb will be the "shrine" for the pilgrimage of the *rends* of the world. Today, seven hundred years later, he could not have been more accurate on this point. One may argue that *rendy* is a concept which cannot be explained within Western epistemological bounds, perhaps because it transcends such limits. Ashouri writes:

> Even though the scientific metaphysical systems claim to have penetrated and illuminated the deep truth about existence, they are paralyzed when it comes to the most important puzzle, the question of life, upon which they want to have an objective look "from outside" and solve the puzzle under the rubric of scientific logic. This is so because one cannot look at life in its "humanistic" terms from outside; one should live it. However, the *rend*-like view towards life in the current of living, with all its turns, twists, and independent existence [*etab*], experiences life in a thousand arena, from many different view points, and it knows "that no one has and no one will solve this puzzle through wisdom (philosophy)."
>
> The *rend*-like poetic view, which in the arena of experience of life is intertwined with the depth of the puzzle of life, does not look for reasons for its "findings"; in the world of science it does not speak in length but tells its story in the poetic language of hints and allusions and asks its reader to become one with its view and outlook. However, this view and outlook

[12]Translation by Bijan Mottahedeh; Original in (Hafez 1994, p. 279).

> is not stable because life experience is not a homogeneous and stable phenomenon and at any age or mood brings a different world and a different view.[13] (Ashouri 2000, p. 302)

In the above quote when he says that "no one has and no one will solve this puzzle through wisdom", Ashouri is quoting the the following line by Hafez:

حدیث مطرب و می گوی و راز دهر کمتر جوی
که کس نگشود و نگشاید به حکمت این معما را

Tell us more of minstrels and wine
And let us leave mysteries of universe behind
For no one did or ever will
Unlock this secret with wisdom alone[14]

Thus, Hafez may be suggesting that the aesthetical, intoxicating, and musical approach to the universe seems to be more fruitful than a logical or epistemological one. Ashouri finally concludes that:

> What we have discussed of the "*rend*" based on imagination of Hafez, is a highest design of a model or an ideal, which just like any other idealistic model can only be found in the world of ideas, and thus, no one, including Shams-al Din Mohammad Hafez himself, is perfectly in tune with it. The "*rend*" of Hafez is a design of a "perfect human", and thus, it is a model for everybody, and no one.[15] (Ashouri 2000, p. 303)

The concept of *rend* can be compared to what postmodernism defines humans to be—adaptable to changing situations without a fixed center of reference. Compare the following line by Hafez to the circles of Derrida which we discussed in section 2.3 with figures 2.1 to 2.3.

عاقلان نقطۀ پرگار وجودند ولی
عشق داند که در این دایره سرگردانند

The learned are center to the compass of Being
But Love knows they are drifters in a circle[16]

[13] My translation.

[14] Translation by Bijan Mottahedeh.

[15] My translation.

[16] Translation by Bijan Mottahedeh.

Even though the content of Persian classical poetry, especially those based on the Khayyamic materialist approach, accommodated a view without a center, the form of the poetry prior to the birth of the new form in the 20th century still followed an old metric system. There are different poetic forms in Persian poetry; however, in all the classical poetic forms various rhyming words and rhythmical structures define formal symmetrical frameworks which act as the music of the poem.

In early 20th century, in a movement mostly attributed to Nima, a very fundamental change happened in Persian poetry. In *Recasting Persian Poetry*, Karimi-Hakkak points out that this movement was ultimately "collective and communal". (Karimi-Hakkak 1995, p. ix) Karimi-Hakkak writes:

> ..., I begin my examination of the process of modernity in Persian poetry with a simple assumption: the desire to be modern must be sought in the specific rhetorical posture, the semantic and lexical spheres of the words, and in a plethora of other units and elements that make up the system of poetic communication in a specific culture. (Karimi-Hakkak 1995, p. 6)

One of the main objects of study of Karimi-Hakkak is the change in the system of signification in Persian poetry through the process of modernity. In regard to the formal elements, Karimi-Hakkak argues that Nima thought the "artificiality of Persian classical poetry" of his days was due to the fact that poetry "had evolved in close association with Iranian music". (Karimi-Hakkak 1995, p. 247) Karimi-Hakkak points out that Nima's departure from the classical form was not a radical move; however, his departure broke the basic barrier for a new form of poetry to evolve. Karimi-Hakkak writes:

> The system of poetic signification Nima devised was not uniform in its degree of departure from the classical system or from the traditional practice based on it. The metric system he adopted in approximately half of his poems, mostly written in the last two decades of his life, differed little from that evolved through the classical tradition. The single most important modification he made in that system was to discard the uniform number of feet which had been a feature of classical Persian poetry almost from the beginning. The exaggerated prominence this aspect of Nima's innovations has achieved stems not so much from the poet's own estimation of its importance as from the fact that it broke the most obvious barrier in the popular perception of the difference between old and new Persian poetry. (Karimi-Hakkak 1995, p. 248)

Generally speaking, the structural change introduced in Persian modern poetry could be compared to the structural change atonality introduced in Western music, especially if we look at tonality in its general terms and look at both new systems as recursive applications of oppositional forces towards traditional forms. What Nima did to the form of Persian poetry is similar to how Schoenberg diverted his attention from tonality. Schoenberg acted against only one parameter of the tonal form and did not touch other parameters such as rhythm; however, he provided the ground for others to break all other parameters. Such evolution can also be seen in how the new Persian poetry was born. However, one should note that eventually the strongest element of change came within the system of signification in the poetry and the manner that social and political content was conveyed. Karimi writes:

> The pervading presence of the social structure in and through the literary text eventually became the defining characteristic of modernism in Persian poetry in the minds of Nima's immediate readers, a social group willing to experiment; with the ideas spread throughout Nima's writing. (Karimi-Hakkak 1995, p. 249)

Even though the system of signification of the old poetry changed drastically one could argue that the Khayyamic materialistic view is still alive among many of the modern poets. In *Seday-e Paye Ab*, perhaps his most famous poem, Sohrab Sepehri (1928-1979) writes:

اهل کاشانم
نسبم شاید برسد
به گیاهی در هند، به سفالینه ای از خاک «سیلک»

I come from Kashan,
My lineage reaches perhaps
To a plant in India, or a clay pot from the soil of "Sialk"[17]

Ahmad Shamloo (1928-2000), one of the most important contemporary poets of Iran, writes:

« - جهان را که آفرید؟ »

[17] My translation. Original in (Sepehri 1989, p. 274). Sialk is a city close to Kashan in which inscribed clay tablets dating back to the late 3rd and early 2nd millennium BC have been found. Some of these artifacts are in the Louvre Museum in Paris and the archaeological museum in Tehran.

« - جهان را؟
من
آفریدم!
به جز آن که منش انگشتان معجزه گر باشد
که را توان آفرینش این هست؟

جهان را
من افریدم. »

" — Who created the universe?"

" — The universe?
I,
I created the universe
who else except me, with these miraculous fingers
was capable of it?

The universe,
I created it.[18]

He does not accept a metaphysical creator; however, thus, his definition of the self cannot have an atomic form. He ends the poem with the following verses:

مرا بر آسمان و زمین
قرار
نیست
چرکه مرا
منیّتی در کار نیست:
نه منم من.

I cannot rest,
neither on earth,
nor in the heavens

because there is no selfhood in me:
I am not *the self*.

[18] Original in (Shamloo 1992, p. 37).

Forough Farrokhzad's (1935-1967) third book, *Ossyan* (Revolt), could be considered the turning point in her ontological view of life. In the poem, *Ossyan-e Bandegy*, she writes:

از چه میاندیشم اینسان روز و شب خاموش؟
دانهٔ اندیشه را در من که افشانده است؟

Why do I think silently day and night?
Who sowed the seed of thought in me?[19]

In this poem, Farrokhzad is talking to god and presenting the case of the devil who has pleaded to Farrokhzad for understanding. To god she says:

ترس ترسان در پی آن پاسخ مرموز
سر نهادم در رهی تاریك و پیچاپیچ
سایه افکندی بر آن «پایان» و دانستم
پای تا سر هیچ هستم، هیچ هستم، هیچ

Fearful in search of that enigmatic reply
I headed down a dark meandering road
You casted a shadow on that "End" and I knew
Head to toe I am nothing, I am nothing, nothing[20]

Hillman thought that "Khayyamic quatrains were Farrokhzad's second favorite, traditional Persian literary works." (Hillman 1987, p. 18). The last two books of Farrokhzad, *Another Birth* and *Let us Believe in the Beginning of the Cold Season*, are among the most philosophically deep and socially aware pieces in Persian literature. About "Green Delusion", one of the poems of *Another birth*, Hillman writes:

> The speaker in "Green Delusion" has doubts, questions, and twinges of regrets as to roads not taken and more conventional and acceptable roles rejected. She recognizes, in addition, that nature can no longer be a comforting idyllic force in her life, that she is far beyond being able to seek refuge in comfortable maternal and domestic female roles, and that her steadfast search for life's meaning has cost her, as well, the comfort of religious

[19] Translation by Bijan Mottahedeh. Original in (Farrokhzad 1989, p. 195).

[20] Ibid. Original in (Farrokhzad 1989, p. 196).

> faith. In essence, the speaker voices those Khayyamic dilemmas, moods and views which FitzGerald's character entertains during the day depicted in The Rubaiyat of Omar Khayyam. That quintessential Saljuq and Victorian individual likewise saw that natural 'wilderness' cannot be transformed into a 'paradise.' The fact of mortality and the realization of the capriciousness of fate make prolonged enjoyment of nature almost impossible. Moreover, religion and science could provide neither adequate answers nor adequate comfort. Ultimately, FitzGerald's Khayyam had to rely on himself and make the best of a bad bargain struck at creation or birth. (Hillman 1987, p. 103-104)

One of the effects of the poststructuralist discourse is the dismantling of the dividing line between high art and popular art. One can argue that Persian poetry has evolved without such a dividing line for at least 1000 years. The relatively rapid acceptance of the new poetry in Iran by the masses should be the sign of presence of a certain ontology, which is in tune with the process and the concepts of modernity. I understand this element to be the Khayyamic materialism which one can argue shares and perhaps supersedes the fundamental concepts discussed in poststructuralism. In his book *Lost Wisdom: Rethinking Persian Modernity*, Abbas Milani studies the roots of modernity in the West and in Iran, and the connection between them. About his book, he writes:

> Some twenty-five hundred years ago, when Herodotus was writing his Histories, Iran, or Persia as it was called then, was the West's ultimate other. Today, that otherness has once again reared its divisive head. A central theme of the essays in this collection is that Iran and the West have more in common than in difference. The crucial link of their unity is their common, albeit historically disparate, quest for human ideals like democracy and freedom.
>
> The other connective thread of the articles is a radical reappraisal of Iran's experience with modernity. I propose that we heed Descartes call to skepticism, and doubt much of what has been accepted as gospel in the nature and historiography of modernity in general, and of Iranian modernity in particular. (Milani 2004, p. 7)

One of the main issues this work has problematized is the model in which it has been written. In chapter 2 I briefly discussed Western metaphysics and the recent Poststructuralist approach in which, based on the work of Jacques Derrida, the separation of the concepts of philosopheme and mythopoem comes under question. Accordingly, the practice of epistemology, which engulfs this text as well, was discussed and in some sense questioned in its most fundamental level. One can argue that in the system of signification in Persian poetry the separation between philosopheme and mythopoem is not as clear or even recognized compared to this difference within the Western metaphysics and epistemology. The unification of philosophy and poetry based on the signification of the word 'poetry' in the West creates epistemological problems mainly because due to the ambiguity introduced with the concept of mythopoem, signs no longer signify specific elements. However, both the dialectic of poststructuralism and the application of the concept of unity of form and material require us to think of the sign not as an essential element but as an infinitely detailed structural element. Such a requirement renders any signifier to become ambiguous in its relation to the signified. In the following section we shall present a study of the effects of such ambiguity on Persian music and especially on improvisation in the system of Radif.

4.1.2 The Radif

The Radif is a framework for improvisation and it is mostly based on a collection of vocal melodies. The organization of this framework in today's practice can safely be attributed to the Farahani family. Improvisation is one of the most important tenets of Persian traditional music. Improvisation in this music involves many rules and the musician needs to learn and internalize the complete body of the ancient melodies. This complete repertoire together with its hierarchical classifications and functional definitions of its melodies is called the *Radif*.

As I discussed in chapter 3, when musical systems are formalized or rationalized, metaphysical arguments are needed to define atomic elements upon which the construction of other musical objects are explained. However, if we are to accept the unity of form and material, such atomic objects can no longer exist. In Western tonal music, and one can argue in almost all other Western music, specific elements such as 'notes', 'scales', or 'chords' are defined specifically, upon which the other musical objects are constructed. In other words, the defined objects act as principles, and based on the principles the rest of the elements are generated axiomatically. As long as the principles are kept intact, the music can go outward with no specific bounds. Figure 4.1 is a simple representation of such a model. In this section I shall present a rationalization of the

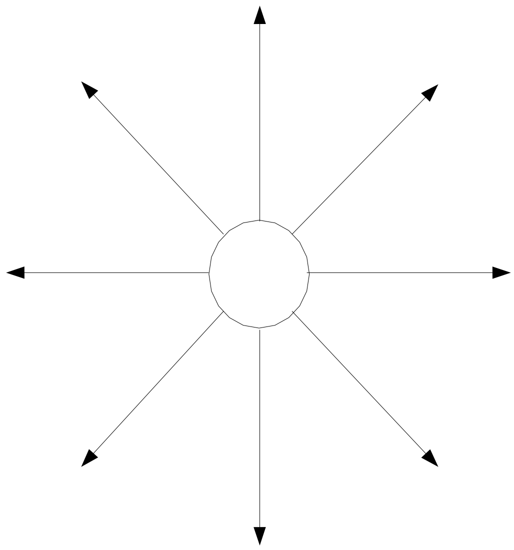


Figure 4.1: A model for axiomatically defined music

Radif and its musical language, in which atomic elements are not specified as distinct objects, but as elements whose definitions are aesthetically negotiable among the various sides of the musical communication.

Radif has a hierarchy of elements. In its most macro level, there are 7 *dastgâh*s and 5 *Âvâz*es. *Âvâz* is a unit similar to the *dastgâh* and enjoys similar musical status; however, it is usually understood that an *âvâz* is a derivative of a *dastgâh*. The *dastgâh*s and *âvâz*es of the Radif are as follows:

- Dastgâh Shour,
  *Âvâz*es derived from Shour are:
  - Âvâz Abuatâ, Âvâz Bayâte-Tork, Âvâz Afshâri, Âvâz Dashti
- Dastgâh Mâhour
- Dastgâh Homâyoun
  - Âvâz Esfahân (derived from Dastgâh Homâyoun)
- Dastgâh Segâh
- Dastgâh Châhârgâh
- Dastgâh Navâ
- Dastgâh Râstpanjgâh,

Often in different times, especially in cadences or section endings, melodic figures and the mood of an *âvâz* indicates its connection to the *dastgâh*, from which it is derived, by entering the *space* (*fazâ*) of that *dastgâh*. Thus, every one of these elements carry with it a historically evolved *space* which isk aesthetically negotiable. One can argue that *âvâz*es are more emotionally charged, while the *dastgâh*s are more elaborate in their structure.

Such a structural organization at the top level repeats within every *dastgâh* or *âvâz*. Every *dastgâh* or *âvâz* is composed of a number of primary and secondary melodic structures (called *goushé*, literally translated as 'corner', representing a little piece of a whole). The primary *goushé*s often have a very distinct *space*, and while the secondary *goushé*s all have their identifiable character, they operate within the *space* of the primary *goushé*s. Primary *goushé*s have unique modes with defined pitch boundaries. *Goushé*s can vary greatly in length and structural complexity. According to various accounts there are between 200 to 400 *goushé*s in the Radif. (During 1991, p. 61) The Radif of Mousa Ma'roufi lists 369 *goushé*s. (Maroufi 1973) Various *goushé*s from different *dastgâh* could share common *space*s with each other; thus, such *goushé*s are used as bridges for going from one *dastgâh* to another in an improvisation. However, it is important to note, that the musical rendition of this concept is aesthetically and technically quite difficult, and therefore, it is only tried by those who technically have mastered all the elements and musically have understood the interconnecting *space*s. The interconnection among the *goushé*s of the Radif is such that, with enough technical and aesthetical mastery, it is possible to start from one *goushé* and traverse all other *goushé*s and still respect the implicit logical rules which define the musical progression of the Radif. The word Radif literally means sequence. In other words, the Radif defines sequences of elements that can be connected to each other to construct a musical object, and thus, it guarantees a certain level of structural integrity in the object.

Structurally a *goushé* is defined with a central note called the *shâhead* (literally translated as 'witness') which can be considered as the tonal center of the *goushé*.[21] Other elements such as ending note (*Îst*) and ornamental figures can also play important structural roles. Specific ornamental figures often become characteristics of groups of

[21] The word 'tonal' is used here in its general meaning and not its specific meaning used in the common-practice Western tonality.

*goushé*s within a *dastgâh* or *âvâz*.

The concept of *space* applies to both macro and micro elements. As such, one can argue that Persian music itself has a certain *space*, whose boundaries are only challenged by a very close connection to the roots of this music. In other words, the improviser always has the ability to improvise over internal elements of a structural organization, but if one attempts to step out of a certain *space*, it should be in connection to the internal elements. As such, the traversing of the *space* between various elements need to follow a certain musical and aesthetical logic. No element is exactly defined and the improviser can play with the definition and introduction of every element. Thus, the performer does not play a specific piece but a rendition of a macro element, such as a *dastgâh* or an *Âvâz*, and one can comment on the quality of such a rendition in regard to the *space* it portrays and how this *space* matches and challenges the *space* remembered by the listener (i.e., the one doing the judging). In an axiomatic model of music, the basic elements are given and a piece is built upon those elements, for example a piece is written in a certain key (e.g., A major). However, in the model of the Radif, the performance plays with the definitions of the elements which define the object that is being played. For example, one may comment that: "this performance was a beautiful Mâhour". However, in an axiomatic model the rendition of the principles is not up for aesthetical alterations, for example, one cannot say, "that is a beautiful A major", and even if such a comment is made, it is not based on the judgment of a piece but a judgment of feeling of the scale. In other words, the old melodic figures of Radif are not based on certain scales (*maqams*), but these melodic figures are ambiguous representation of the *maqams*.

To better understand such a mode of improvisation, imagine that you are given a number of elements to play with within a certain space and we call the collection of these elements in conjunction with the space, a system. Thus, the element of play is always directed towards the inside of the system, such as shown in figure 4.2.

Now also imagine that the same rule would apply to every element on every structural layer as well. In other words, imagine that every given structural element, itself is a structure within a defined space, the definition of whose elements can once again be aesthetically negotiated. One can imagine a picture such as shown in figure 4.3 as the

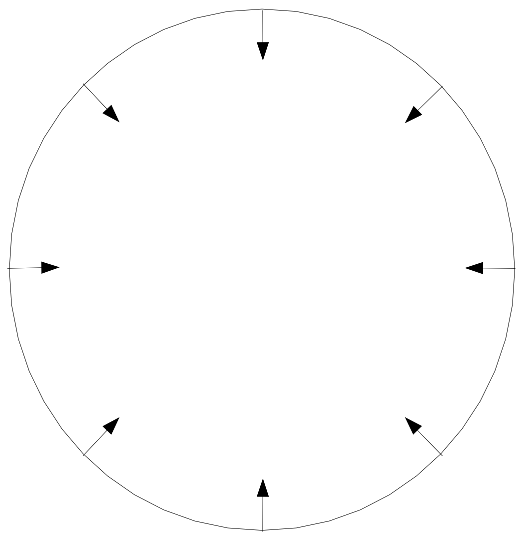


Figure 4.2: A model for the mode of improvisation based on the Radif.

space of improvisation, where every structure is built on top of other structures while the act of improvisation plays with the definition of every element. Thus, as mentioned before, no element is specifically defined. Compared to Western music, in which the scale is a specifically defined element, in Persian music the ambiguity in the definition of the elements is carried even to the definition of the pitch values of the various scales (*maqams*). Thus, as Darvishi and Farhat point out, one can argue that Persian music is not based on a precise tuning definition. (Darvishi 1994, p. 212)(Farhat 1990, p16) On this point Jean During writes:

> The *koron* (p) which lowers the note by *approximately* a 1/4 tone, corresponds in fact to intervals varying more or less from one performer to an other. Thus the interval Dp-C fluctuates between 34 and 38 savarts (136 and 152 cents). In the same way the pitch of certain tones fluctuates according to the modes. For instance the interval B-C may vary in practice from 20 to 26 s. (80 to 104 c.), according to the musicians and/or the modes. (During 1991, p. 66)

Thus, it can often be seen that when a musician passes an instrument, for example a wetar (a four-stringed lute, which has movable frets), to another musician, one may decide to move certain frets based on one's taste for tuning. As such the tuning also

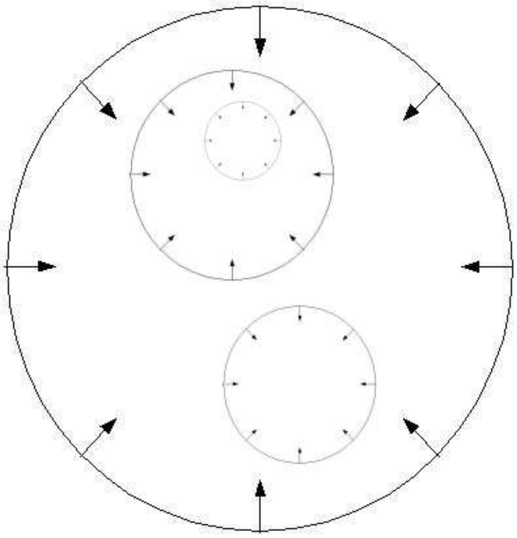


Figure 4.3: A diagram representing the multi-layered space of improvisation based on the Radif.

becomes an aesthetical choice and part of the music.[22]

One of the most socially comfortable and well-accepted forms of music especially during Islamic regimes which were hostile towards music, was singing the verses of the Koran without any instrumental accompaniment. Many believe that this is one of the reasons why the vocal repertoire became the core element of Persian traditional music. It is also perhaps, thus, that poetry finds a central position in musical performances. This evolution, which has resulted in highly ornamented melodic figures, has given a strong monophonic character to these melodies. Moreover, even though phrasing and macro rhythms have to be present in their rendition, most melodies of the Radif are arrhythmical as far as meter structures are concerned. As such, based on the concept of note as an atomic definition, creating counterpoint melodies in which the instantaneous tones would be heard as specific multi-tone units (such as chords) goes against the character of the melodies. On the other hand, because of the structural integrity within themselves and the shared structural similarity with elements in neighboring *space*s,

[22]Refer to (Racy 1991, p. 77-8) for a similar discussion in regards to how similar modes differ "tonally from one Arab country to another" and how various attempts "had failed to produce a 'definite' and 'exact' theoretical scale" for the various modal scales found in Egyptian music.

the character of such melodic figures can combine with each other on macro levels of musical perception, where not only every element keeps its own autonomy, the elements can fuse with each other in harmony[23]. One of the very common elements of musical communication in the Radif is the use of the 'call and response' technique where, for example, an instrumentalist responds to a vocalist and vice versa with structurally similar responses. The exchange is more like a conversation but at times both musicians could be playing or singing at the same time and the structural form of melodies accommodates such an interchange. As such, melodic patterns, which in their sequential combination construct a *goushé* and the *space* of the *goushé*, could be considered as atomic elements of the Radif; however, these elements are defined structurally, and not specifically.

Thus, in an improvisation as long as structural elements are communicated correctly, their specific construction can be part of the music. For example, if we are playing in Dastgâh Homâyoun, as long as we musically communicate the *space* of the *dastgâh* the requirements have been met, independent of how close every element has been to its historically defined origin. The rendition of such definitions are judged aesthetically with a concept called *hâl*. *Hâl* is an aesthetical quality which can be judged by any listener familiar with Persian music ranging from an informed listener to a specialist of the subject. The level of the *hâl* of an object is related to the quality of the *space* it creates. Technical mastery, technical inadequacy, structural complexity, or lack of it, in the object or the observer, do not have any jurisdiction in judgment of an object's *hâl*.

Improvisation is a process of creating a certain mood, or *hâl* which is in tune with that moment both sonically, and psychologically as far as the audience is concerned. In other words, the process is all about the realization of the current *space* and embellishing that *space*, and if one steps out of this *space* it has to be in accord or in the interest of the current moment. Thus, the movement is always towards the understanding of the cores of *space*s. One may argue that it is this form of rendition which has given a strong introvert quality to the Persian traditional music.

Every time we leave an initial element, such as a *space* or a *shâhead* note, it is traditionally customary to return to that initial element. This movement which is called

[23] Note that the word 'harmony' here is used with its common and philosophical meaning in mind and not its meaning within the definitions of common-practice Western tonality.

foroud (literally translated as 'landing') acts as a cadence. Most *goushé*s in the Radif have triangular structures such as shown in figure 4.4.

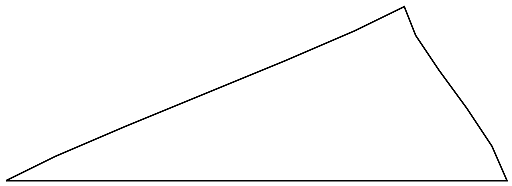


Figure 4.4: The basic shape of a *goushé* in the Radif

For a performance, one often chooses a certain *dastgâh* or *âvâz*. Let us consider a simple progression of a number of *goushé*s. The first *goushé* for every *dastgâh* or *âvâz* is called Darâmad (literally translated as 'prelude').[24] Progressions based on the Radif are usually in ascending form. Thus, for example, when a second *goushé* follows the *darâmad*, it may expand the pitch *space*; however, at the end of the second *goushé* we return to the original *space* of *darâmad*, as shown in figure 4.5. Certain *goushé*s can change the tonal center or the *shâhead* of the *space*. These *goushé* include passages which accommodate this change or they may use other *goushé*s whose functions are to move the *shâhead*. Figure 4.6 presents a progression in which a simple passage is used to move the *shâhead*. One can say that in this case the tonal center or the *shâhead* has been modulated to a different location. Once the modulation is complete and the *space* is moved to a new location, the ending *foroud*s or cadances return to the new *shâhead*. To complete the structure, after the establishment and the play around the new *shâhead*, one returns once more to the original space of *darâmad* with a more elaborated form of *foroud* as shown in figure 4.7. This form of *foroud* often first lands on the modulated

[24] The word '*darâmad*' plays two different roles in the Radif, one as a form and the other as the name of the *goushé*(s) in each *dastgâh* or *âvâz*. Darâmad defines the main *space* of the *dastgâh* or the *âvâz*. All *goushé*s in the Radif are named. Every *dastgâh* or *avâz* has one or more *goushé* called Darâmad which is in the form of a *darâmad* (prelude).

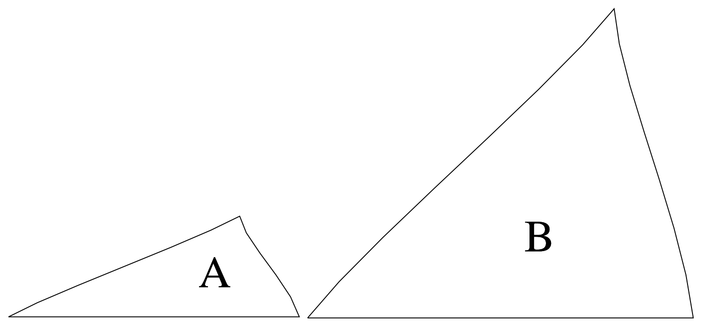


Figure 4.5: A simple progression in the Radif where the second *goushé* returns to the *space* of the first *goushé*, often called Darâmad

.

shâhead and then continues to descend to the original previous *space*. As one can see in figure 4.7 the progression of the whole structure follows the same triangular form as our original *darâmad* did. Now one can imagine the structure portrayed in figure 4.7 to be a starting point for a much longer performance in which such a triangular model could be repeated inside any element. In other words, certain structural and formal elements are portrayed in the musical performance in multiple levels of time and pitch *space*s. Therefore, elements A, B, C, D, or E, could be as simple as small melodic figures which make up a *goushé*, or they could each be a complete *dastgâh* or *âvâz*, in a *morakabkhâni* or *morakabnavâzi* (a performance which moves among the large *spaces* of *dastgâh*s or *âvâz*es), as shown in figure 4.8.

Thus as an example, one progression which could be represented by figure 4.8 could be as follows. The macro elements are A, B, C, D, and E, and the elements within D would be A´, B´, C´, D´, and E´. We start with Darâmad Mâhour (A), move to Dâd in Mâhour (B), then use Fe'li (C) as an introduction for a movement of the shâhead, and then to Delkash (D). The *shâhead* of both Fe'li and Delkash are a fifth above the *shâhead* of Darâmad Mâhour; however, melodies in Fe'li always end on the *shâhead* of Darâmad Mâhour, while in Delkash all *forouds* are on the new *shâhead*. The *space* of Delkash is similar to Darâmad Shour. Thus, in D we can operate within Dastgâh Shour, where A´

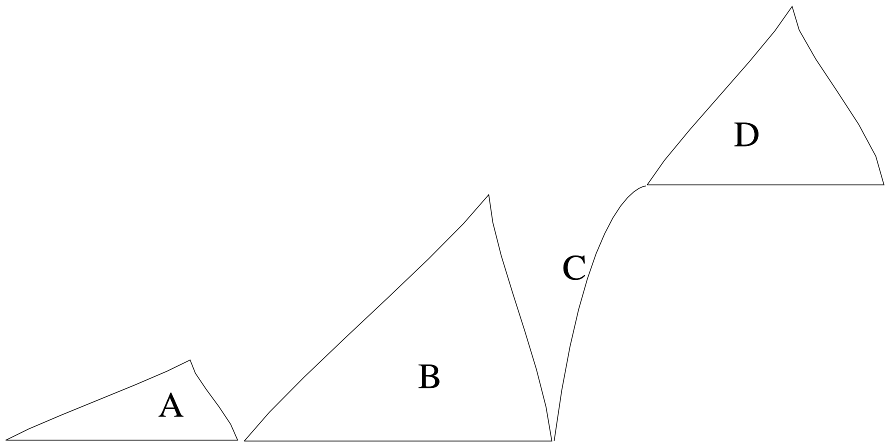


Figure 4.6: Modulation of the tonal center or the *shâhead*

could be Darâmad Shour, B´ could be Rahâwi, C´ and D´ could be Shahnâz, and E´ could be a Foroud which returns the *shâhead* to Shour and moves us back to Delkash in relation to Mâhour, Finally we can use a *foroud* in Mâhour (E) to return to the original space of the Darâmad Mâhour.

4.2 The Computer as an Instrument for the Radif

My general understanding of tonality, in which self-referentiality plays an important role, in conjunction with the qualities of the Radif discussed in previous section, led me to devise a synthesis method called *Recursive Granular Synthesis* which is based on the concept of self-similarity. In order to be able to improvise with acoustical musicians in the language of the Radif, I also devised a real-time interactive computer music instrument called *Lilâ*. In this section I shall explain these two computer music tools.

4.2.1 Recursive Granular Synthesis

I have written about this synthesis method in two previous works. (Yadegari 1992) In this work, I shall discuss some of the recent added features as well. As discussed in chapter 3, I offered a new definition for tonality as follows:

> *Tonalité* is a perceived self-referential relationship between the material and the form of a musical object which characterizes its unity.

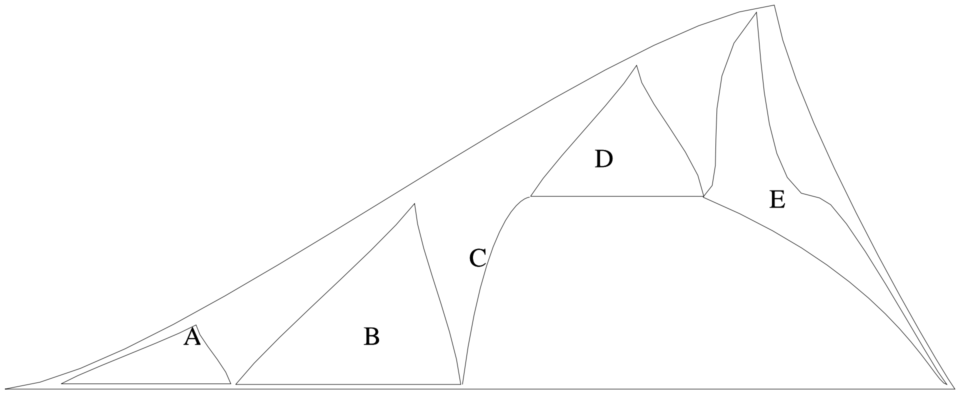


Figure 4.7: Return to the original space of *darâmad* using a more elaborated form of *foroud* and completing the shape of the original triangle

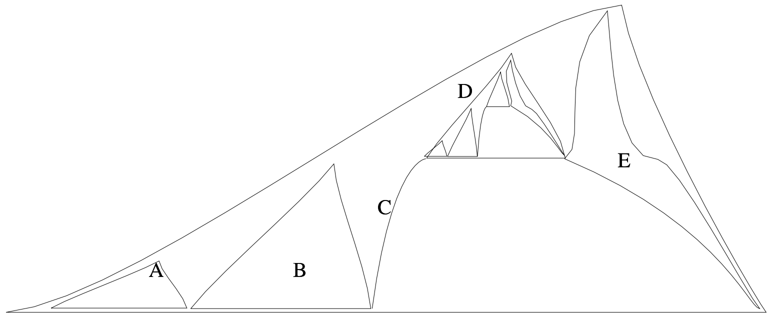


Figure 4.8: Replicating the structure of the whole within a part.

One of the perceived qualities of a self-referential element is self-similarity or self-affinity. Mandelbrot defines self-similarity as follows:

> When each piece of a shape is geometrically similar to the whole, both the shape and cascade that generate it are called *self-similar*. (Mandelbrot 1983, p. 34)

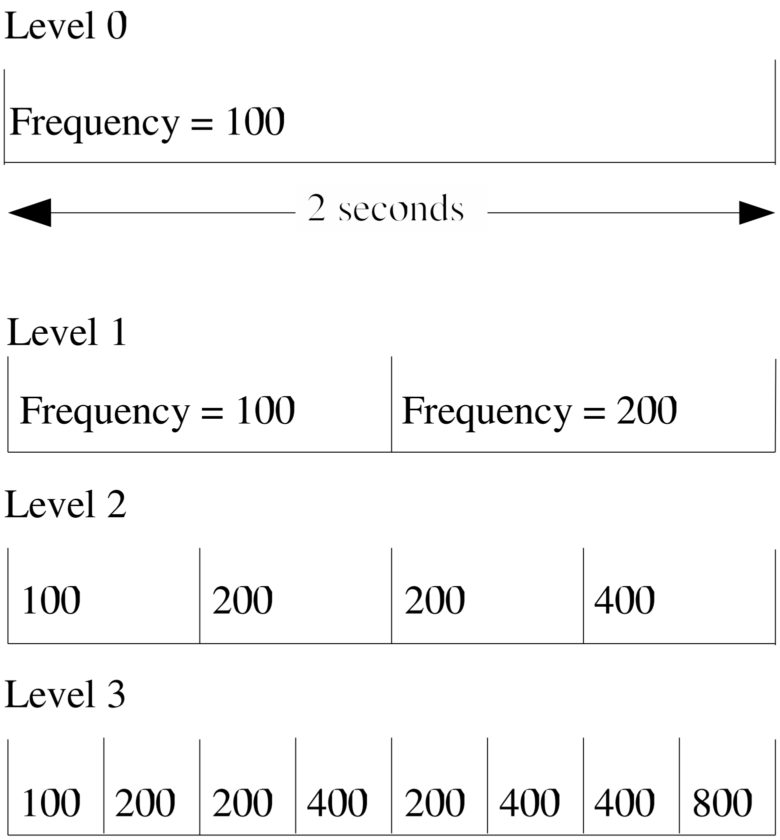
Invariance against change of scale is called *self-similarity*, and if there are more than one scale factor involved we call that *self-affine*. (Schroeder 1991, p. 112) The concept of self-similarity was used as a fundamental design factor for devising *Recursive Granular Synthesis* (RGS). In RGS synthesis parameters are generated based on an initial structure and rewriting rules similar to Lindenmyer's L-System (Lindenmayer 1968), which is one way to create self-similar objects. Thus, in RGS the user defines a hierarchy of structures which are used to generate parameters for the synthesis of sound. Every structure is defined as a collection of complex elements, where every element could itself be composed of a structure. The hierarchy can contain recursive paths; meaning that every element could be composed of structures, whose elements could be structurally composed of the element that is being defined. Every structure is defined by a series of factor arrays. "Time" is the factor which defines the segmentation of time into different *cells*. All parameters are generated by applying the current level factors to previously generated values for every cell. The sound of every instance of time can be composed of the addition of the content of multiple *cell*s. Thus, a segment of sound becomes a multi-layer collection of *cells* organized in time, while a series of synthesis parameters are active for the duration of every *cell*.

Here I give a simple example to explain RGS. As mentioned before, every structure is defined by a series of factor arrays, the most common ones being frequency and amplitude. In this example, I show how the time segmentation and development of a single parameter (frequency) for the various levels are achieved. The structure we are using has two *points* which divides the structure in half at every level of development, meaning that the structure has equal time segmentation (0.5, 0.5). The frequency factors used are 1 and 2. Let's assume that we want to synthesize 2 seconds of sound and we assign an initial development frequency value of 100. This initial value is defined in a macro scale and, even though it is the case in this example, it does not meant that the sound starts with a frequency of 100. We divide the time according to the time factors. Then we multiply the initial value of every factor by the factors of the *points* of the structure. If we recursively apply this process to each segment, we obtain a multi-layer series of frequency values as shown in table 4.1.[25] The idea is that these values can be used for a variety of methods of synthesis of sound (e.g. waveshaping, granular, FOF, or MIDI pitch sequences) or graphics.

A language similar to that used in structure declaration in C was developed to accommodate the definitions of synthesis hierarchy. For every layer of the parameter definition, one defines a *seed* which itself contains one of more collection of *structures*, and pointers to objects for production of the end result. The synthesis always starts

[25] A special rule is provided to decide when the recursion process stops.

Table 4.1: Parameter generation in RGS: the time segmentation of (0.5,0.5) implies an equal binary segmentation of time.



	Time Segmentation	Frequency Factor
Segment 1	0.5	1
Segment 2	0.5	2

with a seed called 'mainseed' and since in the above example we have only one single structure, we have only one seed. Thus, the *seed* definition for the above example is as follow:

```
seed mainseed {
        value: init;
        struct: twopoints;
        seedobj: snd;
}
```

The object of the *seed*, *seedobj*, is the service production module, which in this case is sound synthesis. All the production options are specified in the service production module:

```
sound snd {
        time: 10.0;
        srate: 44100;
        window: "nowin";
        stop_rec: 0.05;
}
```

The value set to *value* is the initial value of the *seed* which is defined as a point, as follows:

```
point init {
        time: 2;
        freq: 100;
        amp: 1;
}
```

The structure of a *seed*, in this case 'twopoints', is defined as a collection of two points:

```
struct twopoint {
        p1; p2;
}
```

The *points* are defined as a series of factors as follows:

```
point p1 {
        time: 0.5;
        freq: 1;
        amp: 1;
```

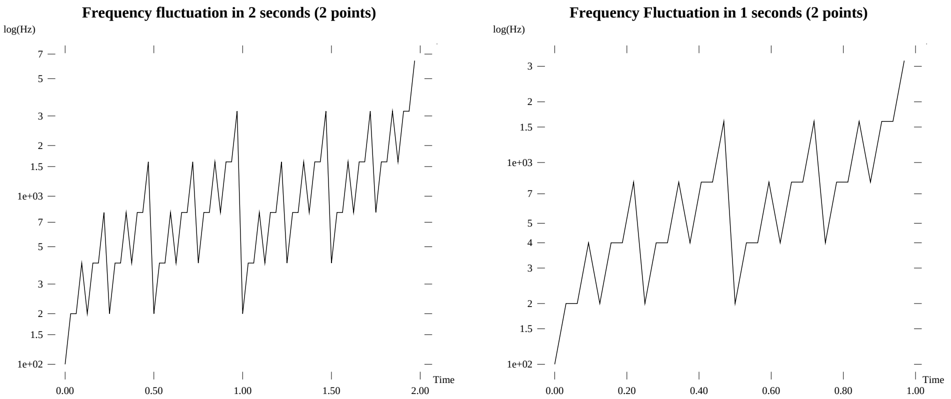
```
        seed: mainseed;
}

point p2 {
        time: 0.5;
        freq: 2;
        amp: 1;
        seed: mainseed;
}
```

Thus, *Structures* are a collection of *points*. *Points* are a collection of *factors* and *options* and a pointer to a *seed*, which defines their internal content. Some of the normally used factors are "time", "freq" (frequency), "amp" (amplitude), and the channel values (e.g., "ch1", "ch2", etc. for multi-channel synthesis.) The synthesis process starts with the *seed* called "mainseed", which has a *point* as its initial starting value. Then, according to the factors found in the *points* in the *structure*, it re-writes the initial "mainseed" as a series of *seeds*. This procedure is repeated recursively until the duration of a *cell* is smaller than the stop-recursion value ("stop_rec"). As mentioned above the sound for every moment can be composed of the addition of the sound content of a number of layers. Figure 4.2.1-a illustrates the frequency fluctuation of the "freq" factor for the last level of the synthesis and Figure 4.2.1-b shows the scaled version of the same data but only for the first 1 second. One can see the similarity of the contours of the tow shapes. However, figure 4.2.1-b could also be the frequency fluctuation for the full 2 second for the previous level of synthesis. Thus, if the x-axis of figure 4.2.1-b is changed to be from 0 to 2, one can see that contours of the frequency fluctuations of the two different levels line up with each other when they are added together.

All the *factors* for *points*, and the values of "stop_rec" can either be double precision values, or expressions. One is able to access all the values of the higher levels by using expressions and accessing a factor as an array. A single value used as a factor, for example α, without an expression is a shorthand notation for the expression:

$$x_{l+1} = \alpha x_l$$

where x_l represents the value of the *factor* x at level l. At every level for every *seed* an output production service routine is called with the currently developed *seed* value. The production objects can have a single *table* and a single *window* attached to them.



(a) (b)

Figure 4.9: The frequency fluctuation of a 2 point segmentation illustrated in table 4.1 (a) shows the frequency fluctuation in 2 seconds and (b) shows the frequency fluctuation in 1 second. The basic shape of both graphs are similar to each other.

In the *sound* production object, the *table* is used as a lookup table with increments defined by the frequency *factor*, while the *window* is scaled in time to be used as an amplitude modulation window for the duration of the *cell*. Every *point* can as well have a *table* and a *window* which override those in the production objects. The language itself is rather simple to understand once one understand the connection between different objects. Every score is passed through the C language preprocessor, so that comments and C style macros can be used in the score.

I have used RGS in a number of my pieces which are based on the concepts used in the Radif. *No Flower, No Incense, Only Sound* (2000) is a fully synthesized piece in the *goushé* Korde-Bayât (related to Dastgâh Shour) with almost no acoustical input. The scores and the sources for this piece are provided in Appendix B. The only acoustical element used in this piece is a 0.68 second recorded clarinet sound which is used as macro amplitude envelopes. One can assign specific scales to *points* and thus make sure that the produced sound falls into a specific scale. For example the scale for the above piece is defined as follows:

```
scale KordBayat {
        or: 2;          /* octave ratio */
        dpo: 1200;      /* number of divisions per octave */
```

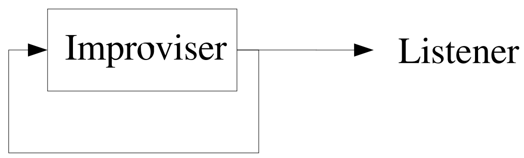
```
        npo: 7;         /* number of notes per scale */
        intervals: 100 200 200 160 140 200 200;
}
```

The factor 'or' is the octave ratio; 'dpo' is the number of divisions per octave, and 'npo' is the number of notes per octave.

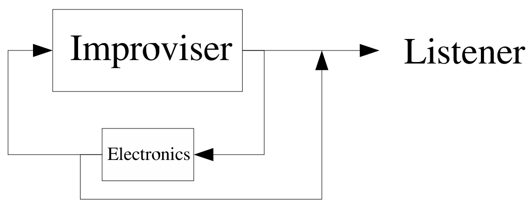
4.2.2 Lîla

> There is an old Sanskrit word, *Lilâ*, which means play. Richer than our word, it means divine play, the play of creation, destruction, and re-creation, the folding and unfolding of the cosmos, *Lilâ*, free and deep, is both the delight and enjoyment of this moment, and the play of God. It also means love. (Nachmanovitch 1990, p. 1)

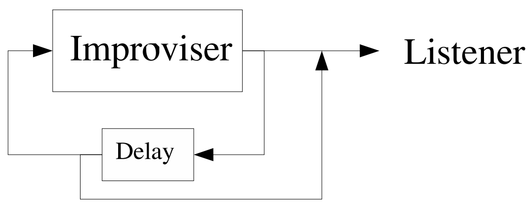
In order to be able to improvise with acoustic musicians in a way that acoustic musicians would not always be obliged to follow the computer, I devised a real-time interactive computer music instrument called *Lilâ*, which was developed using Pure Data. (Puckette 1996) The improvisation language of the Radif and the ambiguity in its definition had a strong role in defining the basic elements of the design. The interactive part of *Lilâ* has no sound of its own in its basic design, although the capability of playing sound files and processing them have been incorporated in it. *Lilâ* is designed based on the ideas discussed in this work, which in regard to music can be summed up to the unity of form and material resulting in the ambiguity of atomic structures. When we accept the unity of form and material to its fullest extend, we accept that music is not a metaphysical entity. The unity of form and material also introduces epistemological problems where the duality of mind and body can no longer hold. When we do not depend on metaphysical definitions, our cognition can be defined epistemologically as a mechanism. Thus, making music can also be seen as a mechanistic process. In this sense, the act of improvisation can be seen as a feedback system where the improviser is reacting to what he or she is hearing. In the simplest case we can have a model as follows:



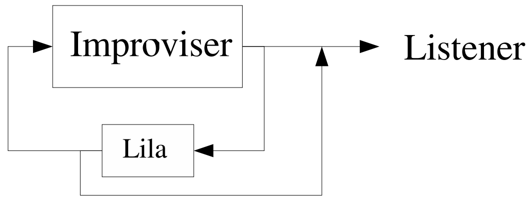
When we amplify the sound of the improviser by electronic and add some processing, such as a reverb, we are adding an extra element in the path of the feedback system, such as the following:



In traditional performances the electronics usually only amplify the sound but do not alter it. Similarly, traditionally any change to the sound of the instruments or any alteration of timing of what is being played back, is understood to be in the musical domain. For example if we add a delay line (with sufficient delay time) instead of the amplifying electronics, for example as follows:



something interesting happens to the way the improviser produces music. Now the improviser has the capability to make the performance seem like a dialogue, but the dialogue is with oneself. Going back to our original assumption of unity of form and material, in which sound and music are considered to be the same, the situation has not changed from the original scenario when there were no processing. The only thing that has happened is that the time scale in which the improviser listens has changed. In other words in the original scenario, the improviser listens to the instantaneous sound that he or she produces, but with a delay line the listening to the basic time unit of the system requires listening at least for the delay period. This is in fact how we listen to rhythms.[26] Thus, it is possible to establish a musical dialogue with the improviser by changing various variables in the feedback path. *Lilâ* is a system which provides electronically simple but tactilely accurate processing capabilities to a human improviser for a musical interaction with acoustic improvisers.



Lilâ records, transforms, and alters the segmentation of the acoustical sound inputs and projects the result back to the acoustic player. By the use of feedback and the real-time reaction of the acoustic and the computer improviser one can create highly complex musical structures. *Lilâ* is designed based on the idea that musical objects can be combined with segments of themselves, particularly when we do not define the music based on atomic structures.

A number of the ideas for *Lilâ* were formed in *Tear* (1999), a tape piece, in which I used RGS to present the electronic medium and Persian traditional music as complementing musical material. In *Tear*, which uses a recording of a vocal improvisation by Mohammad Reza Shajarian based on a *ghazal* by Hafez, I have combined 4 copies of the recording in canonic form. The melody sounds arrhythmical as far as a sense of meter is concerned; however, there are two levels of rhythm at work in this recording, first the rhythm of the syllables of the verses of the *ghazal* and second the more macro level defined by each verse of the *ghazal*. Shajarian establishes this rhythm by melodic figures without words (*tahrir*) prior to singing the poem. Thus, one can imagine the *tahrir*s as new musical verses which have been fitted in the structure of the *ghazal*. Each melodic line is delayed by a single verse. Thus, the *space* of every verse is combined with the *space*s of last three verses in quasi-synchronized timings. Most of the verses are sung in the space of darâmad of Âvâz Bayat-Tork. One can note that the *space* of *goushé* Jamé-daran, whose *shâhead* is a major third above the *shâhead* of Darâmad coexists harmoniously with the *space* of Darâmad.

[26]The unity of sound and music suggests a unity among the various formal classified elements of music as well. (Refer to (Stockhausen 1959), (Stockhausen 1991), and (Yadegari 1992).)

One can argue that an attribute of structural autonomy of the melodic patterns of the Radif is that it is possible to combine a melodic pattern with one (or more) complex element(s). As long as there are some structural similarity between the various elements, a form of harmony, which comes from the balance in the tension between the autonomy of elements and the connection among them through the similarity of their *space*s, can be achieved. Based on this principle I often combine electronic elements, which have long-term structures, with the acoustical melodies of the Radif. These elements are themselves autonomous and compete for the long term attention of the listener. However, their structure is set up in a way to move and climax in accordance with the mixed vocal lines. All the timbral structures for *Tear* were synthesized by RGS.

In an structured improvisation piece, such as *A Window* (2001), I often use prepared sound files to be used as autonomous objects which set the mood of the performance and some of the general timings; the interactive mechanisms of *Lîla* is used as a tool for dialogue with acoustic musicians. *Lîla*'s basic design diagram can be seen in figure 4.10. All the parameters of the different parts of *Lîla* can be controlled either by

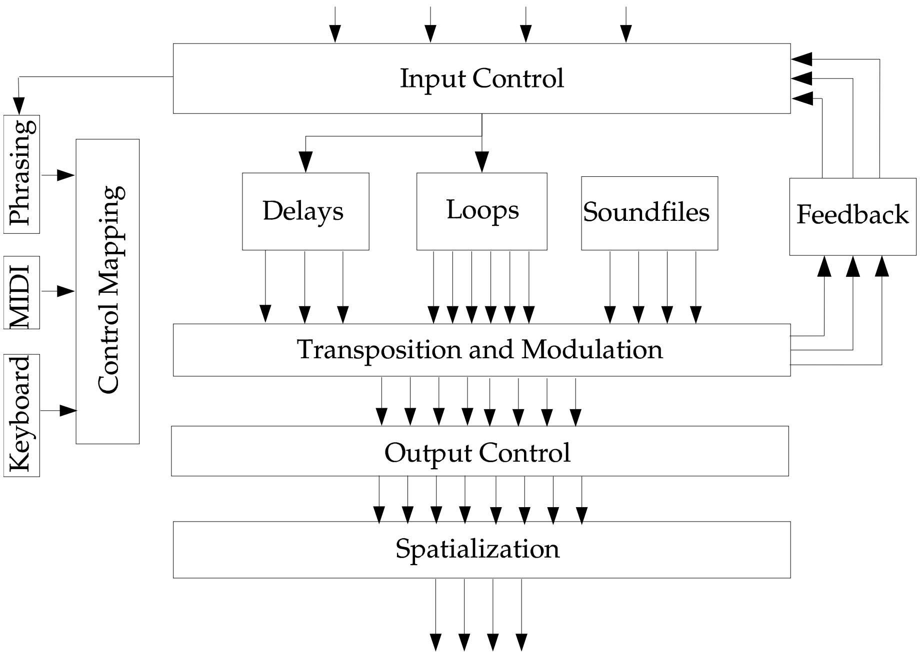


Figure 4.10: Block diagram for *Lîla*

input from the computer keyboard, graphically by the mouse, or by MIDI inputs. For example, the beginning and ending of loops can be signaled by the human improviser on the keyboard, and then the output value of that loop channel can be controlled by a MIDI fader. Delays are set up so that the human improviser would have the ability to indicate delay values tactilely in millisecond precisions. For example, one key is used to define the location of return of the delay as the input is being captured and then any time another key is pushed, the delay time is set to the time segment between the two events.

I have used Lîla in numerous performances with musicians such as Hossein Omoumi (2001, Toronto) , Siamak Shajarian (2003, UCLA), Keyavash Nourai(2001, UCSD and 2003, UCLA), Shahla Sarechani (UCSD 2001), and with Michael Dessen and Ivan Manzanilla (2001, Cuba). Lîla has also been used for the sound design of Peter Sellar's production of *The Children of Herakles* in 2002 and 2004 (in Europe and the United States) which included sections of structured improvisations with Ulzhan Baibussynova.

4.3 Summary

I have presented a number of abstract ideas which have led to some of the basic design principles in my music and the tools I have developed over the past few years. Limiting dependence on metaphysics is perhaps the strongest theoretical driving force in their development. If I can design a tool which would not depend on metaphysical definitions, it will mean that it has no specific knowledge about any specific type of music. Thus, one can argue that such a tool is not bound to any specific musical culture.

In this chapter, I presented an ontology based on a number of concepts in the philosophy of Omar Khayyam along with the influences which this form of thought has had on the classical Persian Poetry. The connotations of Khayyamic materialism is similar to the discourse of poststructuralism and the focal point of both approaches is a discourse on the role of metaphysics in characterizing systems of knowledge. In chapter 2 I discussed the role of self-referentiality in the discourse of Derrida in regards to Western metaphysics in which the separation of the concepts of philosopheme and mythopoem along with the whole history of epistemology comes under question. In contrast, in

Persian culture this separation is not as well defined as it is in the West; however, I would like to argue that this is not necessarily a dividing factor between these two forms of approaches to knowledge. Poetry in the West is understood as an expression which is not necessarily bound by the rules of epistemology. However, what do we call a form of writing which deals with the same problems as does epistemology, but *in addition* its form has also been affected by the content of its study? Derrida calls the work of Lévi-Strauss, whose form has been affected by its content of study, mythomorphic. (Derrida 1978b, p. 286) The poems of Omar Khayyam in which he tackles some of the most basic scientific questions should be regarded with a similar gaze. Both Lévi-Strauss and Khayyam nostalgically realize the instability which comes with the epistemological loss of the center in such an approach. In contrast, Rumi (Mowlana) and Hafez celebrate the lack of a center with passion and affirmation. The mental framework which Hafez has left intricately matches Derrida's call to " Nietzschean *affirmation*, that is the joyous affirmation of the play of the world and of the innocence of becoming, the affirmation of a world of signs without fault, without truth, and without origin which is offered to an active interpretation." (Derrida 1978b, p. 292)

The study of music is also an endeavor which faces similar problems to what Lévi-Strauss had faced. An epistemological system which does not allow self-referential elements in its model is a centric system, and when this system is applied to music it also requires its object of study to adhere to this model. It is thus that almost all attempts at rationalization of music are forced to define some form of metaphysical atomic elements in their model. If we were to see music and its inner workings axiomatically we need to define some atomic elements as axioms upon which we could build other musical objects. However, the unity of form and material does not allow for the definition of atomic elements.

I have used Khayyamic materialism in order to offer an explanation for the musical practice surrounding the Radif which is not dependent on atomic definitions, or in other words the definitions are aesthetically negotiable among those involved in the musical communication. In this chapter I have also shown that the metaphysic-less approach of Khayyam results in a system of signification in Persian poetry in which the signified objects of certain signifiers are left for the reader to interpret. One may be able to find many other reasons, such as political or social forces, for such a system of signification as well; however, it is the materialism of Khayyam which results in an ontology in which neither theology nor scientific objectivity can have the last word as an authoritative focal point.

The formal change in the "new poetry" of Iran, which became one of the main attributes of this poetry, can be compared to the change from tonality to atonality in Western music. In chapter 3, I have shown that metaphysical definitions, or the lack of such notions, played an important role in the formulation of atonality by Schoenberg. Schoenberg had hoped that his form of music would eventually become popular among the masses. (Auner 2003, p. 374) One can argue that we are still waiting for that to happen. However, in contrast, the new Persian poetry which formally transformed around one thousand years of a poetical culture, can now safely be called popular. It is my understanding that Khayyamic materialism has provided a context which has facilitated the accommodation of the concept of modernity in Persian culture. In any case, this has been so in my own musical development and in my application of using the Radif as a model for computer music.

With the understanding of a system of signification in which signifiers do not signify concrete elements but only act as negotiable tools within the context of an aesthetical communication, we can recognize the malleable nature of the musical building blocks of the Radif. Furthermore, I have also explained the structural ramifications of such an approach and how I have used these structural qualities to achieve a sense of harmony among the monophonic elements of the Radif. Related to such an approach, I also discussed the design and use of two computer music tools, a synthesis method called *Recursive Granular Synthesis*, and an interactive real-time improvisation instrument called *Lîla*.[27]

[27] Audio recordings of three pieces listed in appendix C accompany this dissertation as examples of music produced by using RGS and *Lîla*.

Chapter 5

Summary and Conclusions

The use of computers in music presents an interesting problem. One can argue that computers do not have any constraints; however, one can also argue that, this lack itself is a constraint. Acoustic instruments evolve through years of refinement and with them, they bring not only a specific sound, but also a history and a musical culture which shape the process of music making as well as listening. Thus, one can think of instruments as elements with their own *essential* identities which are formed through years of evolution. Even though musical instruments are governed by physical laws, often it is the non-linear idiosyncrasy of an instrument which characterizes the unique features of an instrument, and thus, one of the jobs of the performer becomes to use these features in a musical way. As a simple example, the sound spectrum of various registers of an instrument differ from each other not only in frequency scale, but also in spectral envelope, frequency content, and form of progression over time. Computers are often defined as machines which perform specific instructions. Thus, if we define the concept of a register as only a difference in the frequency of oscillating elements, in the absence of any other instruction, in order to play a sound in a different register, the computer only changes the time scale in which the sound is being played. Thus, the need for exact specifications through instructions can be viewed as the idiosyncrasy of the computers. Instructions given to the computer need to follow a certain order; this order in the most basic software level is based on logical processes. Thus, one can argue that a logical process governs the production of the sound of the computers.

When we think of music as a metaphysical entity and when we expect the various formal elements of the music to follow a specific logic, we end up with two parallel systems of logic, one as the logic governing the physical characteristics of the sound and the other as the discourse which rationalizes the interaction among the metaphysically defined atomic elements of the music. It is commonly understood that the order in music is governed by a cultural logic, while the order in sound is governed by physical laws. With computers, if we are to use them in accordance to their own constraint-less constraint, we need to unify these two streams of logic; hence, the unity of form and material can become a theoretical basis for computer music.

In 1990 I started developing a synthesis method called *Recursive Granular Synthesis* (RGS) in which no distinction is made between musical and sonic structures. Thus, the same structure or algorithm can be used either for production of sound or production of musical structures. In other words, in this synthesis method, which is based on recursive rewriting rules similar to Lindenmyer's L-System (Lindenmayer 1968), one can apply the same structure for macro-level event generation as well as for control mechanisms of synthesis parameters. Synthesis parameters such as frequency, amplitude, duration, degree of randomness, and table lookup indices are generated for different time scales according to the rewriting rules. Various methods for combination of the multiple layers are also provided to the user. Self-similarity and other principles of non-linear dynamical systems have often been used for music either as compositional models or in synthesis methods. Examples of compositional models are fractal pitch contours and multi-level use of the same melodic or rhythmic relationship in different time scales. Examples of synthesis methods are non-linear algorithms, such as recursive table lookups and recursive filters. However, in RGS a single algorithm is used for simultaneous generation of events in macro level and as control mechanisms in micro level of synthesis. Such an approach to synthesis problematizes the separation of the concepts of sound and music in general. (For a more in-depth discussion of the design and implementation of this synthesis method see (Yadegari 1991) and (Yadegari 1992).)

If I were to confine the basis of my musical works to a single principle, I would point to the elimination of metaphysical constructs in the design of my musical systems (both compositional and improvisational).[1] I have arrived at this path through the

[1]During the music making process, which at times is hard to separate from the research and develop-

scientific ontology found in the poetry of Omar Khayyam, and in this dissertation, I have attempted to epistemologically explain my approach. Thus, I have touched upon subjects which are related to my discussion, but have not been the basis for my work. For example, as I have shown in chapter 4, my conclusions relating to poststructuralism had been developed based on the Khayyamic materialism and not through the Western poststructural theory. However, in the process of explaining my conclusions within the language of epistemology, I have also presented some of the theories of poststructuralism, especially that of Jacques Derrida, to show the parallel between my conclusions and those of poststructuralism. I have also touched upon the theory of *autopoiesis* by Maturana and Varela in which self-referentiality plays a fundamental role. (Maturana and Varela 1980) However, based on the concept of self-referentiality, I had arrived at similar conclusions without any knowledge of their work. Similar to Maturana's quote on page 3.4, in 1992, I wrote:

> When we communicate with others, we create collective entities (i.e. societies) which themselves possess a certain level of intelligence. These societies will in turn be able to understand and act *independently* of the individuals in the same way that we are able to act independently of the cells composing our bodies. If we try to explain such situations in a linear and logical manner we run into many paradoxes. (Yadegari 1992, p. 15)

In my master's thesis, from which the above is quoted, I problematized the concept of communication as exchange of information and concluded that the act of communication creates physical bindings among those involved in the communication. In his paper "Information, meaning, and communication: An autopoietic approach", John Mingers writes:

> In their early papers on autopoiesis, Maturana and Varela ... were very skeptical of concepts such as "information" and "communication." They argued that since organisms were structurally determined systems and since the nervous system was organizationally closed, it was not possible for there to be "instructive interactions"—that is, interactions (including linguistic ones)

ment stages, some constructs were introduced metaphysically. For example, the coded scales of Persian music in the synthesis method are used as metaphysical information, since the values were directly coded in the scores. However, especially in this case, it is my understanding that eventually one will be able to find scale values based on the concept of unity of form and material, but this is not as simple as one way mapping of physical characteristics of the tone to the frequency values of the scale. One would have to consider the requirement of self-similarity in the calculation of the scale values in the same way that I discussed the well-tempered scale as a requirement of such principles in tonality on page 120.

> that themselves determine the effect they will have on the receiver. This means that traditional ideas such as objective information, and communication as the transmission of information from one person to another, are not tenable. (Mingers 2001, 109)

Objective information and the commonly understood concept of communication in relation to such objectivity can be considered as the basis of epistemology and philosophy in the West. While such an approach, in which poetry and philosophy are assumed to be separate, has extreme precision in relation to a deductive view of life and existence, it becomes paralyzed in describing a number of common phenomena, such as origins, life, god, love, or genesis, because such phenomena have self-referential structures. As long as epistemological thought insists on declaring individual humans as the only elements capable of cognitive actions, and as long as self-referential constructs are not accepted within the cannon of epistemology, the above mentioned phenomena will stay out of reach of epistemology. Our perceived relationship between form and material is also one of these types of phenomena. In this dissertation, I have explored the self-referential relationship between form and content in music along with the dialectic which has been used to discuss such problems in regards to Western tonality. I have also presented the concept of self-referentiality as a more fundamental principle than inference to be used as a tool for epistemological reconciliation of problems which arise in finding the origins of concepts which are epistemologically characterized as dichotomies.

I have shown that the duality in the perceived dichotomy between the logic of the form and the logic of the content, is only a tip of an iceberg of theoretical problems in epistemology. Thus, epistemological explanations of concepts related to unity of form and material would be in tension with linear epistemology. This tension is the result of the use and our approach towards metaphysical constructs. One can argue that the source of many dualities such as mind vs. body, philosopheme vs. mythopoem, music vs. sound, culture vs. nature, etc. can be found in metaphysical arguments. Once we abandon metaphysics, which is a requirement of unity of form and material, almost all the tools that epistemology has provided us come under question, unless we accept self-referential constructs as valid structures within epistemology, even though the truth value of such constructs are not linearly decidable.

As I discussed in chapter 2, the concept of metaphysics, which appears mainly in the form of the need for an assumed faith in the axioms of the system—the system of epistemology as a whole or any system defined within epistemology—is highly intertwined with epistemology. As such, epistemology finds itself on shaky grounds if we eliminate metaphysics in its characterization. If we are to assume a linear approach to epistemology we have to consider epistemology as a whole mythical and, therefore, not credible based on its own standards. The process of rejection of epistemology by epistemological standards operates in a self-referential space, and in such a space objects are not defined as essential structures based on atomic elements, but they are defined as structures of structures. Thus, if we understand the concept of self-referentiality, we can approach epistemology in a different way, in which we do not necessarily try to understand and specify specific atomic elements but we study the interaction and the space in which structures interact with each other.

In chapter 2, I discussed an important paper by Jacques Derrida called "Structure, Sign, and Play in the Discourse of the Human Sciences" delivered at John Hopkins University in 1966, in which he introduced his concept of 'deconstruction'. In this paper, Derrida considered the work of Lévi-Strauss and the concept of structure, which at the time was an important philosophical concept within the tradition of structuralism. The concepts of structure, sign, play, and center are important elements within structuralism. These concepts are related to each other within the axiomatic model of epistemology. The separation of the concepts of philosophome and mythopoem is one of the assumptions of epistemology. By exposing the structurality of the concept of structure, and the signification of the concept of sign, or in other words, by showing the self-referentiality of the concepts of structure and sign, Derrida showed that the concept of center cannot be maintained within the philosopheme domain of epistemology. Thus, Derrida questioned the complete history of epistemology. In regard to the work of Lévi-Strauss, Derrida argued that the ethnologist has no way of escaping ethnocentrism, and showed that in dealing with this problem, Lévi-Strauss used the musical concept of unity of form and material and declared his own study of myths, a myth as well. Derrida called such a text mythomorphic.

Derrida argued that the approach of Lévi-Strauss, similar to that of Rousseau, is saddened, negative, nostalgic, and guilty. Derrida also argued that this results from the percieved loss of the center in a centric model. Derrida offered the Nietzschean affirmation as a joyous celebration of noncenter rather than the loss of the center. I have shown that even though Derrida did not specificially point to the concept of self-referentiality, this concept is *central* to his argument. I have also shown that in this paper Derrida made a number of arbitrary conclusions by assuming a certain form of totality, which he himself argued to be impossible to attain. Thus, I have argued that Derrida's return to metaphysics based on economical and stratigical grounds after deconstructing the philosophical tradition of metaphysics in the West, is an arbitrary choice.

In "Structure, Sign, and Play ...", Derrida presented the practical problems which led Lévi-Strauss to unite the content and form of his study in a musical model and the connotations which this form of approach instigated in the process of epistemology. One can argue that with Derrida's exposition, the scientific approach, which can be considered as the basis for epistemology, lost its exclusive authoritative position on truth. As mentioned above, when we question the validity of epistemology within epistemology we have to deal with self-referential structures. As Lévi-Strauss had realized, the musical domain is a more accommodating context for dealing with such structures. In much of Derrida's writing, one of the issues he has discussed is the relationship between the concepts which are set as dichotomies against each other, and one of such dichotomies is the tension between melody and harmony according to Jean Jacques Rousseau. In a commentary on the concept of deconstruction in relation to music in *Grove Music Online* dictionary, Christopher Norris writes:

> Derrida locates points of conflict or unresolved tension in a wide range of philosophical writings, from the Greeks to the twentieth century. In each case he shows how an apparently clearcut binary distinction nature/culture, speech/writing, reason/rhetoric, concept/metaphor, philosophy/literature etc. in fact turns out to be strictly undecidable as regards its order of priority. Thus nature is always culturally defined, while speech (supposedly more authentic than writing, since it gives a more intimate access to the utterer's thoughts and feelings) is itself a kind of writing in so far as it bears all the marks (of structure, convention, the arbitrary—non-natural—relation between signifier and signified) that thinkers since Aristotle have standardly attributed to written discourse.[2]

[2]Christopher Norris: 'Deconstruction', *Grove Music Online* ed. L. Macy (Accessed Feb. 24, 2004), http://www.grovemusic.com

After understanding that the boundary between dichotomies are not as clearcut as historically believed, if we say "speech is itself a kind of writing", we also have to understand that at the same time writing is itself a kind of speech. The relationship between speech and writing which, as Norris has shown in the above quote, can be mapped to the nature vs. culture dialectic, is a central point of discussion in much of Derrida's writings, such as in *Of Grammatology* (1976). (Derrida 1976) In this book, Derrida showed how Rousseau's preference for 'melody' over 'harmony' relates to Rousseau's arguments in regards to his preference of nature over culture. Derrida maps melody to speech/nature and harmony to writing/culture. In *Of Grammatology*, Derrida writes:

> ... just as in painting the art of design is degraded when the physics of color is substituted for it, so in the song melody is originally corrupted by harmony. Harmony is the originary supplement of melody. But Rousseau never makes explicit the originarity [sic] of the lack that makes necessary the addition of the supplement—the quantity and the differences of quantity that always already shape melody. (Derrida 1976, p. 214)

Note the use of the word 'harmony' in the above quote. As I discussed in chapter 3, the word 'harmony' can take on a double meaning. One meaning signifies a rather specific construct within a specific musical practice of a specific period of European art music, and the other is arguably a philosophical term with universal connotations. If we assume the specific meaning of it, Derrida is wrong to assume that "Harmony is the originary supplement of melody." And if we assume the more general and universal meaning of the word harmony, then the issue is far more complex in the sense that harmony and melody can no longer be specific identifiable elements. The confusion in regards to terminologies, which have tremendous consequences, are at times made by the specialists in the musical language of the West as well. In continuation of his previous quote, Christopher Norris also writes:

> Rousseau may self-evidently wish to say that melody is more natural than harmony, that nature has been corrupted by culture, that communal values are threatened by the encroachment of civilized artifice, and that language has suffered the decline from its original (authentic and spontaneous) role as a conveyor of human passions to its present (all too sophisticated) use for the purpose of concealing our true sentiments and desires.[3]

[3]Ibid.

Depending on the signification of the word 'harmony', similar to Derrida, Norris may be using the word 'harmony' in an unjustified context. Based on the strict technical meaning of the word 'harmony', one is not able to make any epistemologically sound connections between harmony and melody, as the technical meaning of 'harmony' in almost all musicological writings is based on the metaphysical construction of the 'chord'. Norris continues that:

> In the case of music it is likewise a fallacy (a self-deconstructing argument) to propose that there must have been a phase of development when melody alone was sufficient for all expressive purposes and harmony would not yet have come to exert its artificial, corrupting influence. Thus there is no melody without harmony, in the sense that even the simplest melody (folksong, plain-chant, monodic improvisation etc.) would not be perceived as such in the absence of implied harmonic or cadential structures; also there is the fact of the overtone series, which prevents any single note, or sequence of notes, from being heard in pristine isolation.
>
> ...
>
> Such is the logic of supplementarity that Derrida finds in Rousseau's texts. What, according to Rousseau, ought to be the case is that nature, speech and melody belong on one side of a clearcut binary distinction that sets them apart from such bad supplements as culture, writing and harmony. But in fact he demonstrates the failure of his attempt to hold that distinction in place and the way that those supplements turn out to inhabit the very point of origin. Thus there is no conceiving of nature in the absence of cultural predicates, of speech as apart from those attributes that it shares with writing, or of melody in the absence of harmony.[4]

Here, it is important to be clear in regards to the system of signification in which we are operating. Can we apply the concept of "implied harmonic or cadential structures" to all music, or are we talking about the concept of harmony and melody found only in European music of a certain period? If 'harmony' is considered in the same way that it is discussed in the musical literature of the West (and consider that the above quote is from a music dictionary), the connection between harmony and writing (and its implied connection to the construct of composition) is arbitrary and hegemonic towards any music which does not embrace the concept of Western harmony. As I have discussed in chapter 3, understanding the universal concept of harmony requires the understanding of the concept of self-referentiality. For many musicians and scholars whom I have

[4] Ibid.

come across, understanding the appropriation of the concepts of 'tonality' and 'harmony' by the Western musicology is not an easy point to accept. Words such as 'harmony' are used for setting up double standards. The philosophical concept is used to show a sense of universality of the discussion and the technical term, which is understood to refer to an specific Western construct, is used to set up the ownership of the final conclusions. By accepting that melody is always shaped by harmony (according to its universal signification), harmony becomes the origin and owner of melody, and then, by defining harmony as a specific Western construct, the West becomes the owner of harmony and melody both.

In chapter 3, I discussed the relationship between form and material in regards to the concept of Western tonality. I have shown that without the use of self-referentiality we either have to resort to metaphysical constructs in characterizing music and form, or we are forced to operate within an epistemologically unacceptable and vague approach. The concept of unity of form and material supposes that form is an outer expression of the content, while form organizes the content and effects the way content is perceived. Thus, form and content find self-referential relationship with each other. For the separation of form and material one needs to resort to metaphysical reasons and define two different parallel logics, one for the form and one for the material. Many music theorists have taken ambivalent approaches towards this issue in regards to fitting the definitions of tonality within epistemological bounds.

I have presented the two theories of Joseph Fétis (1784-1871) and Hugo Riemann (1849-1919) (mainly discussed by Carl Dahlhaus) in regards to Western tonality. Fétis argued that musical relationships should not be subjected to physical or acoustical rules, while Riemann tried to fit tonality within an axiomatic system. However, Riemann at his most basic level of definitions had to resort to defining the chord as a metaphysical construct, and thus, explained the assumed dichotomy between consonances and dissonances. Schoenberg argued against such a dichotomy and declared that the difference between consonances and dissonances is not a matter of *kind* but only a matter of *degree* of comprehensibility. For Schoenberg the function of form was always a layout to assure comprehensibility. Thus, he said that tonality, which can be characterized as a form based on the functional relationships among consonant chords, is not necessarily the only suitable form for music. Even though the unity of form and material played an important role in the theory of Schoenberg, he wanted to preserve the metaphysical characteristics of the concept of music. Schoenberg repeatedly has talked about the tension between originality and comprehensibility. I discussed this matter in regards to deconstruction and the philosophy of Kierkegaard on page 58.

Much of the music theory in the West characterizes tonality as a specific practice in the European art music, often called common-practice tonality. Words such as 'tonality' or 'harmony', which have fundamental philosophical connotations, are used uncritically among musicians and scholars. In almost all the scholarly musical works of the West, these words are used as signifiers of specific technical elements of a specific musical practice in a specific period of the West. In *Tonality in Western Culture: a Critical and Historical Perspective*, Richard Norton argues that the source of such an approach, in which these concepts are kept out of reach of a more inclusive understanding of them, is economical and related to capitalism. The tonal form was advertised as a universal form for music. Today both in its 'high' form of classical European music and in pop music, the tonal form dominates almost all music scenes all around the world. Technically speaking, today few scholars would argue for the universality of tonality; however, one can easily note the universal success of Western tonal music particularly in the popular culture which is deeply in tune with late capitalism.

Much of the dominant Western philosophies and economic systems are based on models which adhere to a Darwinian theory of evolution. In such models, the individual is defined metaphysically as separate and independent of his or her environment. Thus, in such a model we accept a metaphysical separation of content from context. Understanding the full connotations of tonality (i.e. unity of form and material) requires us to realize that in the absence of metaphysical arguments, no atomic elements can be isolated in the process of musical communication. Thus, in such a model, music becomes a physical connection among those involved in the musical process. Similarly, it is my understanding, that our common understanding of 'truth', if we are to look for harmony among us, should depend on our definition of 'the self' independent of any metaphysical characterization.

In this dissertation I have touched upon two systems of signification, namely the Persian poetic philosophy, and the theory of *autopoiesis*, in which self-referentiality is used as a more fundamental concept than inference. Both of theses systems use self-referentiality to define the concept of 'the self'. It is a difficult task to find any quotes from Derrida which would talk about any universality; however, in *Of Grammatology* he writes:

> Auto-affection is a universal structure of experience. All living things are capable of auto-affection. And only a being capable of symbolizing, that is to say of auto-affecting, may let itself be affected by the other in general. Auto-affection is the condition of an experience in general. This possibility—another name for "life"—is a general structure articulated by the history of life, and leading to complex and hierarchical operations. (Derrida 1976, p. 165)

Similar to much of the other philosophies of the West, and in tune with Social-Darwinism, Derrida assumes that selfish individuals are the only locus of cognitive faculty and does not recognize the emergent property and cognitive ability of crowds of individual. In a linear model of epistemology the only way to define an individual is metaphysically since 'life' needs to be defined as something more than sum of the parts of which the body is composed. One of the ways which we can explain the emergent property of individuals is to use self-referentiality in characterization of unities which are capable of cognitive action. The theory of *authopoiesis* developed by Maturana and Varela is an example of such an approach. Their basic starting point is that cognition is a function of life (in general and not only that of humans). They use no metaphysics in their characterization of cognitive actions. Thus, they introduce a new form of epistemology. In the afterward to *The Tree of Knowledge* (1992), Varela writes:

> ... we present a view of knowledge that is not based on a representationist doctrine. Representationism can take many forms, but they all share the same idea as a common denominator: that knowledge is based on acquiring or picking up the relevant features of a pre-given world that can actually be decomposed into significant fragments. In the common parlance of the neuroscientist, this process is encoded in a familiar phrases such as "recovering the information in the signal" and "acting in an adaptive manner." This puts the burden of knowledge on pre-given items in the world and leaves no place for the creation of the significance and meaning proper to the autonomy of the living. When these living qualities are put back into our field of view, what we conclude is not that mere negation of representationism—namely, that the organism invents or constructs its own world at whim—but, more

> interestingly that animal and the environment are two sides of the same coin, knower and known are mutually specified.
>
> ...
>
> If the alternative to representationism via autonomy is the first major pillar of this book, the second consists in pursuing this idea to its logical conclusion. That is to say, tracing autonomy from the realm of the biological all the way to the human—including the activity of scientists like ourselves. Thus, the journey proposed in this book begins and ends with the activity and experience of the human observer himself, making a full circle. (Maturana and Varela 1992, p. 253)

One is always faced with a paradoxical situation when one tries to understand 'life' without metaphysics through linear epistemology. Erwin Schroödinger, one of the most important physicists of twentieth century, expressed his views on this subject in *What is Life & Mind and Matter* (1944). He also points out that the paradox of life is related to the concept of 'oneness of mind'. Schroödinger writes:

> Ten years ago Aldous Huxley published a precious volume which he called *The Perennial Philosophy* and which is an anthology from the mystics of the most various periods and the most various peoples. Open it where you will and you find many beautiful utterances of a similar kind. You are struck by the miraculous agreement between humans of different race, different religion, knowing nothing about each other's existence, separated by centuries and millennia, and by the great distances that there are on our globe.
>
> Still it must be said that to Western thought this doctrine has little appeal, it is unpalatable, it is dubbed fantastic, unscientific. Well, so it is, because our science—Greek science—-is based on objectivation, whereby it has cut itself off from an adequate understanding of the Subject of Cognizance, of the mind. But I do believe that this is precisely the point where our present way of thinking does need to be amended, perhaps by a bit of blood-transfusion from Eastern thought. That will not be easy , we must beware of blunders—blood-transfusion always needs great precaution to prevent clotting. We do not wish to lose the logical precision that our scientific thought has reached, and that is unparalleled anywhere at any epoch. (Schrödinger 1967, p. 139)

He concludes that:

> I submit that both paradoxes will be solved (I do not pretend to solve them here and now) by assimilating into our Western build of science the Eastern doctrine of identity. Mind is by its very nature a *singulare tantum.* I should say: the over-all number of minds is just one. (Schrödinger 1967, p. 145)

In chapter 4 I have presented a number of quotes from the classical and new Persian poetry in which the concept of Khayyamic materialism plays important roles in characterizing the identity of 'the self'. Khayyamic materialism is a form of ontology with no metaphysical constructs in its system of signification. I have shown that the basic conclusions of poststrutcural theory, which mostly stem from the concept of 'noncenter', had already been made by poets like Khayyam and Hafez.

In this dissertation, I have used such an approach to epistemology to explain the principles which have led me to the design of two of my computer music tools, namely RGS and Lîla (an interactive real-time improvisation tool). I have also offered a theory for the Persian system of improvisation, the Radif, and the musical practice surrounding it, based on an approach in which no structure is defined essentially. Thus, definitions of such a system are aesthetically negotiable and become part of the musical process. In other words, in such a system there are no need for metaphysical definitions of atomic elements in the musical communication.

Understanding the emergence of 'life' from the material of the body is similar to understanding how music emerges from the material of sound. Linear epistemology is unable to approach either of these problems. As Christopher Small argues in *Musicking*, based on the work of Gregory Bateson, elimination of metaphysics in characterizing 'life' (i.e., the concept of unity of form and material) can lead us to perceive music as an act rather than an object. A system of organization of a society in which aesthetics are considered important in characterizing its fundamental laws, leaves the responsibility of the harmony among its elements on the individuals themselves rather than on a faith on the system itself. The concept of self-referentiality reminds us of the inevitable connection which we have with other living beings and our environment. To make choices in life only based on *economy* and *strategy*, in my opinion, ignores the music in life, and as Nietzsche said: "Without music life would be a mistake." (Nietzsche 1990)

Appendix A

An Undecidable Thesis

Epistemological explanation of the concept of unity of form and material sets itself up for failure from the beginning; meaning that, as I discussed in chapter 2 the concept undermines epistemological understanding. In this dissertation, I have argued that the concept of self-referentiality is more fundamental than inference, or in other words, that self-referentiality is a premise for inference. Thus, if I try to explain self-referentiality with logical processes, I have defeated the concept that I am trying to convey.

On page 58 I discussed a quote by Rose Rosengard Subotnik in which she discusses the logical implications of 'deconstruction' to the point of accepting the "impossibility of all human communication". However, she suggests that we should " resign ourselves more or less good-naturedly" to what she calls the "dialectics of text." Is being "good-naturedly" a requirement of epistemology? What happens if I as a student (one in a lower position of power within a hierarchical power structure) who is to be judged for my epistemological abilities and ideas, would decide to throw up my "hands in despair at the impossibility of all human communication", not based on dishonesty or laziness, but based on a rigorous application and commitment to what I have learned? Worsening of the current global, social, and political condition of the world, which over the past 20 years I have witnessed to infiltrate more and more into the personal spheres as well, does not insinuate that there exist any real communication among humans.

In this dissertation I have argued that epistemology needs to be able to deal with self-referential constructs. Accepting certain self-referential constructs within our epistemological understanding can have extensive connotations. For example, acceptance of a proposition which establishes a physical relationship between our cognitive faculty and our physical body, defines that proposition itself as a self-referential construct. However, such a thought, on the one hand, is fully in tune with scientific intuition, in the sense that accepting any metaphysical propositions within the scientific dialectic should be perceived as superstition, and on the other hand, the thought undermines its own model of survival because epistemology is based on the metaphysical separation of concepts of philosopheme and mythopoem. Thus, the connotations of a very simple argument which seems perfectly in tune with scientific intuition, and which science itself cannot disprove, could be tremendous, since it undermines the complete structure of epistemology.

Based on the material presented in this dissertation, I would have liked to submit the following five page dissertation, which is composed of just a single line, as a statement in regard to the need for epistemology to accept self-referential constructs within its cannon. However, I have included it here as an appendix to show that, I do not mean such a proposal as a polemic approach towards my committee. In fact, one of my reasons for wanting to submit such a dissertation is to argue that, even though, through objectivism we separate a work from the character of an author, the relationship between the author and the judges does play an important role in evaluating the work.

The problem of the "impossibility of all human communication", as I discussed in chapter 2 in regards to the philosophy of Kierkegaard, can be linked to our inability to reconcile the notion of individual freedom in contrast to universal authority, which within the academic context relates to the issue of academic freedom. I posit that the following dissertation cannot be rejected based on written epistemological rules. Even if certain universities may have arbitrary implicit rules on what constitutes a dissertation, one can characterize such rules as hegemonic and dominating in order to curb academic freedom.

One of the arguments regarding deconstruction is the implicit logic which connects the atomic elements of text—these atomic elements being sentences. The following dissertation cannot be judged to be true or false and since it uses no reference, and thus it could be characterized as a self-contained autonomous object, one can also argue that it cannot be deconstructed except based on the deconstruction of the concept of language itself.

In my master's thesis, I offered the statement "Nothing exists" as the shortest self-referential statement I could think of.[1] (Yadegari 1992, p. 73) I have thought about the matter long enough and I would have liked to submit the following five pages only. However, should my committee have accepted it, they would be the ones to be judged by the higher levels of epistemological establishments. Acceptance of self-referential constructs could question hierarchical power structures. I leave the choice up to my committee to decide which version should be turned in. Thus, as Subotnik suggests, I have resigned myself "more or less good-naturedly" to the "dialectics of text", however, not because I think such a resignation by itself would be fruitful, but because I feel today our survival path depends on our collective intelligence, not on our individual selfishness.

[1]Start with: 'Nothing' exists. By objectifying nothing, we turn nothing into something.

UNIVERSITY OF CALIFORNIA, SAN DIEGO

The Thesis

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Music

by

Shahrokh Yadegari

Committee in charge:

Professor ________________
Professor ________________
Professor ________________
Professor ________________
Professor ________________

2004

The dissertation of Shahrokh Yadegari is approved, and it is acceptable in quality and form for publication on microfilm:

Chair

University of California, San Diego

2004

TABLE OF CONTENTS

ABSTRACT OF THE DISSERTATION

The Thesis

by

Shahrokh Yadegari
Doctor of Philosophy in Music
University of California, San Diego, 2004

This statement, but not this dissertation, is wrong, and therefore, it defies all communication.

Appendix B

No Flowers, No Incense, Only Sound

No Flowers, No Incense, Only Sound (2000), is composed in a mode similar to an ancient Persian *goushé* Kordé Bayat. The main force of the piece is in a calm resistance against the climactic form, and thus reversing the usual role of melody and timbre. The piece begins with melodic form, however, the timbres are built progressively which eventually compete for attention of the listener. The ensemble of repetitive melodies will become a musical timbre in which the progressive nature of the sonic timbres can be heard. Spatialization plays a structural role in this piece and in reversing the role of traditional parameters. The multi-layered moving sounds create a depth in space in which the repetitive melodies seem to be static and to accentuate the gestural movements of the timbres. Usually space is used as a collection of points and paths through which the sounds are either positioned or moved. Thus traditionally space serves the sounds. However, in this piece the sounds move to create the space. Therefore, a major part of the piece is intended to be the space that is portrayed for the listener. All the sounds have been synthesized by the *Recursive Granular Synthesis* (RGS) method devised by the author. *Cmusic* (and specifically the space unit generator), developed by F. Richard Moore, was used for the spatialization.

One can think of the generation of this piece in the same way that a computer program is compiled. The synthesis process has been executed on a Linux RedHat 8.0.

Makefiles define the various stages of the compilation process, and how the final and intermediate objects are to be made. *Mix* files are processed by the *mixsf* program. Files with .sc extensions are processed with the *cmusic* program and files with with .rs extention are processed by *RGS*. *Cmusic* and *mixsf* are part of the Computer Audio Research Library. (Moore 1982)

Makefile

```
include $(HOME)/etc/Makefile

GRSFLAGS="-C '-DBASEFREQ=FREQ_Eb3 -DSCALE1=KordBayat7'"

PRODUCTS=mix2.wav mix4.wav
DIRS=partone partbase

all: dirs $(PRODUCTS)

mix2.wav: mix2 partone/partone2.sf partbase/partbase2.sf
        mixsf mix2
        sox mix2.sf mix2.wav

mix4.wav: mix4 partone/partone.sf  partbase/partbase.sf
        mixsf mix4
        sox mix4.sf mix4.wav

dirs:
        for i in $(DIRS); do \
                cd $$i; make GRSFLAGS=$(GRSFLAGS) ; cd ..; \
        done

include $(HOME)/etc/MakeEnd
```

mix4

```
output mix4.sf
ochans 4
input partone/partone.sf
duration 353
fin 1
fout 10
input partbase/parbase.sf
start 60
duration 596
fin 1
fout 10
input partone/partone.sf
start 310.50
duration 355
fin 1
fout 10
end
```

mix2

```
output mix2.sf
ochans 2
input partone/partone2.sf
dur 355
fout 5
input partbase/partbase2.sf
start 60
dur 593
fout 5
input partone/partone2.sf
dur 355
start 310.50
fout 5
end
```

scales.h

```
/*
 * KordBayat with a lower tetrachord (which is the upper tetrachord of shur}
 */
scale KordBayat {
        or: 2;
        dpo: 1200;      /* number of divisions per octave */
        npo: 7;         /* number of Notes per scale */
        intervals: 100 200 200 160 140 200 200;
}
/*
 * KordBayat with a lower tetrachord (which is the upper tetrachord of shur}
 */
scale KordBayat7 {
        or: 2;
        dpo: 1200;      /* number of divisions per octave */
        npo: 7;         /* number of Notes per scale */
        intervals: 200 100 200 200 160 140 200;
}

/*
 * The following scales are based on a 24 division equal-tempered scale
 * provided as templates
 */
scale bayat_tork {
        or: 2;          /* octave ratio */
        dpo: 24;        /* number of divisions per octave */
        npo: 7;         /* number of Notes per scale */
        intervals: 4 4 2 4 4 3 3;
}
scale nava {
        or: 2;          /* octave ratio */
        dpo: 24;        /* number of divisions per octave */
        npo: 7;         /* number of Notes per scale */
        intervals: 4 2 4 4 3 3 4;
}
scale mahur {
        or: 2;          /* octave ratio */
        dpo: 24;        /* number of divisions per octave */
        npo: 7;         /* number of Notes per scale */
        intervals: 4 4 2 4 4 4 2;
}
scale chahargah {
        or: 2;          /* octave ratio */
        dpo: 24;        /* number of divisions per octave */
        npo: 7;         /* number of Notes per scale */
        intervals: 4 4 2 4 4 4 2;
}
scale bayatraje {
        or: 2;
```

```
        dpo: 24;        /* number of divisions per octave */
        npo: 7;         /* number of Notes per scale */
        intervals: 2 4 4 3 5 2 4;
}

/*
 * Full Shur scale up to the owj
 */
scale Shur {
        or: 8;
        dpo: 72;        /* number of divisions per octave */
        npo: 21;        /* number of Notes per scale */
        intervals: 3 3 4    4 2 4 4    3 3 4    4 2 4 4   2 4 4   4 2 4 4;
}
/*
 * scale of daramad shur
 */
scale DaramadShur {
        or: 2;
        dpo: 24;        /* number of divisions per octave */
        npo: 6;         /* number of Notes per scale */
        intervals: 3 3 4  4 6 4;
}
#define ShurDaramad     DaramadShur

/*
 * Dashti with a shur lower tetrachord
 */
scale Dashti {
        or: 2;
        dpo: 24;        /* number of divisions per octave */
        npo: 7;         /* number of Notes per scale */
        intervals: 2 4 4 3 3 4 4;
}

/*
 * Esfahan
 */
scale Esfahan {
        or: 2;          /* octave ratio */
        dpo: 24;        /* number of divisions per octave */
        npo: 7;         /* number of Notes per scale */
        intervals: 4 2 4 4 5 3 2;
}
```

partbase/Makefile

```
include $(HOME)/etc/Makefile

CMUSIC=cmusic
TOSFFLAGS=-R44100 -c2
DIRS= End.descends EndNavaCall NavaCall NavaCall2 Opening1 Opening2
TMPFILES=sp.list
PRODUCTS=partbase2.sf partbase.sf

all: dirs $(PRODUCTS)
partbase.sf: partbase.sc
	$(CMUSIC) partbase.sc  | tosf -R44100 -c4 partbase.sf

partbase2.sf: partbase2.sc
	$(CMUSIC) partbase2.sc  | tosf -R44100 -c2 partbase2.sf

partbase.wav: partbase.sf
	sox partbase.sf partbase.wav

partbase2.wav: partbase2.sf
	sox partbase2.sf partbase2.wav

dirs:
	for i in $(DIRS); do \
		cd $$i; make; cd ..; \
	done

include $(HOME)/etc/MakeEnd
```

partbase/partbase.sc

```
#include <carl/cmusic.h>
set list = sp.list;
set funclength = 128K;
QUAD(7,20);
set revscale = 0;
set t60 = 5;
set cutoff = -60dB;

set rate = 44100;

var 0 s1 "./Opening1/singsine.sf"; {290' sparse good opening}
var 0 s2 "./NavaCall/singsine.sf"; {580; mid-sparse}
var 0 s3 "./NavaCall2/singsine.sf"; {560; mid-sparse}
var 0 s4 "./Opening2/singsine.sf"; {580'open sprse,dense end}
var 0 s5 "./End.descends/singsine.sf"; {                150'' dense}
var 0 s6 "./EndNavaCall/singsine.sf"; {60'' mid-sparse}

#define OUTPUT  SPACE(b9,1) b2 b3  0 1 0dB

ins 0 one;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
{env}           seg  b4 p5 f4 d 5sec 0 15sec;
                sndfile b1 1 1 s1 1 0 -1  d d;
                mult b9 b1 2 b4;
                OUTPUT;
end;

ins 0 two;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s2 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 three;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s3 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 four;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
```

```
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s4 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 five;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s5 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 six;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s6 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

GEN3(f4) 0 1 1 0;
SINE(f5);
COS(f6);
{
GEN2(f5) 1 1;
GEN2(f6) 0 1 0;
}
note  0 one    290 0dB   240Hz   4   20sec   20sec;
note  0 two    580 0dB   240Hz  -4   10sec   10sec;
note 10 one    290 -6dB   240Hz -7   10sec   10sec;
note 10 two    580 -6dB   240Hz  7   5sec    5sec;
note 20 three  559   0dB  240Hz  7    4sec    4sec;
note 20 four   559  0dB  240Hz  -8    2sec    2sec;
note 40 three  540  -6dB  240Hz  8    5sec    5sec;
note 40 four   540  -6dB  240Hz -8   10sec   10sec;
note 220 five  150 -10dB  240Hz  10    5sec    5sec;
note 230 five  150 -10dB  240Hz  -10 2.5sec 2.5sec;
note 280 six   60 -10dB  240Hz -10  10sec  10sec;
note 280 six   60 -10dB  240Hz  5 2.5sec 2.5sec;


sec;
ter 8;
```

partbase/partbase2.sc

```
#include <carl/cmusic.h>
set list = sp.list;
set funclength = 128K;
STEREO(2,20);
set revscale = 0;
set t60 = 3;
set cutoff = -60dB;
set rate = 44100;

var 0 s1 "./Opening1/singsine.sf"; {290' sparse good opening}
var 0 s2 "./NavaCall/singsine.sf"; {580; mid-sparse}
var 0 s3 "./NavaCall2/singsine.sf"; {560; mid-sparse}
var 0 s4 "./Opening2/singsine.sf"; {580'open sprse,dense end}
var 0 s5 "./End.descends/singsine.sf"; {                150'' dense}
var 0 s6 "./EndNavaCall/singsine.sf"; {60'' mid-sparse}

#define OUTPUT  out  b9 b9

ins 0 one;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
{env}           seg  b4 p5 f4 d 5sec 0 15sec;
                sndfile b1 1 1 s1 1 0 -1  d d;
                mult b9 b1 2 b4;
                OUTPUT;
end;

ins 0 two;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s2 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 three;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s3 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 four;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
```

```
                sndfile b1 1 1 s4 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 five;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s5 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 six;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s6 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

GEN3(f4) 0 1 1 0;
SINE(f5);
COS(f6);
{
GEN2(f5) 1 1;
GEN2(f6) 0 1 0;
}

note  0 one    290 0dB   240Hz   8   20sec   20sec;
note  0 two    580 0dB   240Hz  -8   10sec   10sec;
note 10 one    290 -6dB   240Hz -10   10sec   10sec;
note 10 two    580 -6dB   240Hz  10    5sec    5sec;
note 20 three  559   0dB  240Hz  10    4sec    4sec;
note 20 four   559  0dB  240Hz -10    2sec    2sec;
note 40 three  540  -6dB  240Hz  10    5sec    5sec;
note 40 four   540  -6dB  240Hz -10   10sec   10sec;
note 220 five  150 -10dB  240Hz  15    5sec    5sec;
note 230 five  150 -10dB  240Hz  -17 2.5sec 2.5sec;
note 280 six   60 -10dB  240Hz -15  10sec  10sec;
note 280 six   60 -10dB  240Hz  17 2.5sec 2.5sec;


sec;
ter 4;
```

partbase/End.descends/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        time: 120; freq: basefreq; amp: 0.2;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           200;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.75; bleedtime: `time *.33333`; freq: 1.059; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        scale: SCALE1;
}

point a2 {
        time: 0.25; bleedtime: `time`; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        scale: SCALE1;
}


struct one20 {
        a1; a2;
}

seed mainseed {
```

```
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partbase/Opening1/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;


point inits {
        time: 240; freq: basefreq*16; amp: 0.01;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           600;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
        freqref:         2489.008;
        /*
        table:          "nowin";
        */
}

/* time segmentation is in 7, 1/7, 2/7, 4/7 */

point a1 {
        time: 0.142857; freq: 0.875; amp: 1.5;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        stop_rec : `1000 / (cur_time+0.001)`;
        scale: SCALE1;
}

point a_silent {
        time: .285714; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle silent;
```

```
        scale: SCALE1;
        stop_rec : ‘500 / (cur_time+0.001)‘;
}

point a2 {
        time: 0.571429; bleedtime: ‘time * 0.3333‘;
        freq: ‘if ( freq < 50,  basefreq*4 , freq * 0.375)‘;
        amp: ‘if ( freq < 50,  amp * 0.5, amp * 1.45)‘;
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
        stop_rec : ‘125 / (cur_time+0.001)‘;
}


struct one20 {
        a1; a_silent; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partbase/Opening2/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        /* was 480 */
        time: 240; freq: basefreq*2; amp: 0.05;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           600;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.125; freq: 1.122462; amp: 1.3;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        stop_rec : `500 / (cur_time+0.001)`;
        scale: SCALE1;
}

point a_silent {
        time: 0.25; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle silent;
        scale: SCALE1;
        stop_rec : `500 / (cur_time+0.001)`;
}

point a2 {
        time: 0.625; bleedtime: `time * 0.3333`; freq: 0.890899; amp: 1.2;
```

```
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        /*
        time: 0.5; bleedtime: ‘time * 0.25‘; freq: 1; amp: 1;
        freq_i_mult: ‘0.1‘; freq_mult: ‘0.5‘;
        freq_e_mult: ‘1‘;
        */
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
        stop_rec : ‘250 / (cur_time+0.001)‘;
}


struct one20 {
        a1; a_silent; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partbase/NavaCall/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        time: 480; freq: basefreq*16; amp: 0.02;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           600;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.125; freq: 0.875; amp: 1.5;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
}

point a_silent {
        time: 0.25; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle silent;
        scale: SCALE1;
        stop_rec : `4`;
}

point a2 {
        time: 0.625; bleedtime: `time * 0.3333`;
        freq: `if ( freq < 50,  basefreq*4 , freq * 0.375)`;
        amp: `if ( freq < 50,  amp * 0.25, amp * 1.45)`;
```

```
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
}


struct one20 {
        a1; a_silent; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partbase/NavaCall2/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        time: 480; freq: basefreq*8; amp: 0.02;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           600;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.125; freq: 0.875; amp: 1.5;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
}

point a_silent {
        time: 0.25; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle silent;
        scale: SCALE1;
        stop_rec : `4`;
}

point a2 {
        time: 0.5; bleedtime: `time * 0.3333`;
        freq: `if ( freq < 50,   basefreq * 2, freq * 0.375)`;
        amp: `if ( freq < 50, amp * .7 , amp * 1.5)`;
```

```
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
}


struct one20 {
        a1; a_silent; a1; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partbase/EndNavaCall/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;


point inits {
        time: 60; freq: basefreq*16; amp: 0.05;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           200;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.125; freq: 0.875; amp: 1.5;
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle;
        scale: SCALE1;
}

point a_silent {
        time: 0.25; freq: 2; amp: 1.05;
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle silent;
        scale: SCALE1;
        stop_rec : ‘4‘;
}

point a2 {
        time: 0.625; bleedtime: ‘time * 0.3333‘; freq: 0.375; amp: 1.5;
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
```

```
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle;
        scale: SCALE1;
}


struct one20 {
        a1; a_silent; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partone/Makefile

```
include $(HOME)/etc/Makefile

CMUSIC=cmusic
TOSFFLAGS=-R44100 -c2
DIRS= End.descends EndNavaCall Flight NavaCall NavaCall2 Opening1 Opening2
TMPFILES= sp.list
PRODUCTS=partone2.sf partone.sf

all: dirs $(PRODUCTS)
partone.sf: partone.sc \
	End.descends/singsine.sf \
	EndNavaCall/singsine.sf \
	Flight/flighthigh.sf \
	Flight/flightlow.sf \
	NavaCall2/singsine.sf \
	NavaCall/singsine.sf \
	Opening1/singsine.sf \
	Opening2/singsine.sf
	$(CMUSIC) partone.sc  | tosf -R44100 -c4 partone.sf

partone2.sf: partone2.sc \
	End.descends/singsine.sf \
	EndNavaCall/singsine.sf \
	Flight/flighthigh.sf \
	Flight/flightlow.sf \
	NavaCall2/singsine.sf \
	NavaCall/singsine.sf \
	Opening1/singsine.sf \
	Opening2/singsine.sf
	$(CMUSIC) partone2.sc  | tosf -R44100 -c2 partone2.sf

partone.wav: partone.sf
	sox partone.sf partone.wav


partone2.wav: partone2.sf
	sox partone2.sf partone2.wav

dirs:
	for i in $(DIRS); do \
		cd $$i; make; cd ..; \
	done

include $(HOME)/etc/MakeEnd
```

partone/partone.sc

```
#include <carl/cmusic.h>
set list = sp.list;
set funclength = 128K;
QUAD(7,20);
set revscale = 0;
set t60 = 3;
set cutoff = -60dB;
set rate = 44100;

var 0 s1 "./Opening1/singsine.sf"; {290' sparse good opening}
var 0 s2 "./NavaCall/singsine.sf"; {320; mid-sparse}
var 0 s3 "./NavaCall2/singsine.sf"; {560; mid-sparse}
var 0 s4 "./Opening2/singsine.sf"; {240'open sprse,dense end}
var 0 s5 "./End.descends/singsine.sf"; {                150'' dense}
var 0 s6 "./EndNavaCall/singsine.sf"; {60'' mid-sparse}
var 0 s7 "./Flight/flightlow.sf"; {60'' mid-sparse}
var 0 s8 "./Flight/flighthigh.sf"; {60'' mid-sparse}

#define OUTPUT  SPACE(b9,1) b2 b3  0 1 0dB


ins 0 one;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
{env}           seg  b4 p5 f4 d 5sec 0 15sec;
                sndfile b1 1 1 s1 1 0 -1  d d;
                mult b9 b1 2 b4;
                OUTPUT;
end;

ins 0 two;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s2 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 three;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s3 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 four;
```

```
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s4 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 five;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s5 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 six;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s6 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 seven;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s7 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 eight;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s8 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

GEN3(f4) 0 1 1 0;
SINE(f5);
COS(f6);
{
GEN2(f5) 1 1;
GEN2(f6) 0 1 0;
}
```

```
note  0    four   250 0dB  240Hz -10    2sec    2sec;
note  0    one    250 -3dB   240Hz   10   20sec   20sec;
note 52.50 two    300 -6dB   240Hz  -8   10sec   10sec;
note 80 three     240   0dB  240Hz  12    4sec    4sec;
note 90    four   250 0dB    240Hz -12   10sec   10sec;
note 90    one    250 0dB    240Hz   8   2sec   2sec;
note 110 three    240  -6dB  240Hz  12    5sec    5sec;
note 120 seven    180  -6dB   240Hz  12   2.5sec  2.5sec;
note 120 eight    180  -6dB   240Hz  -12          2.5sec  2.5sec;
note 140 six      140 -12dB  240Hz  8 5sec 5sec;
note 170 five     130  -12dB  240Hz  4 20sec 20sec;

sec;
ter 4;
```

partone/partone2.sc

```
#include <carl/cmusic.h>
set list = sp.list;
set funclength = 128K;
STEREO(2,20);
set revscale = 0;
set t60 = 3;
set cutoff = -60dB;
set rate = 44100;

var 0 s1 "./Opening1/singsine.sf"; {290' sparse good opening}
var 0 s2 "./NavaCall/singsine.sf"; {320; mid-sparse}
var 0 s3 "./NavaCall2/singsine.sf"; {560; mid-sparse}
var 0 s4 "./Opening2/singsine.sf"; {240'open sprse,dense end}
var 0 s5 "./End.descends/singsine.sf"; {                150'' dense}
var 0 s6 "./EndNavaCall/singsine.sf"; {60'' mid-sparse}
var 0 s7 "./Flight/flightlow.sf"; {60'' mid-sparse}
var 0 s8 "./Flight/flighthigh.sf"; {60'' mid-sparse}

#define OUTPUT  out  b9 b9

ins 0 one;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
{env}           seg  b4 p5 f4 d 5sec 0 15sec;
                sndfile b1 1 1 s1 1 0 -1  d d;
                mult b9 b1 2 b4;
                OUTPUT;
end;

ins 0 two;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s2 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 three;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s3 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 four;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
```

```
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s4 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 five;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s5 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 six;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s6 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 seven;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s7 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

ins 0 eight;
{env}           seg  b4 p5 f4 d 5sec 0 10sec;
{x}             osc  b2 p7 p8 f6 d;
{y}             osc  b3 p7 p9 f5 d;
                sndfile b1 1 1 s8 1 0 -1  d d;
                mult b9 b1 b4 4;
                OUTPUT;
end;

GEN3(f4) 0 1 1 0;
SINE(f5);
COS(f6);
{
GEN2(f5) 1 1;
GEN2(f6) 0 1 0;
}

note  0    four   250 0dB  240Hz -10    2sec    2sec;
```

```
note  0    one    250 -3dB   240Hz   12   20sec   20sec;
note 52.50 two    300 -6dB   240Hz  -8   10sec   10sec;
note 80 three     240   0dB  240Hz  10    4sec    4sec;
note 90    four   250 0dB    240Hz -10   10sec   10sec;
note 90    one    250 0dB    240Hz   8   2sec   2sec;
note 110 three    240  -6dB  240Hz  20    5sec    5sec;
note 120 seven    180  -6dB   240Hz  12   2.5sec  2.5sec;
note 120 eight    180  -6dB   240Hz  -12          2.5sec  2.5sec;
note 140 six      140 -12dB  240Hz  20 5sec 5sec;
note 170 five     130  -12dB  240Hz  10 20sec 20sec;

sec;
ter 4;
```

partone/Opening1/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        time: 240; freq: basefreq*16; amp: 0.01;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           600;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
        freqref:         basefreq;
}

/* time segmentation is in 7, 1/7, 2/7, 4/7 */

point a1 {
        time: 0.142857; freq: 0.875; amp: 1.5;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        stop_rec : `1000 / (cur_time+0.001)`;
        scale: SCALE1;
}

point a_silent {
        time: .285714; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle silent;
        scale: SCALE1;
        stop_rec : `500 / (cur_time+0.001)`;
}
```

```
point a2 {
        time: 0.571429; bleedtime: ‘time * 0.3333‘;
        freq: ‘if ( freq < 50,  basefreq * 4 , freq * 0.375)‘;
        amp: ‘if ( freq < 50,  amp * 0.5, amp * 1.45)‘;
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
        stop_rec : ‘125 / (cur_time+0.001)‘;
}


struct one20 {
        a1; a_silent; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partone/NavaCall/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        time: 300; freq: basefreq*16; amp: 0.02;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           600;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.125; freq: 0.875; amp: 1.5;
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
}

point a_silent {
        time: 0.25; freq: 2; amp: 1.05;
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle silent;
        scale: SCALE1;
        stop_rec : ‘4‘;
}

point a2 {
        time: 0.625; bleedtime: ‘time * 0.3333‘;
        freq: ‘if ( freq < 50,  basefreq * 4 , freq * 0.375)‘;
        amp: ‘if ( freq < 50,  amp * 0.25, amp * 1.45)‘;
```

```
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
}


struct one20 {
        a1; a_silent; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partone/Opening2/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        time: 240; freq: basefreq*2; amp: 0.05;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           600;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.125; freq: 1.122462; amp: 1.3;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        options: interpol;
        options: nophase;
        stop_rec : `500 / (cur_time+0.001)`;
        scale: SCALE1;
}

point a_silent {
        time: 0.25; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle silent;
        options: interpol;
        scale: SCALE1;
        stop_rec : `500 / (cur_time+0.001)`;
}

point a2 {
```

```
        time: 0.625; bleedtime: ‘time * 0.3333‘; freq: 0.890899; amp: 1.2;
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle;
        options: interpol;
        options: nophase;
        scale: SCALE1;
        stop_rec : ‘250 / (cur_time+0.001)‘;
}


struct one20 {
        a1; a_silent; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partone/NavaCall2/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        time: 240; freq: basefreq*8; amp: 0.02;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           600;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.125; freq: 0.875; amp: 1.5;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
}

point a_silent {
        time: 0.25; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle silent;
        scale: SCALE1;
        stop_rec : `4`;
}

point a2 {
        time: 0.5; bleedtime: `time * 0.3333`;
        freq: `if ( freq < 50,   basefreq * 2, freq * 0.375)`;
        amp: `if ( freq < 50, amp * .7 , amp * 1.5)`;
```

```
        amp_i_mult: ‘0.001‘; amp_mult: ‘0.5‘;
        amp_e_mult: ‘0.001‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: fcycle;
        options: nophase;
        scale: SCALE1;
}


struct one20 {
        a1; a_silent; a1; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partone/Flight/Makefile

```
include $(HOME)/etc/Makefile


PRODUCTS=flighthigh.sf flightlow.sf flighthigh.wav flightlow.wav

all: $(PRODUCTS)

flighthigh.sf: flighthigh.wav
	sox flighthigh.wav flighthigh.sf

flightlow.sf: flightlow.wav
	sox flightlow.wav flightlow.sf

flightlow.wav: flightlow.rs

include $(HOME)/etc/MakeEnd
```

partone/Flight/flightlow.rs

```
/*
 * the result of this score is a sound with 200 layers.  Each layer is
 * an amplitude modulated partial, and all partials are hormonically
 * related to each other.  The layers are scaled in time with the same
 * window, therefore, when we start the layers are temporally out of sync
 * with each other.  It is perhaps better to say that their synchronisity
 * has been streched.  When we get close to the point of climax, the
 * amplitude windows match each other in time and we start to hear the
 * temporal structures.  And with the way the score is set up, partials
 * leave the same way they came in, but just faster.
 */
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point init {
        time: 180; freq:  basefreq; amp: 2; rand: 0; rel: 10;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           200.0;
        srate:          44100;
        file:           "flightlow.wav";
        stop_rec:       3;
        loop:           1;
        freqref:        155.563;
        window:         "clarinet3":7516;
}

point a1 {
        time: 0.98; freq:  1.5; amp: 1.001; rand: 0; rel: 1;
        seed:   mainseed;
        amp_i_mult: `0.1`; amp_mult: `1`;
        amp_e_mult: `0.1`;
        amp_mult_ret: `0.5`;
        options: interpol;
        ch1: `1 - rec_level / 200.`;
        ch2: `rec_level / 200.`;
        scale: SCALE1;
}

point a2 {
        time: 0.015; freq: 1; amp: .9; rand: 0; rel: 1;
```

```
        amp_i_mult: ‘0.1‘; amp_mult: ‘1‘;
        amp_e_mult: ‘0.1‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: ainterpol;
        scale: SCALE1;
}

point a3 {
        time: 0.005; freq: 1; amp: 1.001; rand: 0; rel: 1;
        amp_i_mult: ‘0.1‘; amp_mult: ‘1‘;
        amp_e_mult: ‘0.1‘;
        amp_mult_ret: ‘0.5‘;
        seed:   mainseed;
        options: ainterpol;
        scale: SCALE1;
}

struct two8 {
        a2; a1; a3;
}

seed mainseed {
        value:          init;
        struct:         two8;
        seedobj:        snd;
}
```

partone/Flight/flighthigh.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point init {
        time: 180; freq: basefreq*20; amp: .2; rand: 0; rel: -10;
        seed:   mainseed;
}

sound snd {
        time:           180.0;
        srate:          44100;
        file:           "flighthigh.wav";
        stop_rec:       3;
        loop:           1;
        freqref:        155.563;
        window:         "clarinet3";
}

point a1 {
        time: 0.98; freq:  1.5; amp: 1.001; rand: 0; rel: 1;
        seed:   mainseed;
        options: interpol;
        amp_i_mult: `0.1`; amp_mult: `1`;
        amp_e_mult: `0.1`;
        amp_mult_ret: `0.5`;
}

point a2 {
        time: 0.015; freq: 1; amp: .9; rand: 0; rel: 1;
        seed:   mainseed;
        options: ainterpol;
        options: silent;
        amp_i_mult: `0.1`; amp_mult: `1`;
        amp_e_mult: `0.1`;
        amp_mult_ret: `0.5`;
}

point a3 {
        time: 0.005; freq: 1; amp: 1.001; rand: 0; rel: 1;
        seed:   mainseed;
        options: ainterpol;
        options: silent;
        amp_i_mult: `0.1`; amp_mult: `1`;
        amp_e_mult: `0.1`;
```

```
        amp_mult_ret: ‘0.5‘;
}

struct two8 {
        a2; a1; a3;
}

seed mainseed {
        value:          init;
        struct:         two8;
        seedobj:        snd;
}
```

partone/EndNavaCall/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        time: 60; freq: basefreq*16; amp: 0.05;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           200;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.125; freq: 0.875; amp: 1.5;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        scale: SCALE1;
}

point a_silent {
        time: 0.25; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle silent;
        scale: SCALE1;
        stop_rec : `4`;
}

point a2 {
        time: 0.625; bleedtime: `time * 0.3333`; freq: 0.375; amp: 1.5;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
```

```
        seed:   mainseed;
        options: fcycle;
        scale: SCALE1;
}


struct one20 {
        a1; a_silent; a2;
}

seed mainseed {
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

partone/End.descends/singsine.rs

```
#include <scales.h>
#include <notes.h>

#ifndef BASEFREQ
need to set BASEFREQ
#endif
var basefreq = BASEFREQ;

point inits {
        time: 120; freq: basefreq; amp: 0.2;
        seed:   mainseed;
        scale: SCALE1;
}

sound snd {
        time:           200;
        srate:          44100;
        file:           "singsine.wav";
        loop:           1;
        stop_rec:       1;
        window:         "nowin" ;
}

point a1 {
        time: 0.75; bleedtime: `time *.33333`; freq: 1.059; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        scale: SCALE1;
}

point a2 {
        time: 0.25; bleedtime: `time`; freq: 2; amp: 1.05;
        amp_i_mult: `0.001`; amp_mult: `0.5`;
        amp_e_mult: `0.001`;
        amp_mult_ret: `0.5`;
        seed:   mainseed;
        options: fcycle;
        scale: SCALE1;
}


struct one20 {
        a1; a2;
}

seed mainseed {
```

```
        value:          inits;
        struct:         one20;
        seedobj:        snd;
}
```

Appendix C

Examples of Pieces

The audio tape accompanying this dissertation includes the following three pieces:

- *No Flowers, No Incense, Only Sound* (2000, 11'): Refer to Appendix B for notes on this piece.
- An excerpt of *A-Window* (2001, 9') from a concert recorded at Center for Research in Computing and the Arts, UCSD on Dec. 2001, with Shahla Sarechani on vocals, and Keyavash Noura'i on violin and Kamancheh. In this piece electronic timbres were prepared using RGS and Lîla was used as an instrument for real-time improvisation.
- *Mirrors of the Past* (2001, 11'), an improvisation with Ivan Manzanilla on percussion. Lîla was used as an instrument for real-time improvisation. No pre-made timbres were used in this piece.

Bibliography

Adorno, T. W. (1973). *Negative dialectics. Translated by E. B. Ashton.* New York, Seabury Press.

Adorno, T. W. (1985). *Philosophy of Modern Music.* New York : Continuum.

Adorno, T. W. (2000). *Metaphysics.* Stanford, California: Stanford University Press.

Alizadeh, H., H. Dehlavi, M. Pourtorab, and A. Rashidi (1991). Barasi-e dore-e karshenasi mousighi-e daneshgah/analysis of the university's curriculum. *Book of Mahour 1*, 7–15.

Ashouri, D. (2000). *Mysticism and Rendy in Poetry of Hafez (in Persian).* Tehran, Iran: Nashr-e Markaz.

Auner, J. (2003). *A Schoenberg Reader.* New Haven & London: Yale University Press.

Bateson, G. (1979). *Mind and Nature: A Necessary Unity.* New York: Dutton.

Borgo, D. (1999). *Reverence for Uncertainty: Chaos, Order, and the Dynamics of Musical Free Improvisation.* Ph. D. thesis, UCLA.

Canetti, E. (1962). *Crowds and power. Translated from the German by Carol Stewart.* New York : Viking Press.

Chipp, H. B. (1968). *Theories of Modern Art.* Berkeley, California: University of California Press.

Dahlhaus, C. (1990). *Studies on the Origin of Harmonic Tonality.* Princeton, NJ : Princeton University Press.

Darvishi, M. R. (1994). *Negah be Gharb (Westward Look: A Discussion on the imapct of western music on the iranian music).* Tehran: Mahoor Cultural Institute, 1994.

Darwin, C. (1970). *The Origin of Species.* New York: W. W. Norton and Company.

Dauben, J. (1979). *Georg Cantor.* Cambridge, Massachusetts: Harvard University Press.

Derrida, J. (1976). *Of Grammatology.* Baltimore: John Hopkins University Press.

Derrida, J. (1978a). *Edmund Husserl's Origin of Geometry: An Introduction.* Stony Brook, N.Y. : N. Hays ; Boulder, Colo. : distributed by Great Eastern Book Co.

Derrida, J. (1978b). Structure, sign, and play in the discourse of the human sciences. In *Writing and Difference*, pp. 278–293. London: Routlege & Kegan Paul. tr. of 'L'ecriture et la difference' by A. Bass.

Derrida, J. (1978c). Violence and metaphysics. In *Writing and Difference*, pp. 79–153. London: Routlege & Kegan Paul. tr. of 'L'ecriture et la difference' by A. Bass.

During, J. (1991). *Le Prepertoire-Modele de la Musique Iranienne.* Tehran: Soroush.

Farhat, H. (1990). *The Dastgah Concept in Persian Music.* Cambridge, UK : Cambridge University Press.

Farrokhzad, F. (1989). *Majmou-e Ash'ar Forough (The Collection of Poems by Forough Farokhzad).* Germany: Nawid.

Firdawsi, A. a.-Q. (1987). *Shahnameh.* New York: Bibliotheca Persica.

Hafez (1994). *Hafez* (6th ed.). Edited by Ahmad Shamloo. Tehran: Morvarid Publishing.

Hafez (1995). *The Hafez Poems of Gertrude Bell.* Bethesda, Maryland: IBEX Publishers Inc, Iranbooks.

Hajarian, M. (1999). *Ghazal as a Determining Factor of the Structure of the Iranian Dastgah.* Ph. D. thesis, University of Maryland (College Park, Md.). School of Music.

Harvey, D. (1990). *The Condition of Postmodernity: An Enquiry into the Origins of Cultural Change.* Cambridge, Mass.: Blackwell.

Hayles, N. K. (1990). *Chaos Bound: Orderly Disorder in Contemporary Literature and Science.* Ithaca, N.Y.: Cornell University Press.

Hedayat, S. (1963). *Taranihay-e Khayyam.* Tehran: Amir Kabir.

Hillman, M. (1987). *A Lonely Woman: Forugh Farrokhzad and her poetry.* Washington, D.C. : Mage Publishers : Three Continents Press.

Hofstadter, D. R. (1979). *Gödel, Escher, Bach.* New York: Basic Books.

Jameson, F. (1991). *Postmodernism, or, The Cultural Logic of Late Capitalism.* Durham: Duke University Press.

Karimi-Hakkak, A. (1978). *An Anthology of Modern Persian Poetry.* Boulder, Colorado: Westview Press.

Karimi-Hakkak, A. (1995). *Recasting Persian Poetry: Scenarios of Poetic Modernity in Iran.* Salt Lake City: University of Utah Press.

Khayyam, O. (1970). *The Rubaiyat of Omar Khayyam.* Japan: Shumposha Photo Printing Co. Edited by H.A.N. Esfandiary.

Kierkegaard, S. (1983). *"Fear and Trembling" and "Repetition".* Princeton, New Jersey: Princeton University Press.

Lavine, T. (1988). *From Socrates to Sartre: the philosphic Quest.* New York: Bantam Books.

Lerdahl, F. (1983). *A Generative Theory of Tonal Music.* Cambridge, Mass. : MIT Press.

Lewis, G. E. (1997, Spring). Improvised music after 1950: Afrological and eurological perspectives. *Black Music Research Journal 16*(1), 91–123.

Lindenmayer, A. (1968). Mathematical models for cellular interaction in development, I-II. *Journal of Theoretical Biology 18*, 280–315.

Lorenz, E. N. (1963, March). Deterministic nonperiodic flow. *Journal of the Atmospheric Sciences 20*, 130–141.

Mandelbrot, B. B. (1983). *The Fractal Geometry of Nature.* San Fransisco: Freeman.

Maroufi, M. (1973). *Radif-e haft dastgah musiqi-e Irani.* Tehran: Ministry of Art and Culture.

Massoudieh, M. T. (1995). *Radif-e avazi-e musiqi-e sunnati-e Iran: beh ravayat-e Mahmud Karimi*. Tehran : Anjuman-i Musiqi-i Iran.

Maturana, H. R. and F. J. Varela (1980). *Autopoiesis and Cognition*. Dordrecht, Holland ; Boston : D. Reidel Pub. Co.

Maturana, H. R. and F. J. Varela (1992). *The Tree of Knowledge*. Boston and London : Shambhala.

Milani, A. (2004). *Lost Wisdom: Rethinking Persian Modernity*. Washington, D.C. : Mage Publishers.

Mingers, J. (2001). Information, meaning, and communication: An autopoietic approach. In F. Geyer and J. van der Zouwen (Eds.), *Sociocybernetics: Complexity, Autopoiesis, and Observation of Social Systems*, pp. 109–123. London: Greenwood Press.

Moore, F. R. (1982). The computer audio research laboratory at UCSD. *Computer Music Journal 6*(1), 18–29.

Moore, F. R. (1990). *Elements of Computer Music*. Englewood Cliffs, N.J.: Prentice Hall.

Nachmanovitch, S. (1990). *Free Play: Improvisation in Life and Art*. Los Angeles: J.P. Tarcher, Inc.; New York: G. P. Putnam's Sons.

Nettl, B. (1987). *The Radif of Persian Music: Studies of Structure and Cultural Context*. Champaign, Ill.: Elephant & Cat.

Nietzsche, F. (1960). *Joyful Wisdom*. New York: Frederick Ungar Publising Co.

Nietzsche, F. (1977). *Nietzsche Reader*. New York: Penguin Books.

Nietzsche, F. (1990). *Twilight of the Idols ; and, The Anti-Christ*. New York: Penguin Books.

Nooshin, L. (2003). Improvisation as 'other': Creativity, knowledge and power — the case of iranian classical music. *Journal of the Royal Musical Association 128*(2), 242–296.

Norton, R. (1984). *Tonality in Western Culture: a Critical and Historical Perspective*. University Park: Pennsylvania State University Press, c1984.

Piston, W. (1978). *Harmony* (4th ed.). New York : W. W. Norton.

Puckette, M. (1996). Pure data: another integrated computer music environment. In *Proceedings, International Computer Music Conference*, pp. 269–272. San Francisco: ICMA.

Racy, A. J. (1991). Historical worldviews of early ethnomusicologists: An east-west encounter in cairo, 1932. In P. B. Stephen Blum and D. Neuman (Eds.), *Ethnomusicology and Modern Music History*, pp. 68–91. Urbana, Illinois: University of Illinois Press.

Reti, R. (1978). *Tonality, Atonality, Pantonality.* Westport, Connecticut: Greenwood Press.

Rosen, C. (1972). *The Classical Style.* New York: W. W. Norton.

Rosen, C. (1988). *Sonata Forms.* New York: W. W. Norton.

Rumi, M. J. a.-D. (1991). *Masnavi-e Ma'navi.* Tehran: Sazeman-e Entesharat Javidan. With an introduction by Badi-alzaman Forouzanfar.

Rumi, M. J. a.-D. (1995). *The Essential Rumi.* San Francisco, CA : Harper. Translated by Coleman Barks, with John Moyn.

Russell, B. (1972). *A History of Western Philosophy.* New York: Simon and Schuster.

Schoenberg, A. (1975). *Style and Idea.* Berkeley, Los Angeles: University of California Press.

Schoenberg, A. (1978). *Theory of Harmony.* Berkeley, Los Angeles: University of California Press.

Schrödinger, E. (1967). *What is Life? & Mind and Matter.* New York: Cambridge University Press.

Schroeder, M. R. (1991). *Fractals, Chaos, Power Laws.* New York: W.H. Freeman.

Sepanta, S. (1990). *Chashm Andaz-e Musighi-e Iran.* Tehran: Mashal Publishing.

Sepehri, S. (1989). *Hasht Ketab.* Tehran, Iran: Golestan Publishing.

Shamloo, A. (1992). *Madayeh-e bi Sale.* Spanga, Sweden: Arash Tryck & Förlag.

Small, C. (1998). *Musicking: The Meanings of Performing and Listening.* Hanover: University Press of New England.

Stockhausen, K. (1959). *.....how time passes.....* (English Version ed.), Volume 3. Bryn Mawr, Pennsylvania: Theodore Presser Co.

Stockhausen, K. (1991). *Stockhausen on Music.* London, New York : Marion Boyars.

Subotnik, R. R. (1996). *Deconstructive Variations: Music and Reason in Western Society.* Minneapolis : University of Minnesota Press.

Varela, F. J. (1991). *The Embodied Mind : Cognitive Science and Human Experience.* Cambridge, Mass. : MIT Press.

Varela, F. J. and J.-P. Dupuy (Eds.) (1992). *Understanding Origins : Contemporary Views on the Origin of Life, Mind, and Society.* Dordrecht [Netherlands]; Boston: Kluwer Academic Publishers.

Vieira de Carvalho, M. (1999). 'New music' between search for identity and autopoiesis: Or, the 'tragedy of listening'. *Theory, Culture & Society 16*(4), 127–135.

Von Foerster, H. (2003). *Understanding Understanding: Essays on Cybernetics and Cognition.* New York : Springer.

Voss, R. F. and J. Clarke (1978). "$1/f$ noise" in music: Music from $1/f$ noise. *Journal of Acoustical Society of America 63*(1), 258–263.

Yadegari, S. D. (1991). Using self-similarity for sound/music synthesis. In *Proceedings, International Computer Music Conference*, pp. 424–427. San Francisco: ICMA.

Yadegari, S. D. (1992). Self-similar synthesis — on the border between sound and music. Master's thesis, Massachusetts Institute of Technology, Cambridge, MA.