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Yrjö Mikkonen

On Conceptualization of Music

Applying Systemic Approach to Musicological Concepts, with Practical Examples of Music Theory and Analysis

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UNIVERSITY OF JYVÄSKYLÄ

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ABSTRACT

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This research is a contribution to the research of emergence in the arts. Two cardinal principles of the nature of music and related musicology have not yet been widely understood: 1. Music and the conceptuality of it is not the same thing, although in practise these two are considered cognitively equal. The ontic essence of music and its ontological definitions, therefore, are mixed up, resulting in the common mistake of normative simplification of musicological phenomena. 2. Musicological conceptuality presented in traditional music theory and analysis is systemized but not systemic. These fatal mistakes are prevalent in tradition-based professional music pedagogy which using a typically objectivist and deductive approach treats concepts as rigid and closed structural categories and lacks systemic conceptual cohesion. In the scientific musicology, the new school since the1980s depressed the faith in older formal musicology. This situation requires an emergence to a new conceptual level. Systemic approach and complex systemicity explain musicological concepts in a new way. At the same time the concept of musicology needs to be re-examined, and even redefined. This interdisciplinary research does not prove the validity of any given system, but stresses the importance of systems thinking and abductive systemic approach and introduces various possibilities of systemicity and its creative use. It examines how complex systemicity theoretically appears in cybernetics and systems sciences as projected to fields dealing with concepts, terms, language, and communication. These relate to theories or paradigms of terminology science, feature theories of categorization and semiotics. Constructivism, which has become popular today as a pedagogical philosophy, represents cybernetic systemicity. The research culminates in the concept of the systemicity umbrella, which, along with other findings, is a result of the cardinal abductive research method. Along with new concepts, the research offers several neoterms. The results promise several applications of systemic approach in musicology, which are applicable to musicological education, as well.

Keywords: music, musicology, interdisciplinarity, concepts, systemicity, abduction, music education.

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PREFACE

"We model the world by the aid of concepts and concept systems", writes Anita Nuopponen in the introduction of her dissertation (*Begreppssystem för terminologisk analys* 1994). We live in the world of concepts; at least our mind does. Psychologists often say that fantasy is reality to our psyche; what we experience conceptually in our mind we tend to equate with the world, reality, and truth. This affects on how we act and behave.

Writing a research is a conceptual mind-journey. You can reach the destination through alternative roads. What you have in the end are the conceptual experiences of the journey, part of which you forget part of which you remember. Out of some of this, you collect an organized file of memories of that conceptual journey. Despite their illusory nature, concepts are important to us, to our mind, intellect, psyche, and identity. Through concepts, we relate to the reality, although they are not the reality itself. Self-conscious conceptuality appears as logical conceptuality, and there are many forms of logic. Still, in education and pedagogy, as well as in the main part of science to day, the old "fail-proof" deductivity is felt to relate to reality in a concrete and direct way. The reality, however, is complex. Music is complex; thus, musicological conceptuality is complex.

Writing of this research has not been possible for me without considerable assistance. I wish to extend my first thanks to The Academy of Finland, which supported my work with a handsome grant during 18 months. During the research, I made my family stand my whims of various moods and creativity – they withstood it all laudably. I thank deeply my boss, Rector Ahti Alatalo at the Oulu Conservatoire of Music and Dance, my workplace, for arranging me the time of 18 months to write. I thank Professor Matti Raekallio at the Sibelius Academy, as well as Professor Jukka Louhivuori at the University of Jyväskylä, Department of Music, for supporting my grant application. I thank warmly Professor Matti Vainio and Dr. Yrjö Heinonen at the Department of Music for acting as my research tutors, and Dr. Raimo Puustinen, M.D. for advising me to study semiotics in great detail. My deepest thanks go to Dr. Jouni Suistola at the Near East University, Cyprus, for his keen suggestions concerning my concept of the systemicity umbrella as well as for his unvawering and invaluable philosophical support. I'm grateful to Dr. Pirkko Anttila at Metodix for her open-mindedness and encouragement. I thank Atilla Yilmazkurtag for his advice on Turkish music. Dr. Will C. van den Hoonaard from the University of New Brunswick, Cananda sat with me two hours at my home in November 2000, looked at my manuscript and gave me most valuable hints for writing: "Keep it simple! Forget now theories, they hamper you. Fill in later." I thank you, Will, for your cool advice. I am indebted to Virpi Kalliokuusi at Tekniikan sanastokeskus for trusting me with the then unpublished *International Standard ISO/FDIS 1087-1: 2000 (E/F)* and for linking me with Dr. Anita Nuopponen. I also thank Dr. Lenni Haapasalo, Dr. Monica Zitzen, Dr. Klaus Krippendorff,

and Dr. E. Igenbergs, for letting me to contact them for advice. I thank Veikko Hovinen, a Research Scientist at the University of Oulu, who saved the necessary fragments from the depths of my collapsed computer. He has been my invaluable helpdesk during this project. Mary Gregory and Robert Kinghorn have proofread my text, and I thank them for their valuable sacrifice. I thank my wife Shahnaz, and my daughter Soheila, for their valuable hints and help with the graphics and layout. I am very thankful to my students who put me "up against a wall", challenging and presenting me with tricky abductive questions. My thanks also go to Kari Syvänen, Licentiate of Philosophy, for our inspiring discussions on musicology and for the joyful car rides between Oulu and Jyväskylä.

My mind-journey has not been an easy one. The intellectual challenges from colleagues made me even more firm to persevere and gave me many new viewpoints to improve my results. The most important support has come from the experts of systems research. Therefore I thank most deeply the Distinguished Professor in Binghamton University, New York, Dr. George Klir, the Editor-in-Chief of the IJGS, for admitting my research paper Aspects on Music, Conceptuality, Systemicity, and Education to the International Journal of General Systems. Likewise am profoundly indebted to Dr. George E. Lasker from University of Windsor, Canada, and the President of the IIAS for the faith and openness he has had towards my thinking, and I thank most warmly Dr. James Rhodes, an Assistant Professor in Jacksonville University, Florida, for all the symphathy and support he has given to me. These distinguished experts have acted as my readers.

And finally, I am profoundly indebted to Professor Emeritus Martti Mela, previously at the University of Oulu, a biophysician and systems thinker, without whose initiative, personal support, and untiring enthusiasm and faith in my groping towards systemicity, this research would never have appeared.

In Oulu, Finland, March 2004

Yrjö Mikkonen

"No problem can be solved from the same consciousness that created it.
We have to learn to see the world anew." Albert Einstein[1]

"Top-level theories of science are not deduced from observable facts;
they are constructed by a creative act, and their usefulness can be demonstrated
only afterwards. Einstein wrote: "Physics is a developing logical system of
thinking whose foundations cannot be obtained by extraction from
past experience according to some inductive methods,
but come only by free fantasy". V.Turchin[2]

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1 Available in many sources, e.g. at the home page of Faculty of Medicine, University of Pretoria. http://www.up.ac.za/academic/medicine/orientat.htm (16.01.2002).

2 *Concept*. *Principia Cybernetica Web*. http://pespmc1.vub.ac.be/CONCEPT.html (31. 07.2000).

CONTENTS

All translations from the Finnish and Swedish sources are mine. The picture on the frontispiece is a manipulation of M.C. Escher's Litograph *Bond of Union*, which I have purposed to illustrate the concept of interconceptuality as well as the fact that in our perception reality (onticity), like music, intermingles with its ontological representation.

A condenced version of this dissertation, *Aspects on Music, Conceptualization, Systemicity, and Education* by the author, has appeared in the International Journal of General Systems. Taylor & Francis. Taylor & Francis Group,Vol. 33:1 (February 2004) pp.15-62.

1 INTRODUCTION

What is the purpose of science? Its purpose is undoubtedly to prove and verify. An equally important purpose is to inspire intellectually onto new theoretical vistas. In that case the most important factor is not to prove but to be convincing. What is completely new cannot be easily proven because the new cannot be verified with the old. Then, it must suffice that this new is sufficiently convincing. It also means that a research project is experimental. I feel that my research is an experimental one. It is a research of a conceptual emergence but I challenge that this conceptual emergence also has general validity. Emergence research is one of the hottest issues of today's systems research, and one of the features of emergence is that novel levels of description create novel levels of perception of emergence[3]. This research aims at reaching a new conceptual level through new levels of description[4].

I can think of two possible ways how a scientific research proceeds from given conceptual premises. The first possibility is that at the start of a research there is a selected core concept, or an idea, which is like an organic concept seed laden with conceptual potentialities, features and inherent logical rules in order to grow into a diversified concept tree with branches, leaves, fruits and flowers. The growth, or emergence, as the present systems researchers would say, happens in a suitable ontological environment and the result is a complexity of conceptual differentiation with various connections due to something that is still original. This is what has happened inside various sciences. An original school of thought has gradually grown into a branch of science, or even a paradigm by absorbing various concept elements from its conceptual environment. The diversification of the conceptual environment in all science has increased the possibilities of linking of very different concept fields; the result is conceptual hybridization. Modern musicology is an example of this kind of conceptual diversification. Up to the 1980s it was perhaps " a species". It was musicology that studied music itself; today it is a hybrid, "musicology of

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3 What Is Emergent – a discussion forum in the Internet. http://emergent. brynmawr. edu/index.cgi/WhatIsEmergenceWhatIsEmergent (14.02.2003).

4 See 5.2. Systemic Approach – a New Emerging Paradigm.

the provisional"[5] that allows inside itself nearly any king of research, even the use of paramusical concepts.

Another possibility of a scientific research process is that there is a "ready" universe of conceptualization with "concept stars, concept planets, concept nebulas, concept meteors" that form an enormous entropic, or at least a very diversified universe of conceptual complexity. Semiotics, terminology science, categorization theories, theories of concepts, systems, etc. are like concept stars, and concept planets; they free or bound elements in an enormous universe of entropic, at least of complex conceptuality. They have become into existence somehow and act as concept attractors[6] gathering into themselves more components and layers and starting to live their own diversified star – planet lives. Because these stars and planets float in the same universe of conceptuality they share common concept-atoms and elements. What keeps this universe of conceptuality together are the various laws of systemicity/systemics/systems. The existence of these laws with their features can be revealed by studying the essential features of these "stars and planets" and finding out in what ways various laws of systemicity link them together and affect on them. The study of these laws can be called *systemic approach*. Understanding this kind of systemicity through these laws is a sign of new conceptual emergence.

My research is meant for musicologists with an open mind. I wish to show what concepts are like according to various but carefully selected scientific writings and how concepts used in music description and musicology, especially the concepts of music theory and analysis, match these various descriptions. It is necessary, then, that the reader willingly joins this game and lets himself/herself to be lead to and through new fields of conceptuality and to come back to musicology again and again. It is also necessary that the reader leaves behind the temptation of safe academic pedantry and lets himself/herself to be come inspired and convinced – to perceive the new emergent level.

It is impossible for any researcher to keep abreast with latest truth of a research field, because there is no such latest truth. Therefore, I hope I am forgiven for minor details of truth value, because singular trees of a forest are not as important as the forest itself.

In order to describe complexity I have to abandon reductionism, as well as the law of parsimony, or Ockhams razor, although many researchers see it as a guiding star, including some systems researchers. There are many good reasons why this law is not applicable in several cases[7]. In my case the answer is clear: I do deal with several purposefully selected theoretical viewpoints during the research process because they are my research material. They, however are not the theoretical outcome of the research. The law of parsimony could be acceptable only if the research result would be two or more competing theories. In my case the resulting theoretical outcome is only one: a systemic approach. To be precise, I have **not** written a research on systemic conceptualization of

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5 See 1.1.1.
6 See 3.2.2.
7 Vaknin, S. Parsimony – The Fourth Substance. http://samvak.tripod. com/parsimony.hmtl (14.03.2003).

music: I have written a research on **how I think about** systemic conceptualization of music.

If I challenge musicologists I also challenge systems researchers for their plea for interdisciplinarity, especially in systems philosophy. So far, I have not encountered any research project on systems and concepts. Therefore, this research is *a mixture of subjective thinking – abduction – projected to objective data* – anyone can check them from the sources. The aim of this research is to develop theoretical openings of the conceptualization of ontic music, which, in a complex way, is intertwined with musicology that represents it ontologically. The study involves the main questions of music and musicology (as redefined later), concepts and language, concepts and signs, concepts and information, systems and complexity. The main plot and process of my writing is an "abductive excursion" in the world of systemicity, where the beforementioned factors integrate; the side plot is communication and musicological education (mainly music theory and analysis in the traditional sense). My thinking appears indirectly in the choice of the research material but more so in the numerous comments and interpretations on what I have found in the objective data. All these factors are intertwined at the conceptual level, although musicological conceptuality is the focus to which my theoretical findings repeatedly return. This approach can be considered, if you like, as a new paradigm in musicology. The form of this interdisciplinary research can be divided into two sections; the first part (Chapters 1 – 5) is theoretical, the second one (Chapter 6) is practical application of the theoretical findings[8].

Besides the traditional literary sources (books and articles), the main source material of this research focuses on articles, handbooks, thesauri, encyclopaedias, and dictionaries in the Internet. For the purposes of this research, I have taken along mainly such (encyclopedic) literary material that has clearly an authoritative and normative status because such information, or conceptuality, spreads fast and takes the role of a dominant code. I have wished to tackle specifically the problems of normative and dominant conceptualization focusing to musicological concepts of the level of study course musicology[9].

1.1 On Musicology and Musicological Conceptualization

As this reseach aims at examining musicological conceptuality and musicological concepts, it is vital, before focusing to the more detailed issues, to deal with the nature of musicology, how is it understood today and what is related to it in respect of my research interests. It is necessary to comment, and maybe even define, first *musicology as science*, its present situation and the questions it involves in the conctext of this research. It is also necessary to

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8 Something similar appears to be Lakoff's *Women, Fire, and Dangerous Things* (1987).

9 On study course musicology, see 1.1.6.

comment the relationships of *musicology and music*, *musicology and music theory*, *musicology and music analysis*. Science and its findings are also used in pedagogy of that science and in general basic education; hence, in this research, it is necessary to comment the relation of *musicology and music pedagogy*. After that, in this main chapter, I deal with *musicological conceptualization* in connection of which I give a suggestion of introducing a new level of musicology and introduce two viewpoints to *musicological concepts*, namely the *liberal view* and the *normative view*, as I call them.

1.1.1 Musicology Today – Musicology of the Provisional

Research of musicological concepts cannot be carried out without connecting them to the concept field or concept system they belong: music and music research. The situation of present musicology can be looked from the two angles of *speculative* and *regulative* musicology introduced by Dahlhaus[10]. The first one is the viewpoints of those authorities, such as most of the 24 writers of *Rethinking Music*[11], a collection of papers representing a group of the present leading musicologists. According to them the present field of musicology is very divided and indefinite and they criticize some other musicologists due to their (as the book puts it) outdated and questionable approaches and methods. The tone of the book is careful and uncontroversial; compromising in the prolonged question of the present status of music theory and analysis as a part of musicology. Their writings, according to Cook and Everist, reflect "the conclusion that no final, universally applicable decision on the matter is possible or even desirable."[12] Cook and Everest, the editors of *Rethinking Music* coin the identity of the present musicology as "musicology of the provisional".[13] The articles of the book reflect what could be called speculative musicology which consideres the field of musicology open and "virgin" and searches alternatives to the future of musicology. Speculative musicology could also be called *inductive musicology* because there seems to be no certaing cue in sight of what is coming next, only aspirations.

The second angle is the viewpoint that serves the needs of *practical musicology*. At its best it also serves the needs of musicological education. I include to this all levels of intitutionalized music education, from universities and polytechnics to professional music education. In most institutions this is called either theoretical studies, or general subjects of music. This field of musicology is more *normative*, or even very normative because it wishes to give concrete tools to its users. This is regulative musicology.

Although some of the present musicologists consider Dahlhaus an old-fashioned authority, yet I maintain that his division of musicologies is justified

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10 Dahlhaus in *Grovemusic*. http://www.grovemusic.com/shared/ views/ article. html?section=music.46710.2.2 (17.09.2001).
11 Edited by Cook & Everist 1999. See the preface.
12 Cook & Everist 1999: xi.
13 Cook & Everist 1999: x.

in a wide sense: speculative musicology can also be considered descriptive and/or inductive, and regulative musicology normative and/or deductive.

It is self-evident that in institutions of music research and education the levels of speculative and regulative musicologies intermingle in a varying degree. An example that I have taken into my research is a musicological authority, *The New Grove Dictionary of Music and Musicians*, *2nd ed. 2000*, which represents regulative musicology. The regulative viewpoint of musicology is conceptually more structured and negentropic; it is more definite than the speculative one which leaves all doors open.

In the regulative school of musicology the attitude towards music analysis and theory is more lenient and taken for granted (due to the needs of the prevailing educational philosophy) than in the speculative school. Yet, it is interesting to notice that *Rethinking Music*, the writers of which represent the speculative "school", is actually very traumatic on the issue of music analysis and theory. Quoting the preface (p. xii): "There are widespread of rumors…of the death of analysis…if analysis is understood as Kerman understood it."[14] The phantom of formalism lurks behind in the person of Kerman whose name appears at least thirty times in the preface of eight pages. The reasons of the ongoing trauma is explained in this research in Chapter 1.6.2 Schism in Modern Musicology. Narration vs. Analysis.

Whether one agrees or not with the terms of speculative and regulative, at least one thing is certaing of this division. According to Cook, Philip Bohlman sees musicology as a "political act…musicology not only describes but prescribes through its acts of interpretation. Musicology in short, doesn't just reflect practise; it helps mould it".[15] I would call this also, if not politics, at least ideology. In an interesting way *Rethinking Music* is ambivalent about the role of music analysis and theory – to have or not to have…?

While examining agendas of musicological conferences, articles of musicological journals and the objectives and methods of academic musicological research one can feel concretely that the present field of musicology as science is very divided and indefinite; the situation is truly speculative. This situation is reported in more detail in books, such as *Rethinking Music*, according to which musicology of today is characterized by the loss of identity, confidence and clear direction. The symptoms of this uncertainty, as the preface puts it, are: the contrast between the critical self-awareness of certain musicologists and the practical musicologists with no ideology or intellectual ambition; rejection, or ambivalence of past and present musicological authorities; uncertainty of disciplinary integrity; "post-everything" agenda of musicology; doubts about musicology as a discipline with identity; loss of faith in the status of musicology as profession; liberal thinking and avoidance of value judgements; expansion of musical fields to be studied; the long-awaited equal status of ethnomusicology inside musicology; the more fuzzy boundaries between musicology and other humanities, etc.

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14 Cook & Everist 1999: xii
15 Cook & Everist 1999: 243.

One of the critical reasons of the diversification of musicology as science, as the preface of the book points out, was the activity of Kerman, who in the 1980s launched a furious attack against historical and systematic musicology (music theory and analysis, especially neoserialism of Babbitt and set theory of Forte) coining them as positivism and formalism, and felt aversion towards ethnomusicology.[16] The result was that the assumed coherent identity of the traditional outlook of musicology collapsed and much of the research – although not all because many musicologists did not react on Kerman's criticism – of the 'purely musical' – was replaced by more or less new interests. Especially the social role of music became a research field through various methods borrowed from other scientific fields, some of which had a short life, some of which have stayed longer, such as semiotics, musical surface research, unity concept, performance, composition, rise of the New Musicology and reactions against it.

1.1.2 Music – Musicology Relationship. Institutionalized Musicology

In the middle of writing this research, I came to the startling conclusion that in spite of the plethora of subjects, music institutions of practical music-making, such as the conservatoires in Finland, they provide education virtually only in two major aspects, namely in music and musicology[17] (taken in a broade sense of the term); and in musicology only a narrow spectrum, viz. historical musicology and music theoretical and analytical methods[18]. Music proper, as an ontic phenomenon, means, in my opinion, music making, playing and singing, interpreting, performing, composing, and working with THE living music. Everything else that is conceptualized, i.e. explained, described, theorized, analyzed, and historicized, in whatever way, means or method about music or relating to music, is musicology[19].

> "…there is another aspect of the relationship between word and music that confronts the musicologist with a fundamental dilemma – the need to apply verbal symbols to an art that conveys its meanings through the medium of sound. One can talk or write about music, but the experience of music itself can be known only through its own 'language', the language of sound. The effort to resolve the disparity between verbal and tonal discourse was a lifelong preoccupation for Charles Seeger, who saw little chance of bringing these two realms of meaning into complete coincidence. Until recently it was the inevitable fate of the musicologist to suffer what Seeger called the 'linguocentric predicament', from which the advent of multimedia technology now offers, in theory at least, the possibility of an escape. The CD-ROM Microsoft Musical Instruments (1992), for example, presents an introduction to the subject using text, pictures, maps and recordings to place individual instruments in their cultural and

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16 See 1.6.2 Schism in Musicology. Narration vs.Analysis.
17 In this chapter the term musicology refers mostly to musicological conceptualization.
18 *Grovemusic*. http://www.grovemusic.com/shared/views/article.html?section=music.46710.2 (17.09.2001).
19 Musicological conceptualization.

> aural context. Most such products, however, are educational rather than scholarly, and sometimes openly commercial, in their objectives."[20]

Naturally, anything that man conceptualizes analytically may also become a norm for his successive behavior. Thus, music theory and music analysis easily become norms of making music "in the correct way", and aim at matching the requirements of a certain compositional style[21].

Musicological[22] impact and role in music education is dominant; we do not always even recognize it. Many teachers of music proper (instruments, singing) give tuition through conceptual musicological means. Instead of showing and acting music, they explain through established or invented musicological terms how music should be acted and experienced. The world of musicology is a world of concepts. For me, musicology is anything conceptualized about music: music history, music aesthetics, music sociology, music theory, and music analysis across any musicological field, science, or study course. In a wide sense, the present musicology also accepts paramusical concepts into musicology.

I do not go into the details of the situation of the institutionalized musicology that is well presented by Bruno Nettl[23] It is clear that the variety and oftentimes contradictory findings and research in individual scientific musicological branches do not have the same normative status as the institutionalized musicology; even inside it there are different schools. What I want to present is an example of definitions of musicology that has normative value due to the fact that it is compiled by a society of musicologists. *The New Grove Dictionary of Music and Musicians*, *2nd ed.*; Musicology, §I: The nature of musicology[24] states that musicology has been defined in many different ways during the cultural history of man as to its historical origins, scope and goals. In a simplified form, musicology still means "the scholarly study of music".

A more elaborate definition[25] states that musicology is "a field of knowledge having as its object the investigation of the art of music as a physical, psychological, aesthetic, and cultural phenomenon". The broadest definition[26] that considers music not only as a product but also as a process embraces social sciences (especially anthropology), ethnology, linguistics, sociology, and politics gender studies and cultural theory as fields borrowing methods to musicological research. *Rethinking Music*, instead, represents the voice of individual musicologists, although many of the writers support each other. The ideology of the book is "musicology of the provisional."

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20 *Grovemusic*.http://www.grovemusic.com/shared/views/article.html?section=music. 46710.2.5 (17.09.2001).

21 See the concepts of speculative and regulative musicology in Chapter 1.1.1.

22 Musicological conceptualization

23 *The Institutionalization of Musiclogy: Perspectives of a North American Ethnomusicologist* in *Rethinking Music* by Cook & Everist 1999.

24 *Grovemusic*. http://www.grovemusic.com/shared/views/article.html?section=music.46710.1.1 (17.09.2001).

25 Ibid.

26 Ibid.

The taxonomical division of musicology given by *Grove* is as follows: *I The nature of musicology:* 1. Definitions. 2. Origins: musicology as a science. 3. Scope. 4. Historical and systematic musicology. 5. New trends; *II. Disciplines of musicology*[27] 1. Historical method. 2. Theoretical and analytical method. 3. Textual scholarship. 4. Archival research. 5. Lexicography and terminology. 6. Organology and iconography. 7. Performing practice. 8. Aesthetics and criticism. 9. Sociomusicology. 10. Psychology, hearing. 11. Gender and sexual studies.

Since the 1980s, new trends have appeared beside historical musicology that has dominated the musicological field at least since Adorno. It is not necessary to go into details of the new trends here. A good summary appears in *The New Grove Dictionary of Music and Musicians*, *2nd ed.*[28]. They are also taken up by the writers of *Rethinking Music*, as well as other individual musicologists (e.g. Tagg & Collins). I shall mention here only a few of the later trends. These include the study of music as a social force (Dahlhaus), music as an aesthetic experience (Kerman), relationships of music to other arts and society (structuralistic anthropology, semiotics/semiotic – sociology, which takes music as a product of a system of signs, music as a 'play of signifiers', or music as dialectical discourse/Voloshinov Bhaktin), narratological approach to music, poststructuralism (e.g. deconstructive methods) and postmodernism (e.g. stressing the role of the performer and listener in determining the meaning of a musical work/Barthes, or psychoanalytical methods). Quoting *Grove*[29]

> "More and more musicologists are crossing borders and reconsidering the boundaries of their research, not only that which has separated classical and popular music, written and oral traditions, but also historical musicology from other disciplines including ethnomusicology and music theory."

From all this, one can understand that musicology[30] has become a very large conceptual issue – a complex *concept field*[31] in systemic terminology – which uses concepts and texts from "everything". The role of music dictionaries is to try to keep abreast with the time and reflect the terminology and concepts used in various sources and documents[32]. At the same time, dictionaries, according to Harold E. Samuel[33], are "expected to synthetize existing knowledge, not to undertake research". This means that despite of accumulating forms, quantity and quality of data, the field of musicology tends to keep itself systematized. In music history, for example, this led to the concepts of periodization and the idea of development of music. This idea gave rise to the concepts of schools,

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27 *Grovemusic*. http://www.grovemusic.com/shared/views/article.html?section=music.46710.2 (17.09.01)

28 *Grovemusic*. http://www.grovemusic.com/shared/views/article.html?section=music.46710.1.5 (17.09.2001).

29 Ibid.

30 In all its aspects; theoretical, applied and study course levels; see 1.1.6.

31 Unstructured set of thematically related concepts, see 4.4.9.

32 *Grovemusic*. http://www.grovemusic.com/shared/views/article.html?section=music.46710.2.5 (17.09.01).

33 Ibid.

national, regional and individual styles. Zeitgeist was the explanation, or later the controversial concept of style[34]. Suitable terms and concepts were borrowed from auxiliary sciences of general history and art history[35]. From the systemic viewpoint, all this has attempted to systematize the conceptuality of music, or in fact, of musicology.

Out of the bulk of this data on musicology[36], I introduce only three aspects which can be traced between the lines: 1. Musicology is ontological conceptuality on ontic music; 2. Musicology, or music research and theoretical education, has always been systemic, and therefore very systematical; 3. Musicological[37] descriptions on music, especially music theory and music analysis, have influenced music making, composition, and performance. The third factor has favored deductive normative-pedagogical musicological education that reflects in normative compositional practises and procedures (thorough bass courses, harmonization courses, Palestrina and Bach polyphony, dodecaphonic composition courses, etc.) and in interpretational norms (playing and singing within the confines of established musical styles). The closer we come to our present time along the history of music and musicology[38], the more systemicity and normativeness has increased.

In the course of my research, I shall introduce and comment on the conceptual material of musicology mainly from the areas of music history (historical method), music theory and analysis (theoretical and analytical method). Naturally, anything relating to these is also the interest of lexicography and terminology. I shall deal with musicological terminology in this research and relate it to terminology science[39].

I infer the following starting points or cues for my research: 1. Musicology[40] is cumulative conceptuality; 2. Conceptuality tends to systematize[41], thus musicology has become systematized. Historicity attractor[42] focused on musicology for a long time, over a hundred years. New concepts inside musicology[43], especially since the1980s, caused new several concept attractors to appear and led the field of musicology into the complexity of new trends[44]; 3. Conceptuality moulds practise (due to the prevalent deductive philosophy[45]), thus, the speculative musicology (music theory, music history)

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34 *Grovemusic*. http://www.grovemusic.com/shared/views/article.html?section=music.46710.2.1 (17.09.01)
35 Ibid.
36 In the widest sense of the word.
37 Study course level.
38 In the widest sense of the word.
39 See eg. 4.4.
40 From the theoretical musicological viewpoint; see 1.1.6.
41 See Chris Lucas' idea of mental categories (as mind attractors) in his article *Attractors Everywhere – Order from Chaos*. http://www.calresco.org/attract.htm 08.2001); see also 5.9.3 of this research.
42 See 3.2.2.
43 Applied musicology; se 1.1.6.
44 See trends above.
45 See deduction 3.3.3, as well as Fuenmayors paper "*The Roots of Reductionism: A Counter-Ontoepistemology for a Systems Approach*". *Systems Practice*, 4(5); 1991. pp. 419-448.

resulted in regulative musicological traditions such as regulative music theory and analysis, regulative music making, and performance[46]. The musicological concept of style, or Zeitgeist, in music history, easily serves as a regulative norm in music making, composition, and interpretation – through music education. This all was – maybe intuitively – challenged by a schism in musicology from the 1980s onwards[47].

As sources referred to above state, the major part of the prevailing music theory can be characterized "as highly formalistic", mostly due to prevailing logical positivism affecting many theorists[48] despite of several, if not all, of the less formalistic trends of late. Some kind of need of regaining the lost intellectual identity in music theory and analysis is clearly expressed in the following words:

> "Yet if music theory and analysis are to continue to retain identities as authentic intellectual traditions, it is perhaps desirable to maintain some degree of epistemological formalism and empirical rigour. Far from suggesting a weakness in the programme of music theory, a certain autonomy – and tension – in relation to historical musicology and cultural criticism may indeed be a healthy sign of its vitality and integrity"[49].

This statement is related to the another statement on music analysis by Cook and Everist[50]. Is systemic approach a possible answer to this rhetoric plea? This research will deal mainly with this question.

1.1.3 Musicology – Music Theory Relationship

When we enjoy music, play it, listen to it, musicology, or music theory and music analysis, are not there. They are not present, at least they need not to be there, although some theorists such as Narmour, Lehrdahl or Schenker so insisted[51]. Cook writes: "In analysis, as in everything else, our words constantly threaten to run away with us."[52] – an interesting statement which also refers to the intermingling of onticity of music with ontology of music[53]. Similarly, when we communicate through language, watch the television, or see a smile, semiotics is not there; or when we eat, work, sleep and live our biological and psychological mental life, biology, psychology and cognitive sicence are not there. When we study and learn to live the life, pedagogy (as formulated science) is not necessarily there.

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46 *Grovemusic*. http://www. grovemusic.com/shared/views/ article.html?section= music. 46710.2.2.1; and http://www.grovemusic.com/shared/views/article.html?section= music.46710.2.2.2 (17.09.01).

47 See 1.6.2.

48 *Grovemusic*. http://www.grovemusic.com/shared/views/article.html?section= music.46710.2.2.3 (17.09.01).

49 Ibid.

50 See 1.1.4.

51 Cook in Cook & Everist 1999: 239-261.

52 Cook & Everist 1999: 258.

53 Chapter 4.6.2.

I mean by these examples that these sciences are not automatically involved in our practical life – unless we assume that any conscious conceptualization, any tiny start of defining and categorising is a start to such a science, although in the beginning it does not have any ideological status.

The concepts and terminology of music theory (and analysis in the traditional sense) has been developed during the past centuries to describe music as musical works, usually as structures of music. The conceptual attractor[54] is music as musical works, although the same terms and concepts can partly be also used in other conceptual contexs, e.g. in literature, psychology, or sociology.

Although the main part of my terminology and concepts cover what is known as music theory and analysis (a subdivision of musicology – see eg. *Grove*) I refuse to use these terms rigorously because they are misleading in the sense I mean. Musicology is a corrupted term, it has become transparent, it relates no more directly to music, and the term 'music theory' is practically reified. Here are some examples.

Grove[55] sets music theory under musicology as a subdivision, and maintains that music theory today means "the study of the structure of music". To these belong melody, rhythm, counterpoint, harmony and form, although distinguishing between these is difficult. The more fundamental level includes the study of tonal systems, scales, tuning intervals, consonance, dissonance, duration and the acoustics of pitch systems. To this also music analysis, style composition, score reading, etc. can be added[56]. Other aspects may be included such as orchestration, ornamentation, improvization, performance, and electronic sound[57], or timbre, periodicity and dynamics[58]. Other high cultures, such as those of Arabs, Indians and Chinese have produced a significant bulk of respective music theory, music analysis, style composition, score reading, etc.

This is not, however the only existing view on the limits of the concept of music theory. Tagg & Collins, among many others, criticize that this definition is formalistic and conventional prevailing in Europe and North America, even at the university level. To them music theory should include "acoustic, aesthetic, anthropological, ethnomusicological, formalist, neurological, organological, phenomenological, psychological, semiotic, and sociological theories of music all rolled into one, i.e. the complete musicological gamut of ideas, lines of reasoning, rules, procedures and assumptions used to understand how music works."[59]

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54 See 3.2.2.

55 *Grovemusic*. http://www.grovemusic.com/shared/compon…600887530&session_ name= 42389f971758ea4b (29.08.2002)

56 Tagg & Collins 2001: *Some '-ics' and '-ologies' of Music*. http://www.theblackbook. net/acad/tagg/teaching/ ipms/ ologies.html# Theory Music (29.08.2002).

57 *Grovemusic*. http://www. grovemusic.com/shared/compon… 600887530&session_ name =42389f 971758ea4b (29.08.2002)

58 Tagg & Collins 2001: *Some '-ics' and '-ologies' of Music*. http://www.theblackbook. net/acad/tagg/ teaching/ ipms/ ologies. html# Theory Music (29.08.2002).

59 Tagg & Collins 2001: *Some '-ics' and '-ologies' of Music*. http://www.theblackbook. net/acad/tagg/ teaching/ ipms/ ologies. html#Theory Music (29.08.2002).

The problem, however is this. If music theory to many is the conventional and traditional part of musicology (applied musicology, or study course musicology, we might say), and to others, e.g. to Tagg and Collins it is more than that, then what is musicology? Tagg and Collins point out that the major part of musicology is still "the formalist and/or archivist study of European art music from yesteryear." They wish to include the study of " music as social practice", sociology (of music), cultural studies, media studies, communication studies, anthropology (of music), ethnomusicology, etc. To many other musicologists[60] it would mean practically the same things as listed by Tagg and Collins under the term of music theory. *Grove* lists under the term of musicology at least these: organology and iconography; performing practice; aesthetics and criticism; sociomusicology; psychology, hearing; gender and sexual studies. To some musicologists the new sweep of modern musicology includes even these: cognitive studies, empirical psychology, paleography, organology, critical theory, 'new musicology', gender studies, ekphrasis, narrativity and many other aspects.

The critical question arises: where is the limit of musicology and music theory? To some (such as *Grove*) and to many more music theory is a subdivision (or a subdivision of a subdivision) of musicology; to some, such as Tagg and Collins, it is partly the same thing as musicology. I believe that there are many more different tastes on the division. Who is right, who is wrong? Nobody, in my opinion, as long as any research that vaguely relates to music means musicology. In the systemic sense this means at least a baffling conceptual complexity, or even a conceptual entropy.

If a theoretical-philosophical science and the applied science under it live in a conceptual divorce – as musicology and music theory seems to do – and if the theoretical philosophical level develops its own vocabulary and concepts **independent of** the applied and practical level and concepts then how can we suppose that the theoretical-philosophical concept structure studies the practical leve? The situation described above makes it very difficult for me to limit the term of musicology only to the term of music theory.

1.1.4 Music Analysis Is Not Dead

In light of this research the situation of music theory and music analysis is of special interest. If music theory and analysis at the level of the 'purely musical' has coined all autonomic music theory and analysis unfashionable during the last 15 years, at least a part of musicologists seem to seek some reconciliation. Many articles of *Rethinking Music* discuss the question of musical autonomy in a historical and social context, or in relation to formalism and hermeneutics, or analysis and experience. The book (at least the writers of the preface) suspects the value and sustainability of such musicology that concentrates in applying the purely analytical and theoretical approach to music "separated from the

60 See Cook & Everist 1999, *Rethinking Music.*

universe"[61]. It sees the future of analysis in examination of values, meanings and differences in and through music.

In closer reading some of the writers of *Rethinking Music* seem to point exactly at the interests of my research, and in their comments I sense the need of the rise of a new paradigm in musicology. I take a few examples. The function and nature of analysis has completely new dimensions; it is no more considered empirically objective and rigid along the lines of the Classical category view. Samson's article *Analysis in Context* illustrates the new vista well. He denies the idea that analysis is "in a similar relation to the work as science does to the natural world."[62]. Analysis involves not only the object to be analyzed but also the method and the observer[63]. He takes this to an extreme in his sentence "music analysis is as much a form of self analysis as an empirical explanation of the other"[64]. For me, this outlook associates with what I write about the intermingling of onticity with ontology in the conceptualization of an observer[65]. Cook and Everist, commenting Samson[66], state that "analysis is irreducibly pluralistic"[67]; secondly "analysis is fictive and its substance lies in metaphor"[68]; and finally that analysis is an summarizing act[69].

In my opinion, these statements correspond with the notion that music analysis is not analysis of music; it is rather description of the process and features of the act of analytic conceptualization. For me, there are several ways to analyze with even the so called old-fashioned musical theoretical concepts (chords, cadenzas, modes, etc.) provided they are used in a creative, abductive and systemic way and that the philosophy behind them is explained. Analysis should not focus only on a couple of musicological parametres. I present nine different parametres in application (see Chapter 6). It is possible to find even more parametres. In addition, the summarising interplay of these parametres are individual in each individual musical work analyzed.

In *Beyond Privileged Contexts: Intertextuality, Influence, and Dialogue* Korsyn says: "We need new paradigms for analysis, new models that will allow both unity and heterogeneity".[70] This refers, in my opinion, to the concept of complexity, which is a combination of many heterogenous elements (concepts, in this case) with many and diverse connections (e.g. concept analogy, scale levels, system levels) between these elements. The same need for new paradigms echoes in the words of Gjerdingen (*An Experimental Music Theory*?) who criticizes the traditionally oriented theorists using reified concepts of 'voice leading' and 'tonality' as objective verities. He urges theorists to work with

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61 Cook & Everist 1999: xii.
62 Cook & Everist 1999: 45.
63 This sounds Lakoffian experientalism, see 4.6.
64 Cook & Everist 1999: 46.
65 Chapter 4.6.2.
66 Cook & Everist 1999:2.
67 Ibid.
68 Ibid. It is very interesting that analysis, from this viewpoints seems to approach phenomenialism.
69 Ibid.
70 Cook & Everist 1999: 60.

experimental scientists, "psychologists, acousticians, cognitive scientists, neurologists"[71], etc. He does not mention systems scientists or complexity researchers, let alone researchers utilising creative abductive methods.

Gjerdingen's plea for interdisciplinarity raises the question of the integrity of musicology. Cook and Everist write "if one discipline's inexactitude is another discipline's subtlety, then equally, one discipline's self-validation can be another's hermeneutic circle."[72] Very well said. This points directly to the possibilities of the abductive method: the subtleties of another discipline can act as cues to that discipline which is as yet inexact. To my knowledge, musicology has not yet utilized the subtleties of systemic approach as cues.

Burnham and Maus, according to Cook and Everist, make the same point as I have made in the last aphoristic sentence of my research. I write "At its best musicology prepares us for the reality of music." Cook and Everist, sounding very much Lakoffian[73], infer "analysis that is worthy of the name contributes to the experience, and hence the aesthetic significance, of music. Its effect, then, is to keep the music open to new interpretation, and hence to sustain its capacity to engender new meaning."[74] The value of analysis is that of an ear-opener. Cook writes: "analysis does not simply reflect meaning that is already in music, but participates in its construction."[75] This construction, for me, happens in conceptualization that is articulated and communicated in and through language. This is, then, musicological ontology.

Not only the writers of *Rethinking Music* referred to but also other musicologists defend the status of music analysis, provided that its value and application is seen in a new way. Meeus, referring to the opinion a leading figure in Belgium, Celestin Deliege, endorses the importance of analysis: "theory should become descriptive rather than prescriptive… analysis should reach to the inner structure of the work."[76] Mailman[77] participates in the debate of the possibilites of music theory to explain music with one of the key questions of the relation of the non-aesthetic (music theoretical) and aesthetic properties (aesthetical concepts) of music. Also he presents a rhetoric plea: "Perhaps, more intuitive and comprehensive ways of presenting the subtle and precise concepts of music theory and analysis are on the horizon." Zbikovski[78] supports and modifies Cook's claim (in *Music*, *Imagination*, *and Culture)* of music

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71 Cook & Everist 1999: 169.
72 Cook & Everist 1999: 7.
73 See 4.6.
74 Cook & Everist 1999: 10.
75 Ibid.
76 Meeus, N. *Music Theory in France and Belgium*. The Online Journal of the Society for Music Theory, Vol. 3.4. 1997. http://smt.ucsb.edu/mto/issues/mto.97.3.4/ mto. 97.3.4. meeus.html#Section4 (30.10.2002).
77 Mailman, J. *The Aims of Music Theory and Neurath's Boat: A Reply to Jonathan Walker and Matthew Brown*. The Online Journal of the Society for Music Theory, Vol. 2.4. 1996. http://smt.ucsb. edu/ mto/issues/mto.96.2.4/mto.96.2.4.mailman.html (30.10. 2002).
78 Zbikowski, L. M. *Metaphor and Music Theory: Reflections from Cognitive Science*. The Online Journal of the Society for Music Theory, Vol. 4.1. 1998. http://smt.ucsb.edu/mto/ issues/mto.98.4.1/ mto. 98.4.1. zbikowski.html (30.10. 2003).

analysis as being essentially metaphorical by results of cognitive scientific findings. Agawu's[79] paper on *Analyzing music under the new musicological regime* is another paper where he meditated on the possibilites of the combination of traditional structural analysis with the trends of new musicology.[80]

It seems that in Finland a high level discussion on the new vistas of the present musicology is only starting (through e.g. feminism and ethnomusicologicy). Susanna Välimäki's recent article *Musiikkianalyysi musiikkikritisisminä*[81] is written very intelligently. She points out, for example, that the postmodern musicology, the purpose of which was to liberate muscicology from the chains of formalism, is, paradoxally, in danger of becoming formalist and normative due to the researchers themselves, who while cherishing the ideology of interdisciplinary tolerance and the method of semiotic intertextuality, in fact practise against their ideals (e.g. in critical musicology) [82]. She also is in favor of the possibilities of music analysis, provided it is utilized not as a dogma but in intelligent and case-wise ways.

For me, all this means that analysis is not at all dead; it is experiencing transfiguration. I argue, however, that in principle the factors of analysis have not changed, the **consciousness** about the factors has changed. What has changed is the new way of looking at the analysis. The analyst has become more aware of the real factors that have always been there before. There is still the **objective** to be analyzed, there are still the methods by which the analysis is performed (even by "old" methods). A new thing is the factor of **consciousness of the observer** who should assess what he conceptualizes about the object with a method, what he conceptualizes about his method and what he conceptualizes about his perception. One tool to look at all of these in a new way is the abductive method and systemic approach: a new dimension of conceptualization. Conversely, the "twin sister" of analysis, i.e. theory, will have a new dimension, as well.

1.1.5 Music – Musicology – Music Pedagogy

Science and pedagogy as ontology are formally articulated and communicated conceptualization. All formally articulated conceptualization that has to do with music, has been, or is results of research of music, or about music, and has been conceptualized through ages; it has become a part of the scope and range of conceptuality of and about music, its nature, structure, influence, role, function, and so on. Conversely, music and the factors mentioned above have been and are being examined with these concepts. The results of a research activity normally become to the arena of pedagogy and education, in a restricted or

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79 Agawu, K. *Analyzing music under the new musicological regime*. The Online Journal of the Society for Music Theory, Vol. 2.4. 1996. http://smt.ucsb.edu/mto/issues/mto.96.2.4/ mto.96.2.4. agawu.html (30.10.2002).

80 In more detail, see 1.6.2.

81 *Synteesi* 2/2002: 67-88.

82 *Synteesi* 2/2002: 79-83.

wider degree, whether in the institutions of research or in other circles, for example, in the practical life. In the course of time part of these research results become concepts with strong normative influence and they affect on the philosophy of research and of education.

However, the exact border of what is research and what is pedagogy is fuzzy. Research performed in the auspices of academic institutions requires academic disciplinarity, and the instructors of research projects and the readers of research projects, as well as the faculties, control the scientific level and quality of these research projects. Research must be academically justifiable and academically valid. Instructors and readers, although they are "free researchers" after their academic degrees, act as pedagogues. It is not necessary to draw the line between what is pedagogy and what is research; for me, all this should be intellectual consultation, where each party should be left free to believe what the party wants. It is essential to discuss.

There cannot be any science ('-logy') without conceptualization on and about what is and what has been examined. But conceptualization on and about music (by aid of science of music'-ology') **is not** conceptualization about **the science** of music (musicology); that is another level. If musicology studies music (and "anything" that has to do with music in some way), then what is the name and what are the conceptual tools of the research level that studies musicology (or part of it, let us say music theory and analysis)? Can a study of music with certain conceptual tools (chords, style definitions, form of music, gender factor, or with any of the conceptual tools given below), at the same time study the same tools it uses for studying music? No. So, either it is the study of music (level of musicology) or the study of the (conceptual) tools of music research. How this level should be called – I do not know, unless I just give a name to it, be it *theoretical musicology*[83], creative music theory (as suggested by Tagg on personal communication), or *metamusicology*?

1.1.6 Musicological Conceptualization – A New Level of Musicology

Where is science there is analysis; where is analysis there is theory; where is is theory there is paradigm; where is paradigm there is pedagogy; where is pedagogy there is authority. Thus, science, analysis, theory, paradigm, pedagogy and authority act together and comprise a complex communicative concept field; one cannot be totally separated from another without a loss of relevant conceptual information. All of these are interdependent of each other; all is and need formulated and articulated conceptualization. This conceptualization on either science, analysis, theory, ideology, pedagogy and authority of a certain research field can be coined under the same '-logical' (scientific) conceptualization. Hence, musicological conceptualization and musicological concepts are in the use of musicology as science, analysis, theory and pedagogy, despite of the specific ideology and authority of any of these.

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83 See 1.1.6 below.

The term 'musicology' still exists, even though it exists in a corrupted (transparent) sense. For me, musicological concepts mean those concepts that define and denote what we conceptualize **about music**, – not about experiencing music, not about the gender question of music making, or about acoustics of sound, or about the sociological functions of music, etc. When criss-crossing the vast conceptual field of musicology it is best to be more accurate. I would rather call the concepts (depending on the field) either psychological-musicological, cognitive-musicological, semiotic-musicological, acoustic-musicological, critical-theoretical-musicological, semiotic-musicological, organological-musicological, ekphratic-musicological, etc. – concepts, or using a very general term they could also be a called *paramusical*[84] concepts. If and when I study concepts that have to do with musical theoretical structures, I could call them music theoretical concepts because the word theory already has an ontological connotation. The essential thing is whether any of these are normative and dominant or not in the culture they are used. That is interesting, because if they are, they tend to form (or their users tend to form out of them) consistent negentropic-structural concept systems owing to man's deductive tendency. The concept systems of various music theories (in the traditional use of the term) is a classical example.

In any case musicology is not definition, analysis or description of music but *it is definition, analysis or description of what we conceptualize as music*. I call this *conceptual musicology*, which in a sense is a paradox because all '–logy' is conceptualization[85]. By adding more musicological aspects in the present meaning of the term in defining and describing music, we do not actually describe music any better; we describe only our own conceptualization of music in a more complex way; we only add more variety (differentiation) of concepts, the connections (integration) of which may be loose or practically non-existent. This does not necessarily make understanding and experiencing music any better.

Because musicology today covers semiotics, acoustics, paleography, organology, ekphrasis, gender studies, narrativity – and many other fields – any term and concept used in connection of these can a be a concept in the use of the science of music. Any sociological term and concept is then also a musicological term and vice versa. This undoubtedly makes the study of music confusing. The question arises: in what cases do we study music and in what cases something else? I would say that if we study how a human being reacts emotionally with music it is not necessarily musicology but psychology or sociology, or something else where the behavior is connected with music. It is still the study of the behavior. If we study what **in music causes this behavior** it is also the study of music; it means we try to define what music is in that context. Whatever the case, whether we study human behavior or sociological values – in connection with or without connection with music – we actually

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84 See Tagg; Introductory notes to the Semiotics of Music. http://www.theblackbook.net/ acad /tagg/ teaching/analys/semiotug.pdf (23.09. 2002).

85 See 1.1.5.

study, how we conceptualize these things. From conceptualistic viewpoint we cannot study things directly, only indirectly through our conceptualization, because although we perceive, sense, etc. directly, we make conceptual models in our mind about our perception. Studying means conceptualization that we wish to communicate to others. This communication means transforming what we experience, into communicated conceptuality, and this communicated conceptuality from each other is what we analyze and study; we, as perceivers conceptualize, and our addressees conceptualize what we have conceptualized.
In order to avoid any misunderstanding of the terminology on musicology I have created some new definitions on the concept. Using analogy, which is one of the essential tools in systemic approach[86], I decide to make the difference between the different conceptual levels and aspects relating to musicology (Chart 1). From the systemic point of view in which the variables of scale level factor and complexity[87] are taken into account, and from the scientific-methodological viewpoints of deductivity and abductivity[88], musicology can be understood as three levels: 1. *Study course level/musicology* (third sublevel). These are courses of literary music studies at the basic levels of music education (such as music theory and analysis, history of music, courses of harmonization, orchestration, thorough bass, etc. = systematized musicology, or music theory, as they are called in musicology). From the viewpoint of systemicity and scientific-methodology, this level represents musicological-conceptual simplicity, closed, negentropic-structural and deductive concept systems. Such study courses are meant to be simple, behavioristic and conceptually safe-proof. Conceptual speculation is not allowed. This level is an applied level under musicology. 2. *Scientific level* (second sublevel). This is musicology in the sense as understood today covering a huge range of musicological research from historical and systematic musicology to music semiotics, gender studies, critical theory, ekphrasis, and so on. It could also be called *applied musicology*. It represents musicological-conceptual complexity; methodologically much of it is deductive, partly inductive, or abductive in a lesser degree. 3. *Theoretical-philosophical level* (superlevel) is the "pure" musicological-conceptual level and uses the abductive method in purpose of generating purely new musicological *conceptuality*. This could be called *theoretical musicology* [my neoterm][89], or *metamusicology*. The scientific (applied) level of musicology naturally generates

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86 See 5.9.
87 See 5.6.3.
88 See 3.3.3.
89 *theory*. "The Ancient Greek word theoría (θεωρτα) means 'contemplation' or'reflection'. The modern word theory is however slightly different and has two main meanings relevant to music studies: (i) 'a system of rules, procedures and assumptions used to produce a result'; (ii) 'abstract knowledge or reasoning'. For example, the phrase the theory of art means a system of ideas contributing to the understanding of art. This system of ideas includes formal, structural, psychological, semiotic, sociological, ideological and many other sorts of theory all under the same umbrella. Theoretical approaches are often regarded as conceptually opposed to empirical ones (see empirical)." Tagg & Collins 2001: *Some '-ics' and '-ologies' of Music*. http://www. theblackbook.net/acad/tagg/ teaching/ ipms/ ologies. Html #Theory Music (29.08.2002).

new musicological concepts, as well as new musicological conceptuality, but these studies should be counted into theoretical musicology.

Chart 1 Levels of Musicology

SYSTEMICITY PARADIGMS → ↓	**Open, dynamic, complex conceptuality (metaconceptuality)**	**Closed, complex conceptuality**	**Closed, structural negentropic conceptuality**
Theoretical-philosophical metalevel	"Theoretical musicology"/ metamusicology) (interdisciplinary) – level of this research		
Applied, scientific Level		Institutionalized Musicology (discipline-oriented)	
Study course level			Institutionalized music theory and analysis (subject-oriented)

It is important to notice that in order to generate new theoretical conceptuality (new ways of using concepts) the theoretical–musicological level naturally needs concepts used in the lower levels of the applied musicology level and the study course level, because these levels create the concepts they need in studying and describing ontic (material) music, its features, and use. Thus, musicological concepts are the concepts used at the level of study course musicology and (applied) musicology for definitions and categorizations, whereas the concepts of the theoretical musicology are not musicological concepts.

Theoretical musicology uses another level of conceptuality and another conceptual tools it cannot be studied from inside (applied) musicology. For example, a factor D (systemicity) is needed in order to study the combination of A (e.g. musicological concepts) and B (e.g. semiotics, or concept theories) and C (e.g. terminology science). Automatically this means that A , B, or C cannot be studied only from their own premises, they are **examined from outside**, from the viewpoint of factor D. This is what conceptual complexity to me means. In order to study systemicity as a form of musicological conceptualization, I need

musicological concepts from the lower levels of musicology and its sublevels. In the practical part of my abductive research (Chapter 6) I give examples of synthetising my theoretical-musicological findings with concepts of (mainly) music theory and analysis. This is what the scale level factor[90] to me means. The variables complexity and scale level factor are the main systemic levels and scopes of my research.

The following axioms express the essence of my philosophical viewpoints on the relationship of music with musicology and on the relationship of musicology with musicological statements and musicological concepts.

Any (conceptual ontological) statement about the concepts of 'life', 'nature', 'love', or 'art' which refer to the ontic reality they represent, can be considered basically a philosophical statement. Any philosophical statement conveys philosophical concepts and conceptuality. As no statement about life, nature, food, love, or art, is absolute, or final, its philosophical-scientific value depends on the viewpoint of the branch of philosophy assessing the statement.

Any statement about (the concept of) 'music', or related issues that refer to ontic music, can be considered basically a musicological statement. Any musicological statement conveys musicological concepts and conceptuality. As no statement about music is absolute, or final, its musicological-scientific value depends on the viewpoint of the branch of musicology assessing the statement.

It does not matter whether a scientist-musicologist, an expert connoisseur of music wishing to educate the large audience, a critique, or a music teacher, gives the statement. All of them use language; all of them use conceptual tools. All musicological statements convey musicological concepts and conceptuality, and naturally all theoretical-musicological (= music theory statements and concepts) statements convey them, as well. In communicative practice the musicological often blurs with the theoretical-musicological.

Any definition and description (or statement) that has to do with music is a musicological definition. Authoritative definitions tend to become normative: musicology tends to become normative[91]. History of musicology shows this tendency. Part of traditional musicology (e.g. historical, systematic musicology, especially music theory and analysis), still in use today, is very normative. There are certain risks in this I shall deal with in this thesis.

My research is not purely musicological; it is of interdisciplinary metaconceptuality and it is theoretical-philosophical, mainly at the level of *theoretical musicology*. Therefore it should not be assessed from the common musicological premises; neither should it be assessed purely from any of the single theoretical premises (systems sciences, cybernetics, complexity science, semiotics, categorization theories, or terminology science) comprising the main data of my research because all of them are examined "from outside" letting all of them (if the abductive method presupposes) to be intertwined in a complex conceptual way.

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90 See 5.6.3.

91 This means that all three levels of musicology can also be divided into speculative (or descriptive) and regulative (or prescriptive levels) which intermingle with each other.

1.1.7 Musicological Concepts. Liberal And Normative Views

Liberal View

I study conceptual musicological tools in order to show how these tools can be used in a new way in the research of music. This gives new knowledge on conceptualization about music as well. I call these conceptual tools musicology uses at any of its levels, musicological concepts. Theoretically speaking any concept-term above, say *placebo*, *mundane realism*, *instrument decay*, *EGG* or any other, is musicologically (in the very large, paramusical, sense of the meaning) equally valid as *scale*, *mode*, *interval*, *major*, *minor* – depending on the conceptual concept of the discourse. In the text quoted below the terms *betting paradigm* and "*notes* that might continue a *melodic fragment*" do not fight with each other. It is possible to "marry" "old-fashioned" (as some musicologists tend to think) systemic musicological concepts with more fashionable ones, however, vivisecting the so called music theoretical and analytical terminology from "other musicology" is sheer nonsense.

Let me give just one illustrating example. The School of Music of Ohio State University gives an Internet Glossary of Research Terms in Systematic Musicology[92]. The glossary has 8432 words out of which I can give the following statistics: The range covers terms form A to Z, and has 283 term entries. Words having the root 'music' and their frequency are: musicology (1); music theorist (3); music (1); musical score (1); musical experience (1); musical context (2); musical judgement (1); music progress (1), musical skill (1).

Out of the concepts-terms related to music or other factors that traditionally have to do with music, its nature, structure, influence, role, function, etc. I found only the following: *interval scale* (no explanation), *ordinal scale* (no explanation), *true score* (an interesting one – no explanation), as well as the following ones:

> "*Betting paradigm:* a method for inferring subjective probabilities by having subjects bet on possible outcomes. For example, a listener might be asked to place cash bets on possible notes that might continue a melodic fragment. If listeners behave rationality, then their bets should be proportional to how likely they think the event will be."
>
> "*Mode* (excerpt): measure for characterizing central tendency in a set of numbers. The mode is the most common item in a list of items. A survey of concert programs might establish that the most frequently played composer is Beethoven. We would say that the modal composer in printed concert programs is "Beethoven". When the list contains numerical values, each value may occur uniquely… Compare mean (or average), and median."
>
> "*Probe-tone technique* (excerpt): A technique by which a listener's musical experience can be probed at a particular moment in time. A musical context is presented – such as several chords or the initial notes of a melody. Following the context, a single tone

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92 http://www.music-cog.ohio-state.edu/Music829C/glossary.html (23.09.2002). See also another glossary: *Music Cognition Handbook: A Glossary of Concepts* by David Huron. Dictionary definitions for some 300 technical terms and concepts related to the field of music cognition. http://www. music-cog.ohio-state.edu/Music838/ glossary.html#P (23.09.2002).

> or chord is played, and the listener is asked to judge the tone or chord according to some criterion. Often, the listener is asked to judge how well the tone or chord "fits" with the preceding musical context. The contextual passage is then repeated and a different probe tone or chord is played. Following each presentation, the listener is asked to judge how well the new tone or chord fits with the preceding context. In probe-tone experiments, a dozen or more repetitions of the contextual passage may be presented – each presentation followed by a different probe. In this way, a detailed picture can be assembled concerning the listener's musical judgement at that moment… The probe-tone technique was devised by Roger Shepard and has been extensively used by Carol Krumhansl. See also Krumhansl and Kessler key profiles. probe-tone technique".
>
> "*Theoretical concept* (excerpt): a broad term or concept that is central to some theory – such as "accent," "sadness," "meter," or "popular." A theory typically makes a claim about the interrelationship of such concepts. For example, a theory might claim that slower harmonic rhythms are associated with greater chromaticism. In attempting to test this theory, one must first reconceive of these concepts in ways that make them measurable. For example, the theoretical concept chromaticism might be operationally defined as "the percentage of notes within a given passage that lie outside of the prevailing key as identified by a minimum of three out of four professional music theorists."… See also theory, hypothesis, operational definition,."

Individual words-concepts that have to do associatively with music were: *concert-going*, *sound*, *tonic chord*, *major-minor sonority*, *melody* and *listener*. **All the rest of the concepts and terms** of the glossary could be from any other scientific field, of mathematics, cognitive sciences, psychology, whatever, with no possible anticipatory association to music or its research. At least they are not more than paramusical concepts. If readers from various scientific backgrounds were given excerpts from this glossary they could never guess that they are from a glossary meant to describe and deal with music or anything around, in and out, above, below, behind, in front of etc. about music, its nature, structure, influence, role, function, and so on. I would rather say that this concept field (or rather "concept mess") certainly examines 'music' from outside – I know no more what music is; it would be pacifying to sing along with the definition of Bohlman: " 'Music may be what we think it is… it may not be"[93].

Here are some examples from the above mentioned glossary of 283 terms: *ad hominem argument*, *attrition*, *baseline* (=a control measurement carried out before an experimental treatment), *ceiling effect*, *Chi-square analysis*, *cohort*, *confederate*, *conventionalism*, *cultural ignorance*, *debriefing*, *deduction*, *demand characteristics*, *dishabituation paradigm*, *EGG*, *EEG*, *EMG*, *exclusion problem*, *experimental bias*, *free validity*, *false negative scepticism*, *field observations*, *functional design*, *gnuplot*, *GSR*, *head-in-the-sand-syndroma… hind sight bias*, *hit* (= when a subject correctly identifies a stimulus as belonging to a target response group. See also miss, false alarm.), *hypocrisy*, *Institutional Review Board*, *informed consent*, *internal validity*, *instrument decay* ([sic!] = changes of measurement over time due to fatigue, increased observational skill, or changes of observational standards...), *ipse dixit*, *Likert sale*, *low-risk*, *hypothesis*, *magnitude blindness*, *manipulation check*, *mean*, *measurement error*, *methodological anarchism*, *miss*, *mortality problem*, *mundane realism*,…*outlier* (sic!), *overgeneralization*, *paradigm*

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93 Bohlman, P. V. 1999. *Ontologies of Music* in *Rethinking Music* by Cook & Everist 1999: 17.

shift, *PET*, *placebo*, *premature reduction*, *random error*, *reification*, *research hoarding*, *role playing*, *sensitivity syndrome*, *universality phobia*… and so on, this is only a fraction. No wonder if one feels it is a useless hazard to try to study musicological conceptualization. I disagree with this notion. It is possible to make a systemic research on this glossary, of its conceptual levels and combinations, as well, but it is not within my research interest at the moment because I do not quite believe that this glossary has a strong normative status in the wide field of musicology.

Another kind of a taxonomy of concepts-terminology in the semiotic research of music comes from P. Tagg in his Introductory notes to the Semiotics of Music[94]. His abbreviated taxononomy of PMFAs (patterns of paramusical fields of association) is interesting and elaborate. As typical in semiotic-musicological terminology, practically 99% of the concepts and terms intended to describe music involved can be used in many other non-musical textual contexts. They are paramusical, even paramusicological. Altoghether I call the above mentioned examples of musicological conceptualization liberal musicology.

Normative View

By 'musicological concepts' in this thesis I don't mean whatever concepts used in the literature and discussion of the wide field of musicology in the present and liberal sense of the term. In the research part of this thesis I use the term to denote phenomena that refer mainly to the conceptualization of musical works, independent of genres, styles, etc., but that still connect to musical works and their description. The concept is about music, not about how it is experienced and performed, what is its social use, how it is perceiver by aural sense, etc. To be more precise, I examine that *normative musicological conceptuality* e.g, music theory and analysis) that is not only dominant especially in the elementary music education and training of professional musicians but also at the academic university level of research and pedagogy of music. It means that the concepts and terms try to describe music, and these concepts and terms guide music making. Theoretically speaking, if we conceptualize verbally that "this layer of this musical piece is red and pulsating"; then "if " this definition guides music makers (composers and instrumentalists) to produce a piece of music that in their minds and in the minds of the listeners has a "red and pulsating layer", then this is normative conceptuality. More realistic examples of normative musicological conceptuality are the concepts abounding in the vocabulary, texts and signs of the established music theory, in its general forms.

From this on when I use the term musicological concept I mean what I have defined above. It should not be confused with whatever non-normative and liberal concept used in the vast field of the present musicology borrowing concepts from many established or non-established sciences. My musicological-

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94 http://www.theblackbook.net/acad/tagg/teaching/analys/semiotug.pdf (23.09. 2002).

conceptual examples are from the established core, but what I challenge is: what is conceptualising music in reality? Do we understand the real systemic value of musicological concepts that we assume to describe music? These and many other questions are among the main interests of this research. I do not study musicology in my thesis, so I do not define it but as I have stated in Chapter 1.1.6, I present a new level in musicology: theoretical musicology. I study musicological concepts from systemic viewpoint, those concepts that are dominant and normative and have to do with music as musical works. Musicology has been defined in various ways (eg. *Grove*) and one of its divisions is music theory and analysis, that which used to be the old traditional area of examining musical works.

1.2 Criteria of Qualitative Research and General Outline of This Research

This research falls into the category of qualitative research. At the same time it is an interdisciplinary[95] one using material from several paradigms and research areas. Therefore it is not only musicological[96] and its foundation is not in musicology. If the division of the levels of musicology presented in Chapter 1.1.6 is accepted, then we can say that this research is a metamusicological (or theoretical musicological) one. In qualitative research, the interest is to know what a phenomenon is, how it manifests itself, and what it means[97]. Hirsjärvi, Remes and Sajavaara[98] state that the starting point in qualitative research is to depict *real life which is manifold*. The aspects of reality affect and mould each other and it is possible to find *multidirectional relationships*. Qualitative research aims at examining the object as *holistically* as possible.

These features match perfectly my research, for it aims at understanding systemicity of musicological[99] concepts, which is a dynamic and complex matter. The qualitative criterion of real life is interesting. I argue that also in the research of concrete real life cases (e.g. personal history with all its unique and human features), the actual data which can be manipulated scientifically, ending up with scientific reporting, is always conceptual. Likewise, the rapport itself is conceptual. The data of this dissertation is generally accepted concepts and conceptuality but without persons who have conceived and used these concepts. This research is not qualitative-sociological; it is qualitative-philosophical. – Thus, it is meant to serve the needs of the research of the fundamentals of musicology.[100]

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95 *Ten Cheers for Interdisciplinarity. The Case for Interdisciplinary Knowledge and Research. Social Science Journal 34 (#2): 201-216:* (1997). http://www.cll.wayne.edu/iSP/ MNISSANI/ pagepub/ 10cheers.htm (23.08.2002).

96 Applied musicology.

97 Anttila 1998: 170.

98 Hirsjärvi, Remes & Sajavaara1998: 161.

99 At the level of theoretical musicology.

100 Ibid.

The data in qualitative research is *"soft data"*, and can include, according to Anttila (ibid.), among other things, written and professional documents. In my research, I use mainly dictionary and encyclopedic material on concepts, systems, semiotics, terminology science and other necessary theoretical material[101]. Besides dictionary and encyclopedic material of musicology[102] – which, of course, also serves as educational material – I use some "more pure" musicological study material as well as an outline of my course on systemic approach. I also utilize my pedagogical and educational observations[103] and experiences: script material, course examination material[104], introspective data, and inner knowledge. To the last gategory belong my first tentative systemic starting points[105], as well as new concepts and neoterms I propose and my musicological[106] professionalism. These all, according to Anttila, are possible in qualitative research.

According to Anttila[107], qualitative research has three goals that relate to the ways in which a research is reported. They are *descriptive goal*, *goal of increasing understanding* and *theory-creating goal*. Theory creating goal is linked to *inductive and abductive research method*. In my research, I combine these goals. Thus, among my research goals is the goal of increasing the understanding of conceptuality with the goal of exploring the possibilities of a scientific approach of systemicity.

Hirsjärvi, Remes & Sajavaara[108] also point out that a qualitative research aims at finding truths rather than confirming already existing statements. My conclusion is that this aspect excludes the possibility of a purely deductive research method[109]. According to Hirsjärvi, Remes and Sajavaara[110], it is not possible in qualitative research to reach objectivity in the traditional sense because the researcher and what is known are intertwined together, and the researcher cannot step outside his values. The same writers[111] compare qualitative research with a palette of colors out of which every researcher mixes the hues at his pleasure. He can also *name his own method*. I name my method as a systemic approach[112], and in this way, the spectrum of qualitative research methods cumulates. They list 43 different terms of possible qualitative research methods. On the other hand, they point out[113] that the spectrum in reality is much wider because it is not easy to make differences between epistemological starting points and method. In any case, systems thinking, systemic approach,

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101 See Theoretical starting points 3.2.
102 Applied musicology.
103 My personal reasons of this research, see 1.3.
104 See Chapter 6.
105 See 3.1.
106 Study course musicology.
107 Anttila 1998: 440.
108 Hirsjärvi, Remes & Sajavaara 1998: 161.
109 See 3.3.2; 3.3.3.
110 Hirsjärvi, Remes & Sajavaara 1998: 161.
111 Hirsjärvi, Remes & Sajavaara 1998: 168.
112 The term "systemic approach" was my original intuitive cue term. It turned out later that cybernetics/systems science uses the same term. My method could also be called systemic-conceptual approach in order to stress the ontological side of the matter.
113 Anttila 1998: 164.

or systemicity, which is my method and my object, is not mentioned in the list, or in the whole book, whereas Anttila devotes pages to systemicity.

I do not quite agree with Hirsjärvi, Remes and Sajavaara on the criterion of objectivity in qualitative research. In my research, the case of objectivity is not a problem of decreasing the credibility of the research because my data is generally known "facts": more or less established concepts, or their variants, approaches, and theories[114]. They are not intertwined with my values. I do not study "a unique psychological or sociological case conceptualized" but general conventional conceptual universalities. In order to reach holism, necessary to quality, I need to use interdisciplinary theoretical material[115], which, however, is selected with care. Its shared denominator is systemicity.

Tesch[116] presents four groups of interests typical to qualitative research: 1. Features of language; 2. Finding regularities; 3. Understanding the meaning of text or action; 4. Reflection. My research data meets perfectly with all these interests: 1. Terminology science and semiotics[117]; 2. Systems and systemicity in various forms[118]; 3. Concepts and their nature[119]; 4. Abduction as method, along with heurism, analogy and hermeneutics as research operations[120].

Anttila[121] gives a tentative outline of the research rapport of abductive study (points I – XIII) as follows: *introduction*, *research interests*, *problematization*, *hypothetical solution models*, *choice between solution models*, *empirical testing of solutions*, *matching solutions with outset*, *accepting solutions and conceptual improvement = new conceptual- theoretical model*, *application of solution to practise*, *assessment of credibility of research*, *discussion*, *sources*, *appendices*.

I do not follow strictly her outline. For example, I have to blend typical introductory parts with research interests and modify other details of the outline according to my needs. Otherwise, I follow the general broad profile of abductive logic presented by her: from practical-empirical to theoretical and then back to practical applications. *Dynamic systemic complexity* is the key word of this research[122]. It also permeates the disposition of this research. Complexity means enough differentiation and enough connectedness[123] in systems. For this reason I have tried to focus on theoretical issues "one by one", but have also tried several connections with other theories. The theoretical and philosophical aspects most permeating this research are systemicity (or systemic approach), abduction and semiotics. The tone of my text is often abductive-reflective, even necessarily philosophising. The abstractness of the issue of music and musicology[124] keeps it all together.

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114 See above.
115 See 3.2 Theoretical starting points.
116 In Hirsjärvi, Remes, Sajavaara 1998: 166.
117 See relevant Chapters 4.4, 4.5 and 5.10.5 onwards.
118 Especially Chapters 4 and 5.
119 Chapter 4.
120 Chapter 3, especially 3.3.
121 Anttila 1998: 441, points I-XIII.
122 See also concept bridge idea: 3.2.1.
123 See also 5.6 on systemic complexity.
124 Musicological conceptualization.

My research plan is based on the abductive chain of logic as follows: 1. *Noticing a practical problem* (=pedagogical problems in music analysis, theory and history); 2. *Conception of an intuition* (= students have problems of perceiving/conceptualising concepts that describe music. The background of the problem is philosophical-theoretical); 3. *Formulation and identification of the intuition* (= concepts linked with music form systems) 4. *Finding and analysing material that supports the intuition* (=the need to understand the problem and to find a theoretical and philosophical basis to it); 5. *Formulating and identifying a possible theory* (= selection and examination of those theoretical viewpoints that confirm the cue); 6. *Finding and examining the material that confirm the theoretical direction* (systems sciences, cybernetics, category research, terminology research, semiotics, and the abductive research method); 7. *Refining the theory* (= crystallising and confirming the essential in light of the cue); 8. *Better understanding of the original problem in light of the new theoretical knowledge* (= interpretations of the nature and practical value of the theoretical findings); 9. *Empirical applications and models guided by the theoretical understanding* (=practical examples and suggestive applications); 10. *Conclusions* (= discussion of the results and of their value).

Using a modified abductive outline of Anttila, my research disposition is as follows: In the i*ntroduction* (Chapter 1), after the commentary on musicology today and its relation to music, music theory and analysis and music pedagogy, I present the issue of musicological conceptualization and the questions it raises in the scope of my research (1.1), and after presenting the general background of my research (1.3), I describe the practical situation in pedagogy and education of musicology[125], especially in Finland (1.4). At the same time, I present the general and my personal *research interests*, viz. the pedagogical-philosophical reasons and problems. Then I take up the cognitive-philosophical reasons of the problem (1.5), and finally, the musicological[126] reasons of the research (1.6). The introduction ends with the research frame (1.7): presentation of the aim, research plan, working hypothesis, strategy, method, operations, and material of this research.

This is followed by the *general problematization* of the issue: the relation of music to language and concepts (Chapter 2).

In Chapter 3 (Hypothetical Solution Models), I tackle the *hypothetical solution models* starting with my first intuitive reflections (3.1). They are followed by a presentation of the possible theoretical starting points mentioning those necessary theories that also form the main data of the research (3.2). Next, I elaborate in more detail the abductive research method (3.3). Abduction is here blended with the concept of systemicity (3.3.2), as well.

The *choice between solution models* is presented as a comparison between abductive and hypothetico-deductive methods with criticism on the latter (3.3.3; 3.3.4).

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125 Study course level.

126 Applied musicology and study course musicology.

The *empirical testing of solutions* appears as reflection upon the theoretical aspects of concepts – (Concepts, Systems, Language, Graphics and Music: Chapter 4), and systemic approach and systems (Chapter 5). The empirical side of this means matching musicological concepts and phenomena with the abovementioned theoretical data. This culminates to *new conceptual- theoretical model* or rather, theoretical *approach* as the "systemicity umbrella", a tentative presentation of matching main semiotic aspects and cardinal principles with systems sciences and cybernetics (5.10.5).

This is followed by *application of solution to practise* which means applications of systemicity to musicological concepts along with *matching solutions with outset* which gives some theoretical systemic demonstration models on selected musicological[127] parameters (Chapter 6).

Finally, I end my research with discussion and conclusion (Chapter 7) along with *assessment of credibility of research*. In this way, I have followed Anttila's proposed outline of abductive research.

All translations from Finnish or Swedish to English are mine. Texts in Italics and bold fonts are usually my stressing of important parts of the text.

1.3 General Background of This Research

My research topic with the title *On Conceptualization of Music. Applying Systemic Approach to Musicological Concepts with Practical Examples of Music Theory and Analysis* is a very personal choice. It is founded on two interests relating to each other. The first one is my practical need to find new methods for professional pedagogy of musicology[128], especially of music theory and analysis[129]. These solutions also serve other ends: the general interests of pedagogy of music aesthetics, music history, etc. – briefly, music in general regardless of musical culture or musical style, be they Western, or non-Western. My research wishes to offer an alternative approach to the traditional "old" pedagogy. The second interest is a philosophical one: to understand musicological[130] concepts as systems and systemicity, which in turn has to do with how, and what we teach in music pedagogy.

The "old" or traditional prevailing pedagogy can be explained as an intuitive and involuntary use of hypothetico-deductive (HD) methods of presenting knowledge, although consciousness of this fact is non-existent. Musicological[131] pedagogy, too, is mainly based on this method, or paradigm. The HD-method[132] is better known as a traditional widely used scientific research method, especially in quantitative research.

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127 Applied musicology and study course musicology.
128 Study course level.
129 About definition of music theory and analysis see e.g. *OIMTS* Vol. 4: 343-347.
130 At theoretical musicological level.
131 Study course level, but evidently also applied musicology.
132 See 3.3.3.

Since the 1980s I have intuitively cultivated more and more, Socratic discussion and dialogue with my students, especially in music analysis, music aesthetics, music history, and general pedagogy. This has meant choices of the course load focus: less shallow, more depth[133]. The results of my research indicate that there are solid theoretical foundations for this intuitive approach, and examining these theories has given me new insight on how to refine the method. The main theories behind this are abduction and systemicity. Abduction[134] not only serves my research methodological needs but it is also a form of systemicity[135]. Thus, my research method merges into what I study. Abduction favors systemicity, and systems thinking and systemicity, especially complex systemicity, reveals coherent conceptual material for abductive purposes.

With these starting points in mind, we turn to look at music. I have come to a conclusion, which I consider a fact, that the theoretical and conceptual material of music (= musicological concepts) is systemic, and that it is necessary to articulate this fact consciously. Systemicity, on the other hand, manifests itself in various ways: closed, structural, linear, categorical, open, non- linear, complex, in form of negentropy, or entropy, etc.[136]. The acquaintance with systems theories and cybernetics sheds light in what ways musicological concepts are systemic, because they are not all of same type, but various. What more, that which is usually considered structural appears to be complex. The majority of musicological conceptual systems in use seem to be structural-categorical. This research, however, studies the main principles of systemicity with some examples, and does not go into deeper classification. That is the task of future research.

Acquaintance with systems theories[137] gives us possibilities to design systemic models for educational purposes because we do need to notice that theoretical pedagogy, by and large, means designing conceptual models. To utilize systemicity fully in pedagogy does not dispense with only learning ready systemic models designed by somebody – on the contrary: one has to learn by oneself to design and use systemic models creatively. The utilizer of systems models needs to learn to decompose them into parts and units, to reconstruct them and to explain the dependencies and dynamics of systemic parts. He/she also needs to know and explain the concrete applicability of a model, *id est*, what the phenomenon represented by the construction is. For this we need the abductive approach so that we will take into consideration that semantic field (all the necessary conceptual connections, such as those musicological terms and definitions) that represents the systemicity one is seeking. Abductivity means openness to new interpretative possibilities, critical discovery through hermeneutic spiral in science, as well as in pedagogy because pedagogy *is* finding, not only giving. In science abduction is carried out

133 See 6.1.1.
134 See 3.3.
135 See 3.3.2.
136 See 5.4 on systems and music.
137 See Chapter 5.

by the researcher, or even better: by a researcher group, with his/her/their data; in pedagogy an expert pedagogue helps a student to pass through the hermeneutic spiral without giving too quickly the too readily digested answers.

At this stage, I want to point out that, for me, musicology[138] is purely abstract designed and descriptive conceptuality: it is a descriptive system. It is not music and it does not describe music. It describes what is conceptualized as a description of music. Thus, music theory, analysis or music history do not explain music; they explain and describe by words, models, formulas, and signs (texts in semiotics), how theory, analysis and history (or we through them) understand what music is. However, music is not what it is because of these explanations, albeit that we may let these descriptions impose on us what kind of conceptual decisions we make when making music. Conceptual and abstract systems, such as music, are far more difficult to systemize than what we understand as natural systems. This is admitted by soft systemic science experts:

> "Conceptual systems/Abstract systems
> Description Systems whose components are concepts; for example, logical, numerical, linguistic, philosophical, ethical, and religious systems. Conceptual systems may differ in significant ways from concrete systems and in order to be considered within the framework of any general system theory, a system has to be defined more generally as a complex of interrelated entities (rather than of interacting entities). In order to study concrete systems, abstract systems with analogous relationships may be substituted such that the problem becomes a mathematical one. This process is usually known as the development of a model; the extent to which the abstract model agrees with the actual behaviour of the concrete, physical system is a measure of the applicability of the particular model to the situation in question"[139].

This is exactly what I am doing; I am trying to define systemic approach as a tool to understand interrelations between scientific approaches and theories relating to conceptuality. Still, I need to start with systemic material with certain logical "rigor", *id est*, systems sciences and cybernetics, but I need also to take along a less rigorous linguistic side, such as semiotics[140].

1.4 Pedagogical and Educational Reasons of This Research

Although the immediate and conscious reasons of my research were originally pedagogical and educational, as I shall describe them here in detail, behind them are different and deeper reasons that I shall discuss later. Pedagogy and education deal with transmitting knowledge as information because it is the function of both of them. Pedagogical and educational problems described below can be classified into two categories. 1. Educational and pedagogical

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138 At all levels: theoretical, applied and study course levels.

139 *Encyclopaedia of World Problems and Human Potential* (K C0627). http://www.uia.org/uiademo/ kon/c0627.htm (15.10.2001)

140 See especially the systemicity umbrella 5.10.

problems appear as psychological, behavioral, and cognitive problems (interest and motivation on part of teacher and students). 2. Another type of problems involves the form and contents of the knowledge, and the way of presentation of knowledge conceptually. This is the main interest of the central part of my research, and it is this I mainly criticize in education and pedagogy. I hope the reader can find these two aspects in the following paragraphs, although they are intertwined in a complex way.

1.4.1 Problems in Musicological Curricula and Course Loads

The beginning of these findings is from the 1980s when I worked as a pedagogue of general musicological subjects: *yleinen musiikkitieto peruskurssi* (General Music Knowledge, Basic Course) ja *yleinen musiikkitieto I* (General Music Knowledge I). I also lectured on General Music History (covering the history of the Western music from the Gregorian chant to the Late Romanticism) and on modern music starting from the Late Romanticism to the music of the 1970s, as well as on Scandinavian Music, and acted as a teacher of music analysis, general pedagogy and music aesthetics.

My findings at that time were that both General Music Knowledge courses were treated as elementary gradative introductions to later music history studies. This meant that in those courses music history was taught in a "simplified form" twice before the proper music history studies. However, the problem of music history for me was the question: *What is elementary?* Is it elementary to teach first that the music of the Baroque style is pompous, and that "feelings and reason are in balance" in the music of the Wiennese Classicism? How do we later build on these statements that the music of Couperin, or Pergolesi, or Corelli is not at all pompous; that some of the music of Mozart sounds like Bach, and some of Pergolesi sounds like Mozart, or even Stravinsky; or that Stravinsky may sound like Pergolesi? I realized that these kind of stereotypical atomistic statements offered in elementary musicological[141] readings were and are dangerous. They stick and sit in the minds of students, and in the minds of teachers, as well. They represent reductionism, reification, dominant broadcast codes and preferred readings – to borrow some of the semiotic terminology. Notably the students in conservatoires are interested in their major studies of instruments and voice, but these theoretical subjects are "the unnecessary evil" eating up the time of the precious practical studies. I felt a certain frustration in that I repeatedly recycled the same musicological concepts, but the students experienced them as new concepts when they appeared under a different musicological subject and they were formulated from a different theoretical angle. This notion struck me deeply. My challenge was how to make thinking and analysing practical, interesting, and creative, and how to avoid dangerous stereotypes.

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141 Study course level.

My second finding was that most students starting their professional studies did not really master music theory in a creative way. They had learned to solve some "mathematical formulas" in the form of notes but did not really understand how these formulas act in music: what is the role of leading tones in texture, where is the border of polyphony and homophony (is there a border?), what aesthetic reason is to state that some music is atonal and some is tonal, how to sort out the mess of the plethora of medieval texture types, and so on?

In the 1980s, I changed my pedagogical style of the course load for General Music Knowledge I and started to give new courses which developed into something I now call Conceptual Systems of Music. This six-seven-month course serves as a prelude to actual music analysis[142].

The teaching of the major part of music theory and analysis happens in Finnish conservatoires very much in the same way as was customary in the 19th century. The course loads of counterpoint (in the style of Palestrina and Bach), Rameau-Riemann based thorough bass, choral harmonization, sonata form of Beethoven, and Bach's fugue persist. Later newcomers are modal harmonization, row technique and dodecaphony, and maybe even serialism. The Schenker analysis and set theory is a prevalent method in the Sibelius-Academy but not in the conservatoires or the polytechnics. The Department of Musicology in Helsinki University is the main chair of semiotic music research, whereas that of Jyväskylä University is focused on cognitivism. Specialized courses on specialized styles come and go (Hindemith, Lendvais/Bartók, Reti, Yasser, Schönberg, Kurkela, generative music theory, minimalism, spectral music), especially in compositional studies that are usually more radical than courses of theory and analysis. Electronic music studios in institutions focus mainly on compositional practises and specialized concepts of electro-acoustic "laws" of musical sound and form. Very much of the spectrum of tailored musicological[143] courses depends on the interests of individual teachers. Some of them combine theory and analysis with creative music making (compositional analysis).

All these approaches and methods represent a very complex conceptual field, a vast amount of knowledge and information forms. This means a vast intertextual field in the semiotic sense. If we take along ethnomusicology, not to mention, jazz, pop-music etc., including their interests and methods – which we undoubtedly should – the semiotic and semantic field is limitless.

This is the gist of the situation on the professional level. On the elementary and basic level of music theory and analysis, the situation is stagnated. Older theoretical material is republished, or slightly modified to make it look more fashionable. However, the traditional normative hypothetico-deductive pedagogical philosophy persists.

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142 See 6.1.

143 Study course level.

1.4.2 Similar Problems in Indian Music Education. A Comparison.

An important field of my musicological interests has always been non-European music cultures, especially those of Asia and the Far-East. While studying the educational policy of those countries I came accross with interesting findings. For example, the situation of the institutionalized music education in India has encountered similar problems as the Western one. In his book *Indian Music*, B.C. Deva[144] comments that for centuries the so-called *guru-sishya* tradition, or tight apprenticeship tradition of master and student living together in the same household, ensured a very individual training relationship and safeguarded the high standard of all art.

The modern democratization ("same education for all") and the shift of education into institutions broke the guru-sisya relationship. Many gurus isolated themselves and many institutions started to give "instant courses" on, for example, sitar and voice. As such Deva is not at all against institutions, democratization and the new ideas of the West that inspired for example V.N. Bhatkande to create his 10 *that-scale* system; he is against mediocrity and the wrong kind of equality.

I cannot but quote the extraordinary text of Deva[145] written in the end of the 1970s applicable to the present day in the West as well. Has anything changed since then?

> "...the founding of schools of music run on syllabi and examinations has made the process of learning a mechanical affair. What has been achieved in extent has been lost in depth. Those who graduate from such institutions and universities have a paper to show that they have studied so many raga-s and so many tala-s and have answered some standard questions of history of music. Nothing much indeed. Institutionalized teaching has to be made to incorporate in it the best of the old system. This however, is the tragedy not restricted only to music education!"

Does this all not sound like hypothetico-deductive approach in education?

1.4.3 Educational Problems on General Musicological Level

We have good reasons to conclude that the Western musicological[146] education is in a certain crisis. Listening to the comments of music theory teachers who take their work seriously, I have heard the following general opinions: when compared with students of the past, the musicological competence of the current professional music students dropped already years ago. The students seem not to have the competence or enthusiasm to take the theoretical subjects seriously enough; their motivation towards these subjects is generally low. "Today's students are lazy" is an oftentimes-heard claim.

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144 Deva 1980: 153-155.
145 Deva 1980: 115.
146 In this chapter I comment the importance of musicological conceptualization, especially on the practical level of study courses.

Some teachers fear that the new educational policy in polytechnics will be even more disastrous to musicological subjects. The hourly quota of these courses is diminishing. New general studies and especially courses aiming at so-called academic competence on par with universities are increasing at the expense of musicological subjects. However, understanding and making of music is not possible without good basic musicological-theoretical competence[147], and there must be enough time and training to learn this competence. It would be useful to study these opinions further, but that is not the focus of this research. Professional music pedagogy is going through many changes during these years and this will have a direct effect upon musicological subjects and their future.

In order to save the future of musicological studies whether in the older or newer educational systems, I feel that it is not enough to speculate only on the hourly quota (quantity) and academic prestige of musicological subjects. What has more effect is the quality of every single lesson of musicology. The point is how the learning capacity of the student is used in the best way.

The situation connects with the vital issue of the meaningfulness of general and theoretical (musicological) subjects. They can be divided into two main categories: 1. Descriptive (or analytical), by which one learns the way of explaining "how music works", by which we explain "what music is" (chord analysis, sonata analysis etc.), and 2. Prescriptive by which one learns to make music "in a certain way" (texture writing, or compositional studies). There has been an eternal debate within music institutions on this "theoretical scutwork", which is felt to cause unnecessary stress, is obsolete (thorough bass), too large contents-wise (music history, music aesthetics), and eats up the precious time for *THE* music studies (instrumental and voice studies), and so on – this seems to be at least a European problem.[148] Oftentimes students ask permission to take these courses by reading only the referent literature mentioned in the course load without attendance of the proper lessons in the classroom. When this is allowed, still they are even reluctant to read these books properly. This alarming paradox reflects the typical fallacious attitude that the understanding and knowledge of music comes through reading books. Books never replace an intelligent and creative teacher, and a teacher can never know every good book. If students wish to learn abductive reasoning and systemic thinking by themselves, they should study many different books and be able to analyze them intelligently. Additionally, they should study semiotics.

In the present practise it is difficult to integrate theoretical subjects with practical ones as long as pedagogy and teachers of these subjects stay in their own camps. Inside the theoretical camp alone this integration does not necessarily take place. The problems of conceptualising musicological phenomena, according to my experience, appear among the students of professional music in the following ways:

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147 Musicological conceptualization.

148 Meeus, N. *Music Theory in France and Belgium*. The Online Journal of the Society for Music Theory, Vol. 3.4. 1997. http://smt.ucsb.edu/mto/issues/mto.97.3.4/ mto.97. 3.4. meeus.html# Section4 (30.10.2002).

1. Several students coming to professional music education (secondary and higher education level) indicate the lack of capacity of conceptualising phenomenal, conceptual and structural world of music. The achieved theoretical and basic musicological knowledge[149] does not usually meet the standard of starting immediate professional studies at theoretical level. During elementary and preparatory music studies students do have acquired knowledge of certain theoretical phenomena, concepts and structures, but only as isolated bits and pieces of information. Oftentimes these have even been taught in a biased or inadequate ways; they have been misunderstood, and taught in varying ways. A common mistake at general musicological level is the normative simplification of musicological phenomena. Altogether, musicological conceptualization of starters is chaotic and not systemic. Understandably, this cannot help in understanding music properly in a meaningful and mature way. These symptoms have come up in the opinions of several teachers of basic musicological subjects, as well as in public writing[150].

2. The tradition of holistic or systemic approach to musicological information and knowledge, accompanied with relevant pedagogical activity, is missing in the present elementary and professional music education. No official described curricula on such courses are available, and no pedagogical material has been prepared from a systemic viewpoint. To my knowledge, there are no music researchers and teachers specialized in systems thinking in Finland, and the systemic approach as a pedagogical alternative is non-existent, unless we count constructivism which, to my understanding, represents a form of systemicity in pedagogy. In discussions with theoreticians and researchers of music, I have met sincere interest and resonance towards the possibilities of systemic approach.

3. The incompetence of mastering systemic thinking by students and teachers cause apparent difficulties to assimilate and teach such general subjects which cover "wide spectral musicological conceptuality". These subjects include music analysis of several style periods, music history, and music aesthetics etc., in which a plethora of musicological phenomena[151] appear. "Narrow spectral" theoretical subjects (thorough bass, harmonization, counterpoint, sonata-form analysis, fugue-analysis, etc.) are easier to digest due to their normative and ready-made concept models.

4. As a lecturer on music analysis, music history, aesthetics of music, non-European music cultures, and general pedagogy, I have encountered the fact that students have not usually understood the systemic nature of musicological or any other concepts in the necessary depth (“how/why-knowledge”). They have learned them as isolated conceptual structures ("what-knowledge") without realising into what kind of conceptual fields and systems they belong. In the prevailing standard pedagogy, the semantic, conceptual, or semiotic functions inherent in concepts and their related terminology, are usually not grasped and taken up for discussion.

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149 Musicological conceptualization at basic study course level.
150 Music magazine Rondo in the 1980ies and the 1990ies.
151 Musicological concepts.

5. These problems reflect in the curricular contents of general musicological subjects[152], which in the pedagogical activity lack cohesion, and intended coverage of contents. The objectives are ambitious but the time is short. Undoubtedly there are singular intelligent pedagogues with high professional capacity who are able to integrate knowledge of general musicology[153] with music making. Too often, however, these subjects are taken as isolated packets of information that must be passed through in exams.

6. In order to understand the function of a phenomenon one must understand the system in which the function of the phenomenon takes place. Understanding music contextual-aesthetically, as well as experiencing and performing it appropriately and artistically, seem to link with the systemic and functional understanding of musical phenomena and concepts. Here systemic understanding of musicological concepts can help. This reflects in interpretation and reception of music. Thus, organic music links systemically with organic music conceptualization, and that links with systemic understanding of musicological concepts. I think it is necessary that students study the methods of systemic approach already in the beginning of their musical professionalism. Actually, systemicity should be an essential part of any elementary education as well in order to create a necessary systemic continuum in all education.

From the viewpoint of systemic approach the problems of conceptualising theoretical musicological phenomena and the consequences appearing in musicological education described above can be better understood and receive their explanation in the theoretical part of this research[154].

1.4.4 A Manifesto on Pedagogy of Musicology

In 1999 at the 3rd Symposium of Music Researchers in Jyväskylä before the actual research reset I presented my opinions on the problems of musicology[155] including the direction where to seek for answers.

> *1. The present musicological education in Finland, as well as abroad, has admittedly come to a certain dead end due to outdated educational goals and philosophical approaches and methods.* This is reflected in long-standing problems of curricular planning in musicological study courses and haphazard results in musicological education: a) musical educationists in Finland have long tried to find solutions how to integrate musicology with practical music education – without satisfactory results, b) only too few students seem to rise to the required level in intellectual holistic understanding, "what music is all about?" *The old rivalry between the priority of practical/instrumental studies and the theoretical ones persists. This rivalry is unnecessary and the focus of musicological-educational goals should be shifted.* The necessary development of the praxis of musicological education is dependent on new findings in musicological

152 Like music theory and analysis in the conservatoires and universities.
153 Musicological conceptualization.
154 See abduction 3.3 and especially comparison of abduction and hypothetico-deductive approaches 3.3.3; question of concept categories 4.6; comparison of analytical and systemic approaches 5.8.3.
155 In this chapter I deal with the problem of musicological conceptualization related to study courses.

research applicable to education. *Thus, new insights and analytical descriptive methods must be found in musicology.*

2. The situation is critical especially in the field of professional musicological education, which, on the other hand, currently remains in juxtaposition with the major part of the practical music life and on the other supports certain traditional concert institutions. *Worldwide musical-artistic activity, with all its styles and genres, is continuously cumulating. Modern information techniques offer staggering possibilities to produce infinite amounts of musical information. This information cannot be easily recorded, abstracted and formulated into institutionalized academic study courses.* Moreover, musical information becomes quickly outdated. We either accept pluralistic music education, or try to find universally suitable descriptive methods for holistic conceptual purposes.

The humanistic-ideal challenge in academic music education is still to teach the student to master the old and the new styles and genres of the European concert music. This challenge runs counter to the practical possibilities of most institutional music education. In this light the unwanted musical-cultural racism cannot be avoided. Hence, musical information and knowledge becomes outdated very quickly.

It is no more possible to educate experts who know everything about music. The ideal goal of educating the student to become "a Musical Everyman" is no more possible. It is relevant to pose new and critical questions. What is possible to teach in musicology? What does a student actually learn about music? To remember and repeat, or to understand? What should be the aim of musicological education? How much and what should a student know about music? What is useful knowledge? What kind of musicians, music educators, and music lovers do we want to create? What should they know, what should they master? *Should we drown our students in the sea of information, or should we educate them to swim in it?*

3. The traditional atomistic scientific-curricular-educational approaches to music (i.e. study courses on music theory, music analysis, music history etc.) have, during their long history, created separate disciplines with separate jargons and separate descriptive material. Students starting their professional education on upper secondary/higher level remember bits and pieces of musical theoretical formulae and musicological details without any holistic connections to compositions or musical styles. They seem not to crasp what and how much they actually know. They maybe remember "what" but do not know "how " and "why"? The situation can be explained by the total national educational system, which, despite several remarkable improvements, still cherishes traditional atomistic curricular methods, criticized by modern educational experts. The strongest criticism comes from the camp of educational constructivists. Haapasalo is one of them[156].

4. Many scientific and educational disciplines have started to utilize the possibilities of systems thinking/systems theoretical approaches. This is not yet so in the field of music where literature on this method is not circulated or it is little known. Literature in Finnish is non-existent.

5. The aim of the research is not to prove the validity of any given systems thinking. Rather it is most vital to understand the need of systematic analytical thinking. The present scientific field provides an ample selection of systematic approaches, such as systems thinking, system theory, constructivism, information theory, universal theories, structuralism, and complex thinking. Links to this kind of approach can also be found in the fields of semiotics and cognitive paradigm.

The further notions were part of the background information of the validity of the research.

Some primary musicological systems/including universal musical examples from various styles and cultures/examples:

Musical style systems Tonal/sound systems Texture systems Rhythmical systems Form systems Timbre systems Musical dynamics systems Musical communication systems etc.

156 See 1.5.2.

Some secondary musicological systems/an example:
Texture

Melodic part systems	*Harmonic systems*
Polyphonic systems	*Heterophonic systems*
Unison systems	*Drone systems*
Cluster systems	*Field technique systems*
Minimalist systems	*Noise/effect systems*
Speech choir systems	*Music + text systems etc.*

** Analysis of specific textures (possibly in relation to specific tonal systems/specific rhythmical systems/form systems/timbre systems etc.).*
** The process of introducing systems happens from familiar to less familiar phenomena.*

Some tertiary musicological systems/an example:
Melodic part systems
1-part melodies: Gregorian chant/modality Arabic chant/modality
Indian chant/modality Songs of chivalry European folk song/ major minor tonality
Ethnomusicological examples Jazz/pop-music etc.

** Analysing/comparing examples, where a given tonal system has specific prominence (where possibly not) in the unfoldment of one-part melodies.*
** The process of introducing systems happens from familiar to less familiar phenomena.*

1.5 Cognitive-Philosophical Problems of Old Style Pedagogy

The present problems of musical-theoretical education and described above indicate certain philosophical-theoretical problems. Knowledge about music is controlled by concepts about music. But do we control these concepts?

The most important mental capacity of man as regards the existence of culture and civilization is his ability to think. His second most important mental capacity as regards the existence and development of culture and civilization is his ability to communicate his thoughts. The most important and versatile means of communication is language[157]. Concepts and their meanings pertain to every form of communication; not the least to verbal communication.

Concepts (normative or prescriptive) about, or of music – be they manifested in whatever communicative way (signs or texts, in semiotics) – are the most important medium to sustain and promote general knowledge of music. Musicological concepts of music are the most important medium to sustain and promote general knowledge of the structure, or system of music. What follows from the previous or latter statement is that verbalized concepts (signs and texts) tend to become normative (naturalized, in semiotic terminology) in constant and general usage. We cannot avoid it totally. The largest community (interpretative community, discourse community, textual community, in semiotics) of normative musicological concepts are students and teachers of music, and specialized music lovers. With concepts of music, music is made known to "the audience". By means of these concepts of music, more information about the phenomenal world of music is produced and controlled. Concepts of music are the tools of music research and education. Education

[157] See 1.7.6, Research material and background literature re V.N. Voloshinov.

controls music consuming and consuming brings feedback to education. Thus, certain naturalized musicological codes also become dominant codes. A good question: what is the present status of this tool? Do we master and control concepts of music?

The problems of traditional musicology[158] reflect in *cognitive* or *constructivist* learning problems with students of music. The following notions should be familiar to teachers in music institutions of long standing: 1. Theoretical study courses (including general subjects such as music history, music analysis etc.) are experienced as disturbing, taking time from the practical subjects of music making. 2. Theoretical subjects do not integrate enough with practical subjects, especially on a professional level of musical specialization (professional higher level studies). 3. Contents material of theoretical subjects do not integrate with each other horizontally but keep to their specific vertical curricula (course loads; Am.) because they are taught and learned as separate static packages of information[159]; in short, they do not form an integrated conceptual systems field in the minds of teachers and their students.

It is not the purpose of this research to deal with problems 1 and 2, but to concentrate on giving light and solutions to problem 3. The answer is systemicity and systemic approach.

1.5.1 Constructivist Criticism

In his book *Oppiminen*, *tieto*, *ongelmanratkaisu* (2000)[160] Lenni Haapasalo, a representative of constructivist thinking[161], discusses the foundations of pedagogy and stresses the need of profound reforms based on the latest findings of the nature of knowledge and research of learning processes. His observations on "stray" subjects, such as maths and natural sciences, are valid, as regards to the general subjects of music. According to Haapasalo, static conceptualization of knowledge (naturalized, reified subjects, in semiotic terms) through isolated course loads and subjects which are learned atomistically as ”facts”, seems to lead pedagogical actions and learning processes to a cul-de-sac. He refers to research results, according to which, students do not learn to master even the most basic concepts and methods in order to live the normal life.

The national educational system "strives for transmitting scientific expertise, unfortunately with novice methods”[162]. Lehtinen et al. (1989)[163] drive their point home even better:

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158 Study courses.
159 See Haapasalo 2000: 62.
160 Learning, knowledge, problem solving (title translation).
161 Haapasalo, among others, considers constructivism as separate from cogniticism; Haapasalo 2000: 97.
162 Haapasalo 2000: 63.
163 In Haapasalo 2000: 64.

> "The school system typically aims at production maximally prompt automatism without safeguarding the sufficient and functional generalization of knowledge, it disregards the hierarchical connections of participating actions and elements of knowledge. This misleads in many cases to automatism of situation-oriented and inefficiently organized knowledge and action system."

This statement in my opinion points directly at the need of the emergence of systems thinking[164].

Applying the notions of Haapasalo: theoretical subjects of music with their formalistic model learning are comparable with mathematical school subjects, and the general subjects of music are comparable with natural sciences. We may raise a question: in what measure do music institutions, of even higher and academic level, work in the old-fashioned way?

Several researchers (e.g. Ambiola/1983, Cleminson/1990), according to Haapasalo, confirm that education seems to miss reasonable basic philosophy and direction. His conclusion is that we should "visualize knowledge more dynamically than is usual in institutional education"[165]. His alternative in pedagogy is systematical dynamic constructivism.

Haapasalo's thoughts confirm those of mine. The problem in controlling the field of conceptual subjects of music is connected inherently with the dynamic control of musicological concepts, and with its basic philosophy. Haapasalo, referring to Ernest (1991), stresses the importance of constructivism in the reform, not only as learning psychology but also as a perspective[166]; or as Lawson (1979) puts it a "paradigm for improving education"[167], and, in the end, as an approach, or a metatheory, or a paradigm. As for me, I am inclined to see constructivism as part of a larger perspective, that of systemicity and systems thinking[168].

1.5.2 Music As "Mathematics"

Music in the West as well as in the East has commonly been compared with mathematics. It has been compared with architecture and language, as well. Analogy with mathematics is understandable when examining the traditional institutional education of musical-theoretical subjects. Presently the education of music theory and analysis in professional institutions in Finland, in conservatoires, polytechnics and the Sibelius-Academy, can be divided into two "schools". The older traditional school favors philosophy and aesthetics basing on the German-Krohnian music theory and analysis. The more modern one favors set theoretical or Schenkerian approaches[169].

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164 See also comparison of analytic and systemic approaches 5.8.3.
165 Haapasalo 2000: 63.
166 In Haapasalo 2000: 95.
167 Ibid.
168 See 4.3.3 Concepts – Knowledge – Epistemology. A Cybernetic View.
169 Referring to my discussion with professor Lauri Suurpää at the Sibelius-Academy on 26 March 2001.

Both schools favor the use of standard formula patterns basing on measurable and calculable units and proportions such as numbers, repetition, symmetry etc., have been a must. The curricula of theoretical subjects are grouped into progressive levels and courses of theoretical-technical difficulty: music theory and solfége, harmonization, counterpoint, thorough bass, serialism, row-technique, music analysis in various specialized techniques, Schenker, set theory, Asafjev, Lendvais, Schönberg etc. Most of these courses typically offer precise normative rules of "music-making" pretty much in the form of "music mathematics". Learning objectives follow the models familiar from the school world. Knowledge about music is expected to expand and increase horizontally in the minds of learners during each course and vertically in each course load. In mathematics, it is expected that certain mathematical perception models suit best a certain age group. Likewise, the mastering of music theory is rationed to pupils "as a continuum of degrees of difficulty". In mathematics, lucky enough, the spiral principle of learning is used; in music theory it is uncommon. Because of this atomistic orientation towards learning and knowledge the integration of related theoretical subjects such as harmonization, counterpoint, etc., is missed. Even more drastic, the complex integration of musicological parametres, e.g. connection between texture and tone system, is lost[170]. Evidently, it is taken for granted that these "technical models of music" integrate automatically in the heads of the learners, provided the learners have advanced to a certain point (which point?) during these courses.

This is the worst ongoing scenario in most of the education of music theory, albeit that sounds of reforms have echoed from the field and some solutions are hopefully somewhere being tested.

Although the students are taught in music theory lessons "how music is made", and how it is constructed, the products of these courses are not normally considered as music with any artistic value; their task is only to control technical musicological manufacture. Therefore, it is very safe and handy for the teachers of music theory to give and assess tasks based on formulas of exact structures and musicological *algorithms*.

Comparison of music theory with mathematics reveals the negative aspects of the present situation in a “stark” way. Such music education where training in theory and analysis happens algorithmically and is comparable with conventional mathematics makes the same mistakes made in the pedagogy of mathematics[171]. Out of the 32 claims by Haapasalo I have taken "only" 15 – I could have taken more – and have replaced the concept of mathematics with the concepts of *music theory/musicological knowledge*, *music*. I endorse these statements as evidence of the present crisis of theoretical subjects of music.

> Curricula in form of a list [course loads] have been devised through which normatively structured knowledge has been imparted in schools and universities

170 Compare with Haapasalo, 2000: 62-63.
171 Compare with Haapasalo 2000: 151-152.

> mainly through deductive teacher centred pedagogy, for learners of certain age groups, at standard lesson periods (60 minutes!), at a standard pace.
>
> [*Basics of musicology – musiikkitietous* in Finnish] has been imparted mainly as symbolic constructions of knowledge disregarding the fact that in the cultural-historical perspective this subject is, for the most part, traditional lore as result of heuristic processes.
>
> Pedagogy has focused on utilising enormous amounts of learning tasks that favor almost exclusively adaptive and reproductive working methods, mostly so called drilling. The student is seen as a passive receiver of knowledge.
>
> Teaching of ready-made (algorithmic) models of action has evidently been the greatest cause of associating negative beliefs, attitudes and feelings towards [*music theory*].
>
> [*Music theory*] at schools has had far too little connections with [*music*] as science, and also as a tool for problem solving and building-up the world-view. It has become an instrumental asset, whose starting points and objectives have not been challenged.
>
> [*Music/theory of music*] is considered an objective structure of knowledge instead of paying attention to the emergence of this knowledge from a student's viewpoint, in one word: how to plan and steer the processes of knowledge emergence.
>
> [*Music theory*] in schools has been a catalogue of concepts. However, in order to facilitate conceptualization, qualitatively differentiative approaches have been too few, or study material has been poor.
>
> Too much stress has been laid on the importance of pieces of knowledge. The more universal, contents-free nature of [*music theory*] has been left unnoticed.
>
> [*Music theory*] has not been taken as a medium for a student's growth and world-view formation. It has become a study subject focusing on course loads or on musicological learning capacities.
>
> Curricula emphasize contents-oriented objectives instead of actual learning processes.
>
> Learning objectives have been formulated and worked out from strictly behaviorist viewpoints.
>
> Equality in education has been the major social factor. Curricula have not included enough alternative or optional study contents.
>
> The focus of learning assessments has been mainly on assessing of performance, not of assessing learning processes.
>
> The possibilities of integration inside [*music theory*], and between other subjects (such as general musicological subjects) have not been investigated thoroughly and without prejudice...
>
> Learning objectives and study contents are distributed over several school terms/academic years. Hence several study contents are taught over and over again as new study contents (spiral principle, repetition).

I feel strongly tempted to comment in detail on the apt contentions of Haapasalo, which contain many juicy points as regards to musicological subjects in conservatoires and universities. Unfortunately, this is not the place to delve into them. They only justify the urgency of this research.

1.6 Musicological Reasons of This Research

In addition to the evident educational application value of systemic approach towards musicological concepts[172], it also has very important paradigmatic

172 See Chapter 6.

musicological[173] reasons. As indicated in Chapter 1.1.1 (Musicology Today – Musicology of the Provisional), the trends in new musicology since the 1980s have set the question of music into an ambiguous position.[174] The post-structuralistic hegemony[175] is ambivalent about the value of music analysis[176] and seems to underestimate the possibilities to study "music directly" as conceptual systems because systems converge structures, norms and formalism, which were rejected by many musicologists. However, it is not thinkable to lay the foundation of understanding about music if we reject formal tools altogether. They are needed, not as rigid structures, but as a dynamic complex conceptual tool to present variable systemic possibilities.

The need of presenting the possibilities of systemic approach either in musicology, or music education cannot be properly understood without going into the cardinal question of music itself from a conceptual viewpoint. This I shall present in Chapter 2.1. Secondly, systemic thinking has not yet reached a worthy status in basic, professional and academic education. There are clear signs of the need of systemic thinking among educationists and pedagogues. For example, constructivism has gained more and more public recognition, but systemicity behind constructivism is not known. On the other hand constructivism itself is not necessarily understood properly, as commented on by one of its representatives, Lenni Haapasalo, in a private discussion. I believe that this is due to the deeper reasons: systemicity is not generally known.

1.6.1 Musicology Needs Systemicity, Not Only Systematism

All the following intuitive opinions are not to be taken as strict scientific facts. They rather function as a cue in my abductive method.

Music, or actually musicology[177] commenting on music, is conceptually very rich and detailed. There seems to be no other art form using such a rich and detailed conceptual field. In institutionalized Western music practise, education, and cultivation, "all" historically cumulated concepts from the Middle Ages to our time are presently in use in musicology. I do not think that this is so in other art education. It has been taken for granted that every professional musician and pedagogue must master these concepts to a high degree. It is thought that understanding music professionally needs all this knowledge. I cannot think of any other art form which still cherishes old conceptual models so faithfully and persistently as music does. I also cannot think of any other art form whose descriptive concepts and prescriptive models, especially the concept of tonality, have spread universally through several hundreds of years and through so many cultures. "Western music" is perhaps the most universal of all arts. I do not mean that it should be so.

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173 Theoretical musicology.
174 See 1.6.2 Schism in Modern Musicology.
175 E.g. narratology and deconstructionism.
176 See 1.1.4.
177 Applied musicology and study course musicology.

Making music does not necessarily need any material instruments. Mind and voice suffice. In this respect, music resembles language. Certain languages – English, French, Spanish, Arabic, or Chinese – have become universal. Likewise, the conservative Western major-minor tonal music has become the "musica franca". Similarly, as certain linguistic-grammatical patterns have been accepted to explain the linguistic phenomena of English, Finnish, or Russian languages (nouns, verbs, adverbs, inflection, etc.), in the same way, certain Western musicological concepts have become accepted to describe musical phenomena of many otherwise dissimilar music cultures (such as a Mozartian sonata and a Finnish folk song).

Since the 19th century, and somewhat earlier, the same concepts, structures, and formulas of music have been used to describe and analyze the music of many centuries. At least two texture types: polyphony and homophony, as well as two-tone systems: major-minor tonality and modality, have been very dominant. For both, detailed and elaborate structural formula systems have been developed.

What we analytically call the polyphonic practise (learned style and free polyphony) covers the Western music from at least the Flemish schools up to our age (dodecaphony and after), and the homophonic one (with cumulative chromatics) from the Renaissance (at least Lasso and Palestrina, Gesualdo) to the modern era. Even the artistic solutions of Debussy or Scryabin are explained, at least partly, through homophonic-tonal analysis.

The major-minor tonality started already in the 14th century in Italy and by the Celts and Britons even earlier. Its dominance persists today, and it is rediscovered over and over again, some time ago again as "neue Schönheit". Its vitality is due to chromatics interpreted as mutations of tonal and tone functions. Modality, in the traditional sense, belongs to the universal tonality system with special possibilities to elaborate linear melodic nuances such as those of Indian, Indonesian, or Arabic music. As in texture, the possibilities to mix polyphony with homophony exist; also combinations of major-minor and modal tonality (e.g. predominantly in jazz) have been explored. In the course of time the cognition of the systemic nature of all these systems has produced new interpretations of the nature of vertical texture structures (possible chord types) as well as linear texture structures (new modality interpretations such as those of Messiaen). This all is very systematic and complex and it is not the fault of musicology as such that within it the application of systemicity has become necessary. For the latter reason, I have to elaborate in this research what systemicity means in relation to musicological concepts.

1.6.2 Schism in Modern Musicology. Narration vs. Analysis

It is part of the rules in the society that we take much of the established for granted. The dominant code and naturalization[178] of traditional musicological language[179] has done the trick to musicological concepts: the normative old (regulative) and the descriptive (speculative) new musicology[180] "musicology of the provisional"[181] seems to be at a crossroads. Unnecessarily so, because researching concepts of music in general has a natural connection to music analysis and theory. This aspect, however, is what the new musicology seems still to put under question.

The traditional and still dominant institutionalized music analysis uses practically the same sets of musicological concepts as are used in music theory. For example, all academic texture writing, scoring or compositional exercises are performed by aid of analytical tools. In his article *Analysing music under the new musicological regime* (1996) Kofi Agawu[182] summarizes of the history of music analysis which started sometime in the 18th century, or even earlier, and became established in the late 19th century. Only in the 1980s were the first comprehensive books on music analysis in English published (Bent, Cook, Dunsby, Whitall). They featured the various compositional techniques of the previous decades, partly also for pedagogical purposes. To quote Bent[183], music analysis is: "the resolution of musical structure into relatively simpler constituent elements, and the investigation of the functions of those elements within that structure." Whitall[184] writes: "The analytical process is two-fold: to identify the various materials of a composition, and to define the ways in which they function."

Traditional music theory, according to Agawu, "undertakes to codify 'the various materials of a composition' (Adorno, 1982)"[185] and to exemplify their functioning in a range of works; it insists that its methods meet explicitly stated criteria of coherence; and it often proclaims aesthetic preferences, though not always directly." For Adorno theoretically based music analysis and music aesthetics are married in order to achieve "the truth content" of a musical work. This is the ultimate purpose of analysis. As Agawu states, these viewpoints

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178 Chandler. *Semiotics for Beginners*. Glossary. http://www.aber.ac.uk/media/ Documents / S4B/ sem-gloss.html (10.10.2001).

179 Applied musicology: formalistic musicology, music theory and analysis concentrating in the study of the structure of musical works.

180 Applied musicology: later, "more liberal" trends focusing the social factors of music.

181 See Chapter 1.1.1.

182 Agawu, K. *Analyzing music under the new musicological regime*. The Online Journal of the Society for Music Theory. Vol. 2.4 1996. http://smt.ucsb.edu/mto/ issues/ mto. 96.2.4/ mto.96.2.4. agawu.html (27.08.2001).

183 "Analysis," in *The New Grove Dictionary of Music and Musicians*, ed. Stanley Sadie [London: Macmillan, 1980], vol. 1, pp. 340-88) in Agawu, ibid.

184 "Analysis." In *The New Oxford Companion to Music* (Oxford: Oxford University Press, 1983), vol. 1, p. 58. in Agawu, ibid.

185 T. W. Adorno, "On the Problem of Musical Analysis", *Music Analysis* 1 (1982), pp. 169-187 in Agawu, ibid.

were clearly structuralistic, giving rise to the early musical semiology of Ruwet and Nattiez.

During the same period when the 'old' theory-based musicology was trying to establish itself, Joseph Kerman (1980, 1985) attacked it with accusative and pejorative terms of formalism and positivism[186]. His reaction was part of the rise of a new trend, 'new musicology' which, instead of structural forms, wanted to pay attention to affects, expression, meaning and cultural context of music. It was looking after "a plot, a program, an emotional scenario, a context, an agenda, a fantasy, or a narrative"[187]. The mere connections between certain structural patterns in a work were not at all enough. The time had come to "semiotics, response and reception theory, narratology, gender theory, cultural criticism…the new musicology is, in short, eclectic and selectively pluralistic (Rosand, 1994)"[188].

In his prophetic *The Musicology of the Future* Kramer[189] fears the death of musicology unless it utilizes "postmodernistic strategies of understanding". His grandiloquent manifesto, as Agawu calls it, wants to "liberate musicology (and music theory) from their ostensible conservatism and complacency." Kramer lists the interests of the new musicology: politically-motivated criticism; issues of race, gender construction and sexuality that impinge on the consumption of music; non-canonical repertoires, especially of the popular variety; reception of music that is understood not necessarily as an account of other listening subjects (with specific histories and geographical backgrounds) but as an account developed around the individual subject, etc. He continues: "… the language in which all of this is mediated is best if it highlights the performative element in writing – charged, colorful, sometimes obscure sometimes playful, but never clinical or 'scientific.'"

Rightly so, Agawu[190] meditates upon the possibilities to unite the 'formalistic' theory-based analysis and anti-formalistic new musicology such as social discourse, but is understandably unable to give an answer to this "Gordian knot". He discusses critically the various approaches of new musicologists (especially that of Susan McClary, who tries to combine old formalistic methods of tonal and thematic analysis with gender and myth. He introduces various other approaches in the new musicology: phenomenology of music (Clifton), hermeneutic readings (Lewin), foundational instability of terms, contingency of analysis, fragility of conceptual constructs (Street), etc. As stated in Chapter 1.1.1 several writers of *Rethinking Music*, admit and restore, although in careful words, the validity of music analysis. However, systems

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186 Kerman J. 1980 "How We Got into Analysis, and How to Get Out", *Critical Inquiry* 7 (1980), pp. 311-331; Kerman, *Contemplating Music* (Cambridge: Harvard University Press,1985) in Agawu, ibid.

187 Agawu, ibid.

188 Rosand, E. 1995 "The Musicology of the Present", *American Musicological Society Newsletter* 25 (1995), pp. 10-15, in Agawu, ibid.

189 Kramer, L. 1992 "The Musicology of the Future", *Repercussions* 1 (1992), pp. 5-18, in Agawu, ibid.

190 Ibid.

thinking or systemic approach is neither mentioned nor taken up in these studies.

1.6.3 Earlier Systemic Research in Musicology

In this paper, the linguistic expressions of systemicity, terms such as systemic (systems) approach (the systems approach) systems thinking, systems view, systemicity, and the like, overlap[191].

Very little scientific literature of the systems approach applied to musicology is available. Of earlier research of music and systems we have to mention C. Georgescu's and M. Georgescu's *A System Approach to Music*[192], as well as I.H. Witten's and D. Conklin's *Modeling Music: Systems*, *Structure*, *Prediction*[193]. The former research is about a system approach to the structure of musical works and musical composition, and an explanation of the development of selected musical styles from a normative (my wording) musicological-structural[194] viewpoint basing on von Bertalanffy's General Systems Theory, and of other more sophisticated system theories. The deduction is that music as developing art and works representing it, "behaves" (my wording) like an organic complex system, which can be characterized by systems theoretical properties. Georgescus' study uses graphics and formulas common to first order cybernetics, such as flow charts, other technical drawings, etc. along with textual explanations.

The latter research by Witten and Conklin is a commentary and criticism on Georgescus' findings plus their own interests: new methods of predicting music and ways of evaluating the effectiveness of prediction methods. Their main focus is to address "how effectively a purely syntactic system can model the (structurally stable) musical surface" through computer analysis of large bodies of existing music, in this case of Chorales of J.S. Bach. The researchers treat Georgescus' paper "visionary, a "gigantic and magnificent scaffolding", it is a "pioneer work", whose scope is "ambitious", etc. Their work is more focused to seek constrained models.

The marriage of these two papers is summed up in the Conclusion part of Witten and Conklin. According to them[195], "Georgescus identify the system-theoretic notion of a structural bifurcation [departure from the standard] with a paradigm shift in musical [compositional] expression… identifying such instabilities within individual musical works [producing morphogenetic = individual works]". Witten and Conklin stress that the need of understanding morphogenesis is to associate it with dynamic, predictive models.

In my opinion, both studies miss, what is essential: actual music cannot be studied through musicological analytical concepts. Music and musicology are

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191 See 5.3.
192 Georgescu & Georgescu 1988: Interface, Vol. 19, 1990: 15-52.
193 Witten & Conklin 1989: Interface, Vol. 19, 1990: 53-66.
194 Music theoretical.
195 Witten & Conklin 1989: Interface, Vol. 19, 1990: 63.

two different conceptual fields. We may, of course, let musicological modelling influence normatively on music making, as is the case in institutionalized music studies, but in essence the existence of music does not need it.

Neither of the two studies deals with the question of systemicity of musicological concepts, which in essence is the conceptual material of both studies. All the aforementioned researchers take the normative musicological concepts for granted using them as research material for systemic purposes. My interest, however, is to explore the very concept field[196] of normative musicological paradigms, such as texture or form, and their cores and boundaries, by aid of systemic approach.

Out of other better modern general theories that aim at presenting musical works as a system, either from the viewpoint of analysis or composition one has to mention the Generative Theory of Tonal Music. As we know Jackendoff and Lerdahl created their Generative Theory of Tonal Music (GTTM) in the1980s following the ideas of the generative linguistic theory of Chomsky (1965). His findings have had important influence in developing artificial language generation linked with artificial intelligence and mathematical modeling. To me, GTTM is not a systemic method, in the sense I mean systemicity. It is not a metamethod although it shows certain holistic systemic features because of complexity and variety of the manipulation of its ”laws”. It is systematic but not systemic, it is an applicative method, or even a study course method among other applicative, or study course methods. In closer examination from the viewpoint of systemicity, the GTTM represents a deductive and very negentropic concept-model system. It is a normative description of “the musical intuitions of a listener who is experienced in a musical idiom”[197]. It does not describe actual music as individual musical pieces; it desribes a maneristic, socially, historically and culturally bound style of musicological conceptualization from the viewpoints of certain music analysts. Therefore, it is very formal and reductionistic, and limited to **a certain** musical (or, in fact, musicological) idiom to that part of Western tonal music that can be analyzed through the academic established thorough bass methods.

In GTTM all music (or, rather, all musicological conceptualization) is treated practically as homophonic; the theory is not able to handle with polyphony, which to me represents a more refined textural complexity than what GTTM is able to describe. Besides, the aim described in the theory is, in my opinion, a fallacy. It is not possible to define the scope of Western music (or, rather Western musicological conceptualization), neither is it possible to befine the scope of homophony, or tonality; GTTM explains only a part of its intended scope. To me, for example, the Western major-minor system, as an actual concept system, does not have a clear boundary with other modal tone systems.

In the light of systemicity, GTTM does reveal a certain amount of complexity: the well-formedness rules – that “state that the groups are constructed only out of contiguous sequences of events, that the whole piece

196 See 4.4.9.
197 Ruttenberg 1994.

forms a single group, that larger groups may or may not be partioned into smaller groups, and that if they are the partioning must be complete."[198] – can be interpreted as representing variety of elements (differentiation), and the preference rules as the scale level factor (e.g. of register, loudness, articulation, note duration, etc.). However, this kind of an approach is not far away from serialistic rules of the 12-tone row system (dodekaphony).

It is most evident that the GTTM theory has been generated abductively by too strong a cue; the cue has already been a theory, and the real novelty, thus, has been lost. (Besides, I think that the name of the theory should be reformulated into "A Generative Theory of A Tonal Musicological Conceptualization" – because the theory does not describe, neither does it generate, actual music). The problematics of GTTM as describing actual music seems to refer to the problematics of mathematical modeling of music, which is outside the focus of this paper. Ruttenberg writes: "For one thing, generative theories are languages for describing sets rather than for specifying processes and activities." – Then, to me, music, and even musicological conceptualization is certainly much more than mere sets.

1.6.4 We Think, We Construct, We communicate – We Need Concepts

> "We structure the world by aid of concepts and concept systems. Every scientific field is made up of concepts, which together form systems, concept systems. Without concepts and concept systems the world would appear to us be as an endless mass of singular objects. We compare objects and register similarities, differences, and other connections between them, and on this basis we formulate concepts. Concepts are elements of thought, and therefore (they are) mental constructions basing on our knowledge on matters and things. In order to communicate we give names to these concepts."[199]

This quotation is from the beginning of Anita Nuopponen's interesting dissertation *Begreppssystem för terminologisk analys* (1994) in which she develops a theory of terminology by creating a classification of concept systems and concept relations in hope to improve methods for terminological analysis and terminology work[200]. Her text illustrates aptly the role of concepts in helping us to understand the world around and inside us as well as its phenomena. When applying her view, one finds that music is one of these phenomena. Music is inside us and outside us. Music is "some kind of conceptual thinking", at least we may name it as mental constructions when we communicate about music, and when we communicate about it in the form of musicology[201] we use words, terms, and models, which represent our concepts.

This short but concise quotation contains practically all the relevant conceptual elements, which at the same time forms the core of my research. In her dissertation, Nuopponen does not introduce the theories behind systems

198 Ibid.
199 Nuopponen 1994: 15.
200 See in more detail 4.4.
201 Musicological conceptualization.

(although she mentions the concepts of systems theory and structuralism) because her work concentrates on theoretical questions offering practical solutions in terminology work. Her systemic background is that of the traditional terminology theory by Wüster with some modifications of other researchers and herself. The approach is linguistical-structuralistic, which is one form of systemicity. My research goes into the basic questions of systemicity where one of the forms is structuralism or terminology science.

1.6.5 Paradox of Musicology. Music Is Not Musicological Concepts About It

In order to understand my research and its aims, it is essential to accept something unusual in musicology[202]. I am not a radical constructivist but for the purposes of this research, I maintain that we cannot study music directly, but that we study conceptualized data on music; at least our scientific results are always conceptual indirect data. It is these conceptual results we communicate and use for science and in science.

The reason for this is understandable. Science is very much quantification, even quality is quantified in some way. Science attempts to be coherent in the semantic way and needs somewhat stable semantic tools, terms, and definitions representing scientific concepts[203]. In musicology[204], we do not handle musical concepts (such as emotions, feelings and associations) directly; we handle concepts about music and musical concepts. Terminology science[205] makes differences between the ontic level, the ontological level, the conceptual level, and the semantic level[206].

Theoretically, one could go into deep discussions about these relations, but for practical and linguistic reasons, Nuopponen reduces the issue into two: ontological and ontic. According to this division music, musical works and everything pertaining to "live" music as reality are existing ontic phenomena with ontic relationships. In systemicity, or in systems thinking, this equals with *actual system*[207].

Ontological concept relationships are, according to Nuopponen, conceptual simplifications of those relationships we notice between real phenomena[208]. Added to the ontological level is the model level[209]. These ontological simplified concept models we take as music because models of perception tend to become models of doing[210]. After describing music "as it is", we also tend to make music

202 At the level of theoretical musicology.
203 See Karihalme 1996: Chapter 5.1.
204 Musicological conceptualization.
205 Nuopponen 1998: 67-69.
206 See also the division of Karihalme 1996: 113-114.
207 See 5.4.1.
208 System for Mela, see 5.4.2, see also 4.4.13.
209 Semantic, linguistical, especially terminological, see also Karihalme 1996: 114.
210 See also Mela 5.4.3.

"as it should be". Thus, onticity and ontology intermingle in our conceptualization[211].

The great difference of ontic and ontological reality becomes manifest in those "cases" of music which live mostly through oral tradition, where performance variety is flexible, or is not dependent on written conceptual notation. Indian raga is a good example. Although much has been theorized on the tone system of raga alone, its beauty escapes structural descriptions. Personally I feel that the "best theoretical" readings on raga are metaphorical and close to the style of *belles-lettres*[212].

There is another very interesting angle to the question of musicological concepts and their relationship to music: linguistic-conceptual definitions are never final. We can never verbalize exactly or enough on a matter because this is related to the factor of who are using the definitions. Musicological definitions, as definitions on any other matter, are never final. However, in science we have learned unconsciously to assume that definitions are standards by which we can operate in order to create categories and statements of "facts".

Plato illustrates this point. In the Phaedrus[213] Plato lets Socrates tell a story about the Egyptian god Thoth and King Thammuz. Thoth has invented many things including writing in order to help the Egyptians to learn and remember. However, the king disagrees pointing out that Thoth has only invented an aid for making notes which in fact weakens the memory of those who trust in signs outside of their mind, that is to say, who trust in writing. The king argues that reading notes should be guided from the outside. Socrates goes even further. He states that written words are only an aid to remember the whole matter to which the words refer.

It is most obvious that Socrates in fact refers to semiotic intertextualism[214], to preferred reading, reification, dominant codes, etc.[215]. Written words are only a fraction of the continuum of a larger concept field that unfolds itself during discussions on the matter and it is called a *conceptual attractor*[216]. It is part of the conceptual world and links with other ideas and concepts of its creator. Socrates was not against written texts. He was worried about the direction of the text[217]. Socrates warns that a written text without a spoken and intelligent explanation is an orphan and a mute. It does not explain itself in any way unless its creator explains it. It can be misunderstood and misused. Without an explanation, a written text strengthens preferred reading. We also know how we people usually behave with written texts: preferred reading is almost unavoidable.

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211 In more detail, see 4.5.1; 4.7.2.
212 See the literary style of R. Shankar in My Music My Life 1969: 29.
213 Faidros: 200-202. Platon, *Teokset*, *kolmas osa*.
214 On intertextualism see e.g. 1.7; 3.2; 5.10.2, etc.
215 See 5.10.2.
216 See 3.2.2.
217 See also Pierre-Francois Moreau's article *From Socrates to Spinoza*. Unesco Courier 10/1992: 17.

1.7 Research Frame

1.7.1 Aim of This Research and Research Plan

The primary aim of my dissertation is to explore theory-analysis-based musicological concepts in light of systemic approach[218], although at the same time I have to explore the relationship of music and musicology[219]. The research method is qualitative-abductive. Through careful reflection and a lot of reading, I have come to the following ontological conclusions. Concepts[220] are linked with conceptualization and understanding which are linked with knowledge. Knowledge is linked with the perception of the reality. The reality, inside us and outside us, represents the truth (truths) which is (are) the ultimate objective of developing knowledge and understanding[221]. The absolute or final truth of anything is, however, inaccessible because of the relativity of all science. Knowledge manifests itself in forms of civilization and culture. Knowledge and concepts are communicated mainly by language in a society. Thus, language is the lifeblood of concepts and knowledge. These interrelations and connections of reality/truth, conceptualization/understanding, knowledge, language, civilization/culture, I metaphorically call the *cognisphere*[222]. As the biosphere, the cognisphere, too, is a complex system[223]. Any comprehensive study of concepts takes into consideration the elements of the cognisphere at least to some extent.

There is no way, no means to storage and embrace all the knowledge existing in a culture. Culture changes, language usage changes, knowledge changes, and understanding changes. New concepts and new ways to express them come into existence continually. The possible amount of concept combinations that can be created by the aid of language is infinite times infinity. The complexity of texts expressing meanings and concepts is called intertextualism in semiotics. This, however, does not mean that all and every conceivable language-related concept is "fit for life" in the cognisphere. As in the biosphere, where unfit units and combinations of organisms appear and perish, thus, also many conceptual ideas (invented by scholars) are bound to fall into oblivion. The "life of texts" varies in the course of time. Especially *broadcast codes* and *dominant codes*[224] are big factors in moulding the cognisphere of culture, especially through normative education. For a "text consumer" of musicology[225] to survive in today's musicological cognisphere is to learn to

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218 See also the last sentence of 1.6.1.
219 Applied musicology and study course musicology.
220 See definitions of concepts 4.3.
221 To Adorno theoretically based music analysis and music aesthetics are married together in order to achieve "the truth content" of a musical work. See 1.6.2.
222 Comparable with biosphere. See 4.7.2.
223 See features of complex system 5.4.1; 5.4.4; 5.5.1; 5.6.3, etc.
224 Chandler. *Semiotics for Beginners*. Glossary. http://www.aber.ac.uk /media/ Documents/S4B/semiotic. html (25.07.2000).
225 Musicological conceptualization.

"swim" in the sea of musicological intertextualism of knowledge and information. Systemic approach is a kind of "swimming ability" and musicological concepts should be examined in this light.

Scientific theories, which deal with structures, constructions and systems, are expressions of man's ability to conceptualize reality systematically. In a broad sense, this means systemic approach. No given systems theory, however, is the only correct one because science is always relative. Although concepts are abstract mental entities, science and education uses them for its purposes by aid of terms and conceptual definitions or categories.

I prefer certain preciseness and systematism along with systemicity and prefer dividing my *research plan* into the categories of *working hypothesis*, *research strategy*, *research method*, *research operations*, and *research material*. This division gives the reader a more precise idea of my way of working than a blunt chapter called "research method". Theodorson and Theodorson[226] define research method in the following way: "Any honest attempt to study a problem systematically or to add to [our] knowledge of a problem may be regarded as research…" This research aims at fulfilling the criterion of increasing our knowledge of the nature of musicological concepts in a new light. My method does not tend to be strictly systematic according to any positivistic way, but instead a systemic one[227].

1.7.2 Working Hypothesis

My working hypothesis, or cue in the abductive terminology, is that musicological concepts can be examined as systems. It is not uncommon to find systemic approaches in other scientific fields or disciplines. It is much used in natural and technological sciences, as well as in their integration; such a science is biodynamics. It is worthwhile perusing the list of the names of the members of the *ISSS (International Society of Systemic Sciences)*[228] representing more than thirty countries from a vast selection of scientific interests. In musicology[229] so far only little systemic research has been done[230].

Relating concepts and systems, for example, cyberneticians, such as Klaus Krippendorff among others, use categories to explain the interrelationships of names (terms) inherent in the cybernetic system[231]. In sociology structural functionalists (e.g. Emile Durkheim, Talcott Parsons) developed a view to examine the continuity and change of societal values and norms analogous with the systems of biological organisms. Parsons even incorporated evolutionism

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226 *The Modern Dictionary of Sociology* 1969. New York. In *The Penguin Dictionary of Psychology* 1995. http://www.xrefer.com/entry.jsp?xrefid=155263&secid=.- (25.07 2000).

227 See 5.2; 5.7; 5.9.3.

228 See 5.1.

229 Applied musicology.

230 See 1.6.3.

231 Krippendorff. *WDCS.Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ASC/CATEGORY. html (29.08.2001).

and cybernetics in his ideas[232]. In developmental psychology, Kalish[233] and others look at the experiences of the child in holistic terms. In constructivism and in semiotics, which are touched upon in this research, the idea of systems reoccurs. I have not met descriptions and definitions of systemicity in contructivist pedagogical readings and practically nothing in semiotic readings. Among the constructivists, Ernst von Glaserfeld (radical constructivism) also stands out as a cybernetician[234]. In practise, systemicity in some way features all sciences.

Sciences aiming at studying systems can be used as reference in understanding systemicity in other sciences. The diagram (*Chart 2)* below shows graphically the main components of the conceptual model I study in this research. The focused concepts are in the ovals. The blue lines and blue fonts show the connections to related concept fields. My target is to study musicological concepts, mainly normative musicological concepts of traditional musicology[235], in light of systemicity. For *systemicity*, I need to study systems and related theories (cybernetics and systems sciences). For *concepts* I need concept theories (feature theories: mainly the classical view and the prototype theory), I also need *language* through which concepts are communicated. Concepts systemized and as systemicity represent knowledge and information. Ontological musicology[236] is one of the large semantic fields and a sector of knowledge and information in general.

Language research happens notably through linguistics, which is a broad field. Out of linguistics, the semantics-related terminology theory suits my purposes because terms tend to be normative. I deal only slightly with semantics because it studies mainly meaning and logic in a formal linguistic level[237], using language as a logical tool. Semiotics, broadly speaking, examines the arbitrary use of signs in society and the interpretation of the cultural systems, conventions, behavior, and ideologies behind these signs[238]. Semiotics as philosophy rises on the level of systems sciences and cybernetics of today, whereas semantics remains on the structural level as the older Saussurean semiotics does.

The study of language also leads to the purpose of language: to (the concept of) communication, which is the tool of pedagogy. Constructivism by nature is linked with systems and constructivistic pedagogy with systemicity.

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232 Functionalism (sociology). http://www.xrefer.com/entry/504107 ;Durkheim, Emile. http://www.xrefer.com/entry.jsp?xrefid=502483 ; Parsons, Talcott. http:// www. xrefer.com /entry.jsp?xrefid=512218 (11.02.2002).

233 Kalish1998. *Educational Psychology 711. Catrgorization and Conceptual Development*. http://www. education.wisc.edu/edpsych/711_1kal.htm (29.08.2001).

234 See on Glaserfeld. http://www.oikos.org/vonen.htm (29.08.2001).

235 Formal applied musicology and study course musicology.

236 Theoretical, applied and study course musicology.

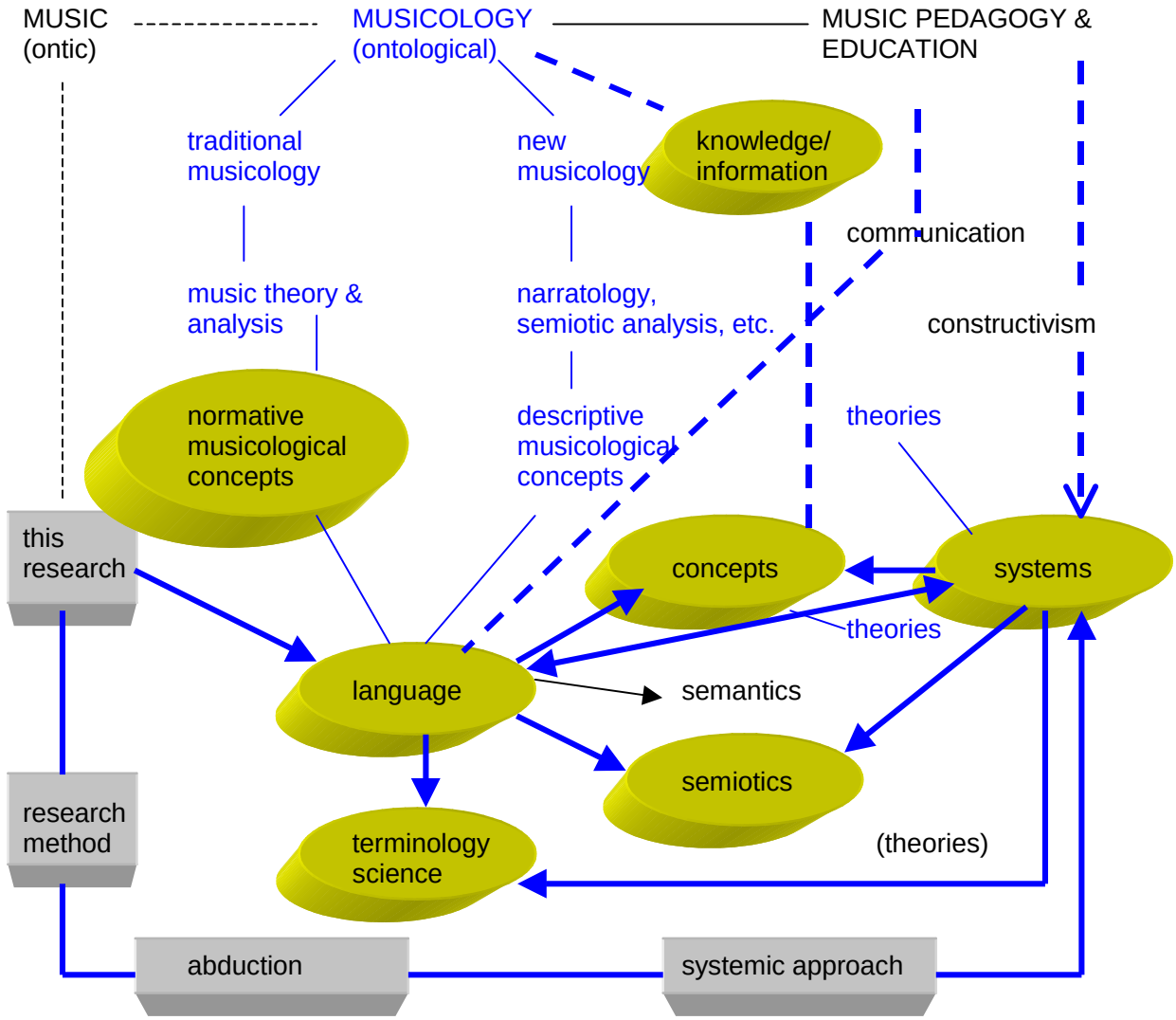
237 *The Concise Oxford Dictionary of Linguistics*. http://www.xrefer.com/entry.jsp ?xrefid = 573136 &secid=.-&hh=1; The Oxford English Reference Dictionary: http://www. xrefer.com/entry.jsp?xrefid= 423118 &secid=.-&hh=1 (25.11.2001).

238 *The Oxford English Reference Dictionary*. http://www.xrefer.com/entry.jsp? xrefid= 423178 &secid=.-&hh=1; *The Macmillan Encyclopaedia 2001*. http://www.xrefer.com/ entry.jsp?xrefid= 515346&secid=.-&hh=1 (25.11.2001).

Concepts are transmitted between human beings in communication. Normative concepts are the main tool in traditional pedagogy, be it music or any other field. They are the main tools of traditional science, as well. Although the original drive of my research was to find solutions for musicological[239] education, the research results are not purely or only educational. They are scientific conceptual models that, of course, can be used for pedagogical purposes as well.

It is important for the reader to notice that in my research, I approach concepts, terminology science, semiotics, and systems on the one hand through language (as linguistic descriptions and definitions) and, on the other hand, I approach them from the side of systemicity and systems.

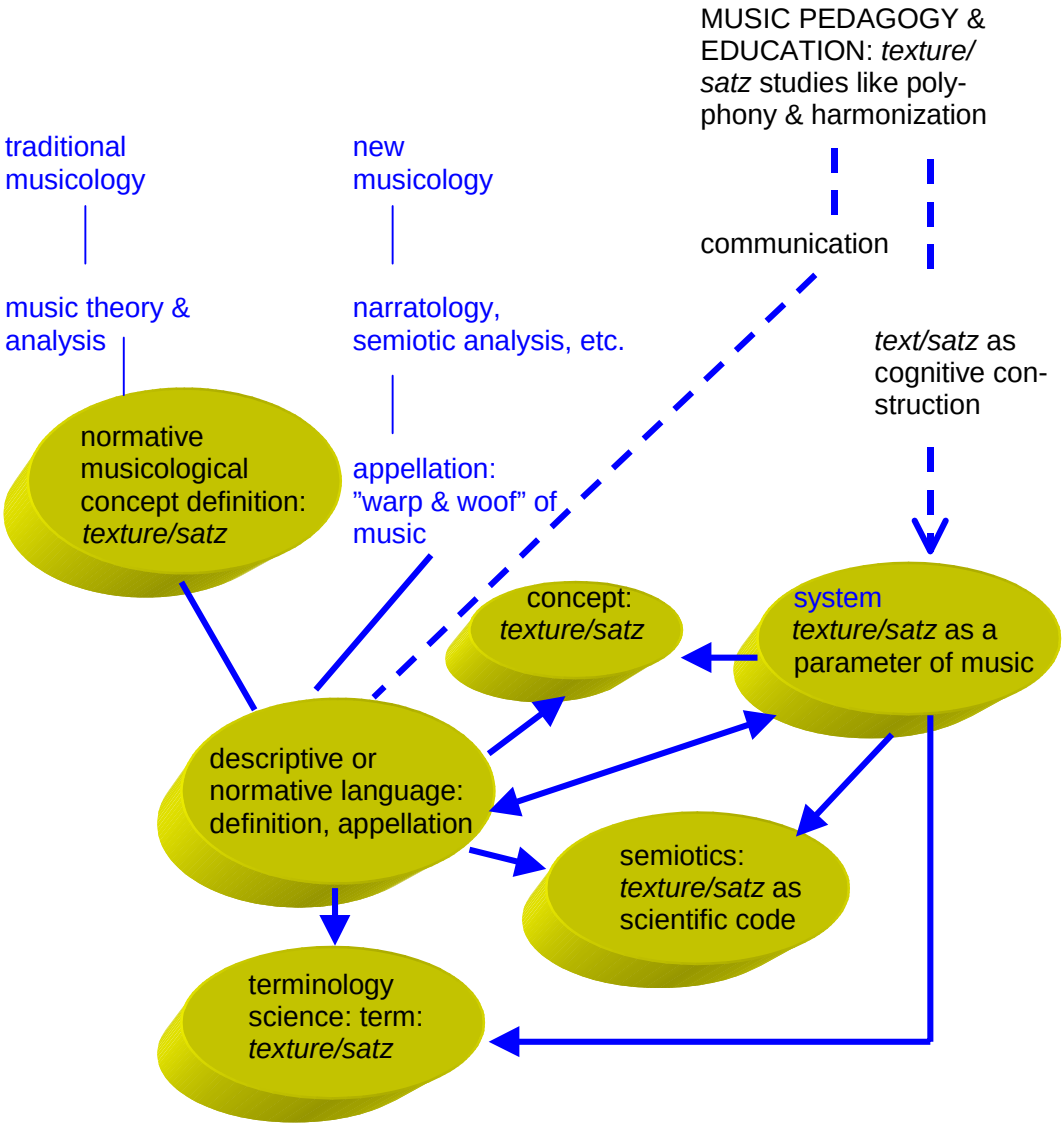
Chart 2



239 Study course musicology.

The following chart (*Chart 3*) is an expanded practical example of *Chart 2* on a selected musicological concept. This example is also related to chapters 4.4.7 and 6.2.3 with their respective charts (9 and 22). The concept taken is 'texture/satz' that represents the object: written or aural musical excerpt. This concept can be expressed through language either descriptively (which can be "anything" descriptive like "warp and woof" of music, flow of musical structures and so on depending on the style of language) or normatively as texture or satz. This, of course, depends on what is considered as texture/satz from the extensional and intensional viewpoints, and this leads into its definition and appellation. If its normative use is widely accepted it becomes a term used as a semiotic code (semiotics) for communicative purposes in e.g. music pedagogy and education. From the viewpoint of systems, texture/satz can be considered as one of the parameters of music.

Chart 3



1.7.3 Research Strategy

Strategy by common definition in *The Penguin Dictionary of Psychology* means: "as derived from the Greek for generalship, a plan of conduct or action, a consciously arrived-at set of operations for solving some problem or achieving some goal" [240]. My research strategy covers the following:

1. To examine a) the nature of systemicity in relevant scientific theories; b) the nature of concepts in relevant theories; c) the nature of musicological concepts by aid of concept theories; d) the relation of concept theories and systemicity through systems theories/cybernetics; e) the relationship of concepts, language and communication because of my pragmatic interest in educational applications; and f) the nature of information and knowledge, because musicological concepts are information and knowledge.

Actually, I started first my research with intriguing readings on justified constructivistic criticism against traditional deductive-oriented pedagogy (e.g. Haapasalo) but systemicity and concepts were my first theoretical targets. Semiotics and terminology science came along later but it was not at first easy to find the logical bridging links between all these. The key idea proved to be the concept of *systemic complexity*, which means differentiation and connectedness along with dimensions of time, space, and scale[241]. These concepts do not connect spontaneously with researching the "workings of mind".

2. To find out what kind of previous systemic (systems sciences, cybernetic) research existed in musicology[242] and if systemic research had revealed anything of musicology or of musicological concepts. Very little existed in musicology[243] and there was nothing along the lines of my interest. Instead, systemic sciences, especially cybernetic premises, turned out very fruitful in explaining concepts. Semiotics, in light of systemicity, turned out to be a complexity between *concept system* and *concept field* – partly structured, but mostly an unstructured set of thematically related concepts[244].

3. A conscious attempt to bridge the scientific approaches and descriptions linked with the aforementioned goals. A useful tool for this was analogy[245], and the hermeneutic spiral principle.

5. Using systemic approach to improve the quality of my earlier systemic sketches of certain parameters of music I used earlier in my pedagogical activity, as well as to find new systemic musicological descriptions. This in the course of my work proved possible[246].

6. The most important field in bridging concepts and language is terminology theory because of its semantically clearly defined terminology. Concepts and systemicity are important factors in the structure of terminology

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240 http://www.xrefer.com/entry.jsp?xrefid=156704&secid=.- (29.08.2001).
241 See 5.6.3.
242 Applied musicology.
243 See 1.6.3.
244 See Chandler's comment on semiotics, 5.10.6.
245 See e.g. 5.4.7.
246 See Chapter 6.2.

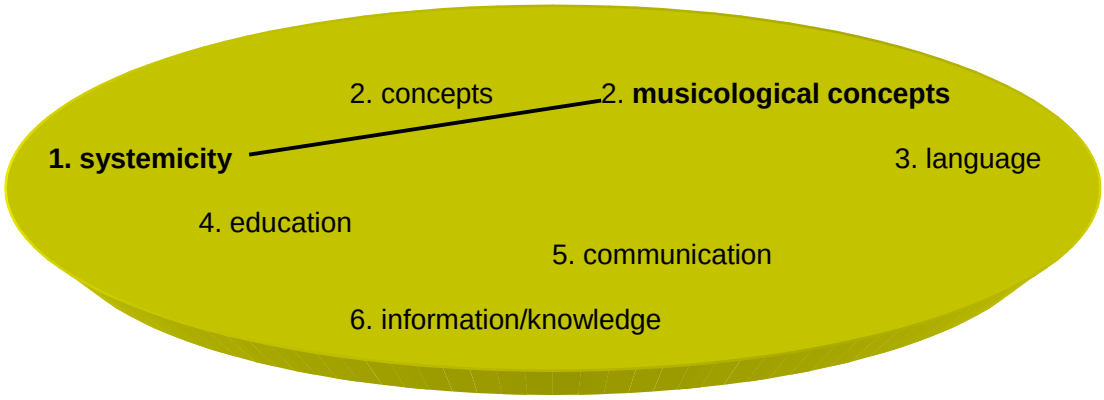
science because it aims at the systematic presentation of defined concepts, although in an old fashioned classical categorical way. However, the overall conceptual material of terminology science suits very well to modern complex systemic examination, as shown by this research.

7. Education involves communication. Communication happens mainly through language, which represents verbalized concepts. The societal role of language, and likewise, of concepts, is well explained by semiotic principles. Semiotics does not, however, reveal so much of the nature of concept, unless interpreted hermeneutically and with careful reading (e.g. the Peircean term of sense means concept, in my opinion).

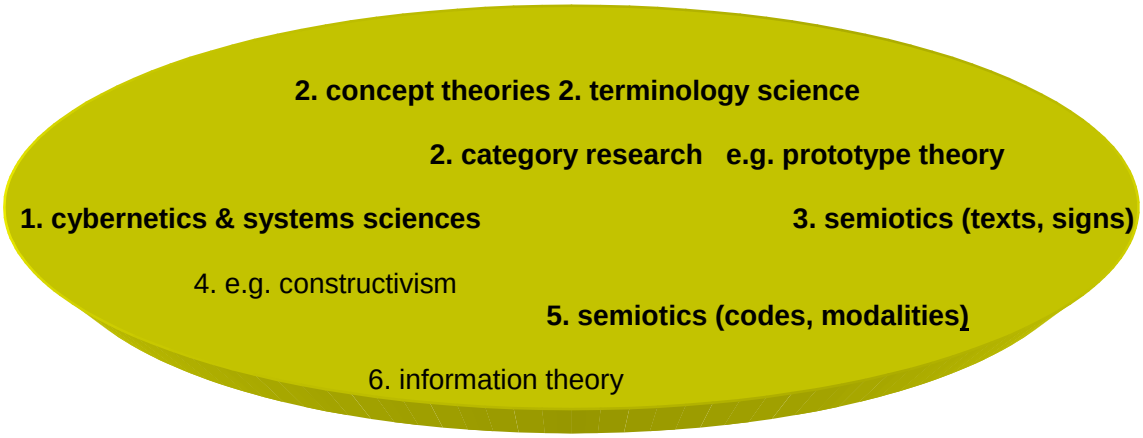
8. I decided to proceed in my strategy in a natural way for myself, partly disciplined, partly intuitive heuristic.

Chart 4

Research Strategy Diagram A: *What* is examined conceptually?



Research strategy diagram B: *Which theories* systemic conceptual examination involves?



To sum up the choices between my research objects and corresponding theories of this research, see the systemic diagrams above (*Chart 4).* These diagrams

show concretely that although we wish to understand only musicological concepts in a systemic way (diagram A) we still cannot leave out other important theoretical connections (diagram B). The theories are inside the oval in order to stress that they belong into the same concept field and are linked together conceptually in a complex way. I have omitted the possible connective lines because "everything links to everything" in some way.

The words in bold font indicate my main focus and material; the words in normal font indicate the other fields touched. The diagram (compare with *Chart 2*) also shows how many aspects are related to systemicity: concept theories, terminology science, structural semiotics (represented in texts and signs), and social semiotics (represented by codes and modalities). It also shows that language (represented here through texts and signs in semiotics) is linked to codes and modalities of language, to definable words (terms/terminology), to concepts, of course, and to systemicity. Constructivism can be interpreted either from pedagogical-educational viewpoint, or from cybernetic viewpoint (as is done in this research). Concepts appear as information and knowledge through language, therefore the aspect of information theory must be involved to some degree.

1.7.4 Research Method: Abductive

A method is simply a way of working towards a goal. The following two quotations remind us about the goal of scientific research method:

> "If 'scientific method' is taken to mean 'a way of reaching the truth about natural phenomena', there is no such thing. There are many 'truths', and many 'methods'. Nothing can be taken for granted. Even the view, put forward by Francis Bacon in the 16th century, that logical inference based on observation is better than guesswork, does not hold true in every instance…"[247]

> "Although the question of scientific method is generally thought to resolve itself into two parts – the problem of discovery and the problem of justification – it seems fair to say that philosophers have felt significantly more comfortable with the latter than the former. Indeed there are those (like Karl Popper) who have argued that philosophy can say nothing of value about discovery and that the whole topic is best left to the historian or psychologist…"[248]

As to my working method, I worked first by intuition, trying at the same time to define its scientific identity. I collected relevant material and data, assessed it and improved my earlier findings in the light of later findings. The application of abductive method (the content of this term is not very strict) and reasoning turned to match closest to my way of working[249]. The idea of data saturation

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247 *Bloomsbury Guide to Human Thought*. http://www.xrefer.com/entry.jsp? xrefid= 344724 &secid=.- (29.08.2001).

248 *The Oxford Companion to Philosophy*. http://www.xrefer.com/entry.jsp?xrefid= 553487 &secid=.- (29.08.2001).

249 See 3.3.

(certainty of reached validity of the data) comes from the grounded theory thinking[250].

According to Anttila[251], the qualitative abductive method can be summed up in the following ways:

> A necessary guiding principle, either a preconceived intuition or a well-defined hypothesis of an interesting phenomenon (=cue).

In this research, my guiding principle is the hypothetical systemic nature of musicological concepts and of concepts altogether (concept is a system)[252].

> Anttila: While the inductive method starts from empirical praxis towards a theory formulation, and the deductive one (also hypothetico-deductive) is the application of a theory on research material, the abductive method starts with empirical research material without rejecting a possible theory behind.[253]

Empirical examination with a cue keeping a possible theory behind involves heuristic and hermeneutic thinking being open to analogy[254].

> Anttila paraphrased: the abductive approach uses earlier scientific views and theories, not to be stated or proven as such but as a source of inspiration and ideas to new theoretical findings. Very essential to abductive research is logical thinking basing on a cue. The cue determines the quality of the research material and its interpretations[255].

My research uses a substantial amount of scientific views and theories as sources of inspiration (sees also Research material and background literature).

> Anttila: of special value is what the abductive method has in analysing systems.

This, as stated before, is the main objective of this research.

1.7.5 Research Operations: Heurism, Analogy, Hermeneutics

Bloomsbury Thesaurus explains the nominal use of the term of operation in the following way:

> "Noun. 1 operation: implementation, execution, action, performance, exercize, treatment, work, working, doing, course of action, course, procedure, measure, process, movement, motion, power, force, stress, strain, swing, play." [256]

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250 Dick, B. 2000. *Grounded Theory: a Thumbnail Sketch. Resource Papers in Action*. (2000). http://www.scu.edu.au/schools/gcm/arp/grounded.html#a_gt_bib (29.08.2001).

251 1998: 130- 32; see also 139-140; 163-164

252 See above Working Hypothesis.

253 Anttila 1998:140

254 See below Research Operations: heurism, analogy, hermeneutics.

255 Source as before.

256 *Bloomsbury Guide of Human Thought*. http://www.xrefe.com/entry.jsp?xrefid= 198265&secid= 2.1- (29.08.2001).

During my research process, I have certainly done, worked, moved, implemented, measured, processed and strained myself as well as played with the ideas of researchers and those of mine.

My main research operations have been intuitive heurism, analogies, and hermeneutic spiral principle applied on data. As stated before, the validity controlling principle I take from the saturation idea of the grounded theory. The abductive method also allows the intuition of the researcher to apply various approaches to the problem, provided they match the theory behind. Thus, I have included various operations in handling the research material: logical thinking and argumentation (interpretation) of theoretical ideas and designing systemic diagrams/charts along with texts. I have also invented fictive but authentically-based stories of pedagogical situations[257] that best describe the practical cognitive process and application of systemic approach to musicological concepts "in live situations".

1.7.6 Research Material and Background Literature

A considerable part of this research purposefully consists of carefully selected quotations and paraphrasing from scientific theoretical readings. This facilitates the reader to understand how systemic approach to concepts emerges from cybernetic and systems scientific premises, how they relate to semiotics, to theories of conceptual categories, especially to the prototype theory, to other relevant theories of this research and to the abductive research method. The assessment of textual contents is also a natural feature of the qualitative research tradition represented by this research.

I have used extensively the modern Internet facilities with a quick access to updated knowledge in reliable web locations supported by available literature. I had a good reason for this. It is not enough to read only a few "great authorities" of various theories and paradigms, simply because all writers limit themselves to certain linguistic codes and expressions. By limiting oneself only to certain descriptive models and codes, one limits his/her intuition and heurism and misses scientific relativity. Reading compilations of several writers, or perusing through a considerable bulk of different independent writers, is a must. This is the irrefutable feature of intertextualism, which is a necessary linguistic-semiotic cardinal feature in systemic approach towards concepts.

Further, I did not wish to limit myself only to musicological[258] sources or only to strict systems sciences or cybernetics. For example, when finding out about the nature of concepts (which is inherently linked with language usage), or about systems (which link to "whatever"), it is absolutely necessary to become acquainted with various uses of language and descriptions in different scientific readings and be open to any interesting cue from whatever scientific

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257 See 6.2.9.

258 Applied musicology.

field. In short, if you allow my very personal view, all scientists, at least those using the abductive method, should study semiotics, althought is not necessary to become its keen adherent.

My main sources in exploring systemicity come from cybernetic readings[259], systems sciences[260], and soft systems[261]. The *Metodix*[262] web location on the Internet gave a good start in finding about systems. Pirkko Anttila's well-written book *Tutkimisen taito ja tiedon hankinta*[263] (The art of research and knowledge gathering) gives a good presentations on systemicity and on abduction among many other valuable contents on research methods. In semiotics, I have used mainly D. Chandler's *Semiotics for Beginners*[264] supported with other semiotic readings by Peirce, Bakhtin[265], Greenlee (*Peirce's concept of sign*), Eco (*A theory of semiotics*) and others. I read V.N. Voloshinov's *Marxism and the Philosophy of Language*[266] with great interest because of its stress on social semiotics and the role of language in communication. There was not much information on terminology science on the Internet. Instead of it the most valuable help came from *Tekniikan sanastotyön keskus* in Helsinki[267] which sent me the brand new *International Standard ISO/FDIS 1087-1:2000 (E/F)* for my tool on concepts and related issues, as well as relevant literature (e.g. Nuopponen's dissertation[268]). I found several useful sources on concept theories, but the most important was Rosch's prototype theory (e.g., by M. Zitzen and Lakoff[269]) on categories opposing the old classical view. In constructivism, which was first my main interest, I took my main support from Haapasalo's informative and interesting *Oppiminen, tieto ja ongelmanratkaisu*[270]. In finding additional up-to-date and reliable sources, the web source of *Xrefer*[271] proved very valuable. It covers information of many well-known dictionaries and encyclopaedias on philosophy and human thought, psychology, linguistics, geography, sociology and so on.

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259 *Principia Cybernetica.Principia Cybernetica Web*. http://pespmc1.vub.ac.be.

260 *The International Society for Systems Sciences/ISSS*. http://www.isss.org.

261 P. Checkland in Finegans article *Soft Systems Methodology: An Alternative Approach to Knowledge Elicitation in Complex and Poorly Defined Systems*. http://www.csu.edu.au/ci/vol01/ finega01/ html/ (13.01.2002)

262 www.metodix.com.

263 Akatiimi Oy, Helsinki 1998.

264 Chandler. *Semiotics for Beginners*. http://www.aber.acuk/media/Documents /S4B/semiotic.html (25.07.2000).

265 Honeycott 1994. *What Hath Bakhtin Wrought? Toward a Unified Theory of Literature and Composition*. http://www.public.iastate.edu/~honey/bakhtin/thesis/.html (11.07.2000).

266 Translated by I. Matjeka and I.R. Titunik, Seminar Preee New York and London 1973. Various esearchers argue whether Voloshinov and Bakhtin were the same person.

267 Kuhmonen, K. (toim.) 1999. *Toimikunnista termitalkoisiin. 25 vuotta sanastotyön asiantuntemusta*. Helsinki: Tekniikan Sanastokeskus.

268 Nuopponen, A. 1994. *Begreppssystem för terminologisk analys*. Vasa: Universitas Wasaensis. Acta Wasaensia No 38 Språkvetenskap.

269 Zitzen, M. *On the effieciency of prototype theoretical semantics*. http://ang3-11phil-fak.uni-duesseldorf.de/~ang3LANA/Zitzen.html (22.08.2000).; Lakoff, G 1987. *Women, Fire and Dangerous Things*.

270 Haapasalo, L. 2000. *Oppiminen, tieto ja ongelmanratkaisu*. Neljäs tarkistettu painos. Joensuu: Medusa-Software.

271 www.xrefer.com

In musicology[272] I had first to rely on the five volumes *of Otavan iso musiikkitietosanakirja* (1976-79)[273], which is somewhat outdated but in many ways still valid because of its detailed articles dealing with my interest. Practically nothing has changed in the basic normative musicological conceptuality since the 1970s when the dictionary was compiled (mainly basing on the Swedish *Sohlmans musik lexikon*). The older *Grove Dictionary of Music and Musicians* (from 1980s) was written in the same theoretical style but the latest *New Grove Dictionary of Music and Musicians* (2001)[274] that I have used as an Internet version is more compact theory-wise. It displays some criticism against older structuralistic views in favour of later narratological semiotics. *Rethinking Music* edited by Cook and Everist gives the necessary description of the present situation on musicology as science, as well as indicates the need of reassessment of the neglected status of music analysis and theory.

I did not consider it necessary to report in detail the situation of the musicological[275] theoretical and analytical literature presently in use in most Finnish professional music institutions (conservatoires, polytechnics and the Sibelius-Academy), although my inquiry gave some results from several institutions. Based on it, I deduct that the normative musicological conceptuality in theoretical analytical subjects is prevalent everywhere except in those places where semiotic musicology exists.

I contacted directly some of the writers of the data I have used: Zitzen, Isenberg, Nuopponen, Haapasalo, Anttila, Krippendorff, and others. They all understood with genuine interest my point to try to find solutions for systemic approach to concepts.

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272 Applied musicology.

273 *Otavan iso musiikkitietosanakirja.Volumes 1-5*. 1979. Keuruu: Kustannusosakeyhtiö Otavan painolaitokset.

274 *Grovemusic. The New Grove Dictionary of Music and Musicians, 2nd ed.2000.* www.grovemusic.com.

275 Study course musicology.

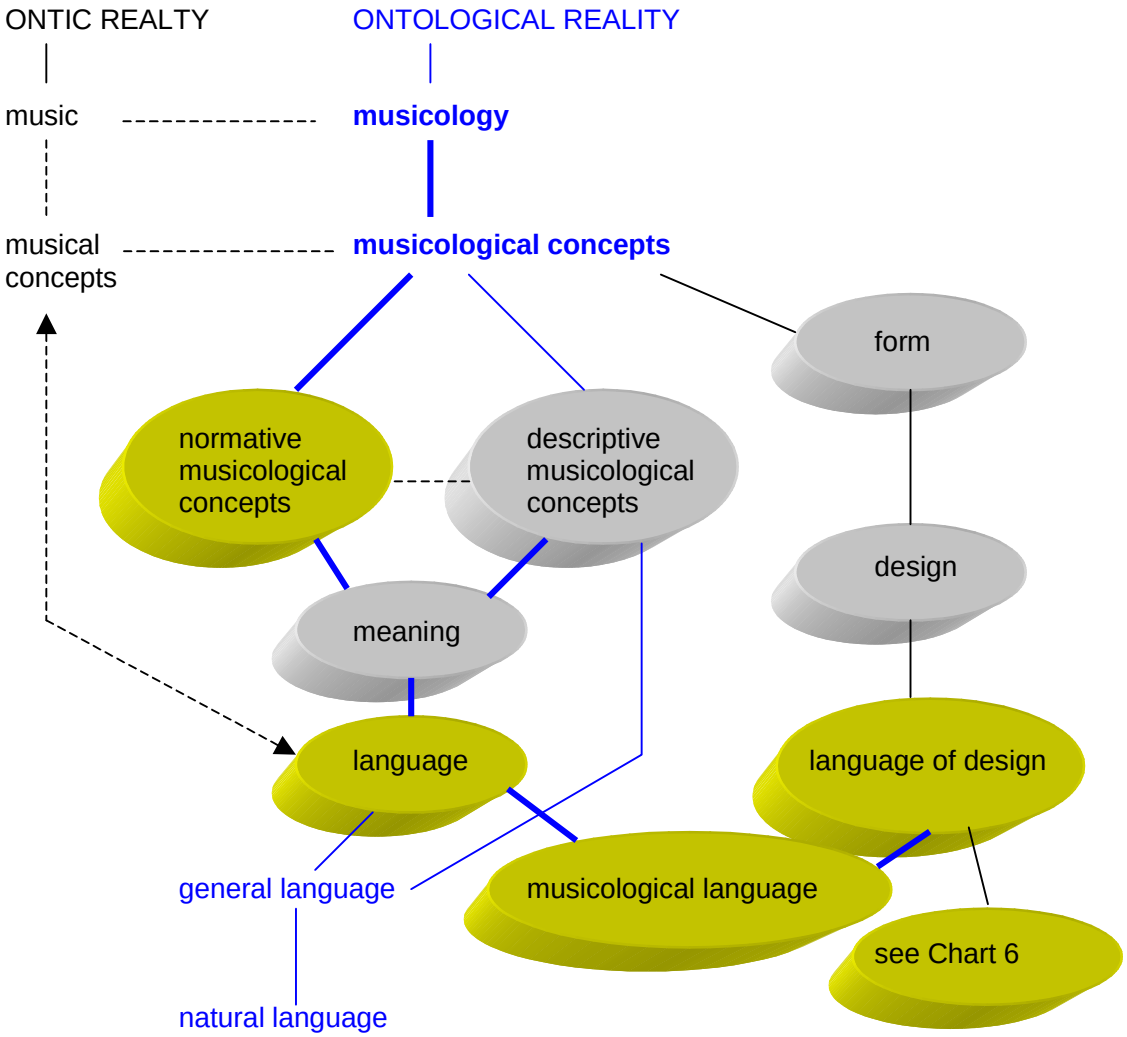
2 THE RELATION OF MUSIC TO LANGUAGE AND CONCEPTS. LANGUAGE OF FORM AND DESIGN. GENERAL PROBLEMATIZATION

The following chapter covers the necessary philosophical abductive discussion on the nature of music and its relationship to language and concepts, before I enter into the strict theoretical questions of concepts and systems[276]. I had to clarify the relationship of *music* as ontic reality with *concepts* as ontological reality, and how they relate to *language* –, which is closely related to musicological concepts, although concepts are not the actual music we think they represent. The C*hart (5)* below shows summatively the main components of the conceptual model I use in this part of my research[277]. The focused concepts are in the brown-yellow ovals. The oval of descriptive musicological concepts is grey; I do not study that field in great detail because its semantic field is very large. In this research, I concentrate mainly on systemic normative musicological concepts, language, and terminology. The blue lines and blue fonts show the connections to related concept fields. On the question of music and musicological conceptualization, the reader may refer especially to Chapter 1.1.2, as well as Chapters 1.1.5, and 1.1.6.

276 Chapters 4 and 5.

277 Musicology as ontological entity means all three aspects of musicology: theoretical, applied and study course musicology.

Chart 5



2.1 About the Onticity of Music and Ontology of Musicological Concepts

What is music? Is this an impossible question? Why is this question impossible? In view of what I presently understand about concepts and about their relationships to language (of which the question above is an expression), this conclusion seems to be correct.

As we have been taught, the most established axiom of concepts offered in general dictionaries and encyclopaedias is that they are abstract conceptions, ideas, or notions; they are something in the world of mind having (or not having – they argue about this) a correspondence in the inner or/and outer world. Some treat them as mental tools for mapping and organising knowledge and behavior as schemes. The *ISO/FDIS 1087-1:2000*, which is a new and very

important tool in terminology work, defines concept as a "unit of knowledge created by a unique combination of characteristics"[278] which, arguably are, on their part, concepts as well. Bundles of associated concepts are treated as categories[279], and so on. The idea of category comes from Kant himself.

The issue of concept appears to be so complex that several explanations are necessary. To some researchers categories are linked with mental prototypes [280]; some think concepts are memes[281], which are some kind of "genes" in the mind of man, capable of acting like genes. To some researchers categories, which are connected to concepts, can be simulated with mathematical-logic categories as fuzzy sets[282]. All these views have their reasons to which we shall come back later in more detail[283].

Whatever theoretical model one applies in examining concepts of music, or concepts related to music in general, one cannot avoid the basic question: *what* do we actually study? If we study concepts related to what they are supposed to represent, i.e. music, we have to ask ourselves: what is music? Surprising or not, from a purely conceptual viewpoint this appears to be an impossible, or at least an improper, question. Why?

Music as an existing "thing" is an "objective"[284] ontic reality. What *is* music? – is completely another thing; it is an ontological and seemingly objective generalized question posed by man who conceptualizes music and defines what it is. The question about the nature of musical concepts ('what are musical concepts?'), at the first glance, also appears to be an objective ontological question about music. But it is not because concepts exist as ontic realities in the mind of a (subjective) subject, in a mind who conceptualizes ontologically. Thus, the ontic and the ontological are intertwined in the mind of man; it is a complexity. I do not wish go any deeper in this question here; I have written a separate paper on the issue[285]. The important thing is to notice that no conceptual definition is absolute and final because it depends on how much of the ontic reality man wishes to conceptualize ontologically in his mind at a certain moment and in a certain situation. The result is always unended semiosis, out of which we pick a conceptual portion for our conceptual purposes of categorization. By the question "what is music?" we really mean: *how* music is what it is? The result is many kinds of concepts, e.g. "social constructions", if we wish so to define. Or the question "what do we who are bound to conceptualize, *know* about music?" in fact means: what is our common stock of knowledge. The conclusion of all of this is: using concepts is knowing

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278 The *ISO/FDIS 1087-1:2000*: 3.2.1.
279 See 4.6 Cognition and Concept. Concepts As Categories in Feature Theories.
280 See the Prototype Theory 4.6.2.
281 Heylighen 1993 *Epistemology, introduction. Principia Cybernetica Web*. http://pespmc1.vub.ac.be /EPISTEMI.html (07.10.2000).
282 Finegan 1995 *Fuzzy Systems and Soft systems Methodology – a Complex Connection*. http://www.bf.rmit.edu.au/~andrewf/fuzzyssm/fuzyssm.htm (29.08.2001); Rocha 1997. *Evidence Sets: Contextual Categories*. http://www.c3lanl.gov/ ~rochaes_ contx. html (04.09.2000).
283 See Chapter 5.
284 Radical constructivists do not accept this.
285 Mikkonen 2003b.

about, or knowing, how something is what it is; and that is an epistemological question.

It is known that certain Western composers of the 19th century music were deeply interested in the question of the ontic and ontological nature of music. According to Matti Raekallio[286], Ferruccio Busoni maintained that a composition itself is an arrangement of a composer's abstract idea into another dimension. Busoni, commenting on the essence of musical transcriptions, wrote:

> "The frequent opposition aroused by my transcriptions and the opposition which senseless criticism often evoked in me made me try to reach some clarity in this point. My final opinion about it is this: that notation itself is the transcription of an abstract idea.
>
> The moment that the pen takes possession of it the thought loses its original form. The intention of writing down an idea necessitates already a choice of time and key. The composer is obliged to decide on the form and the key and they determine more and more clearly the course to be taken and the limitations. Even if much of the idea is original and indestructible and continues to exist this will be pressed down from the moment of decision, into the type belonging to a class. The idea becomes a sonata or a concerto; this is already an arrangement of the original. From this first transcription to the second is a comparatively short and unimportant step…The performance of a work is also a transcription, and this too – however free the performance may be – can never do away with the original. For the musical work of art exists whole and intact before it has sounded and after the sound is finished. It is, at the same time, in and outside of Time."[287]

"Concepts reveal about" – we may say; through concepts comes realization. In her book *Begreppssystem för terminologisk analys* Anita Nuopponen[288] uses the term *ontic* for the phenomena of reality. From the viewpoint of systems thinking (e.g. Martti Mela, 1999), the reality is made up of *actual systems*[289]. *Ontological conceptual relationships*, according to Nuopponen, are simplifications of those relations that we see as relations of real things[290]. Similarly, systems are conceptual reductions of actual systems, and models are symbolic reductions of systems[291].

Another axiomatic notion I maintain – this is related to cybernetics[292], or terminology science[293] – is that concepts are always concepts from a certain viewpoint: from that of an individual (*individual concept* in terminology science[294]), or from that of a social group that uses a commonly accepted concept (*general concept*, ibid.). Therefore, the questions like "what is this, what is music, what is system, etc.?" – as such – is irrelevant. Such questions should always be more specified: from what/whose viewpoint, in what context, in which environment, etc.?

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286 Rondo 4/2001: 35.
287 Busoni 1987: 87-88.
288 Nuopponen 1994: 52.
289 See 5.4.1.
290 Nuopponen 1994: 69.
291 See 5.4.1; 5.4.3.
292 *WDCS.Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ ASC/CONCEPT.html (22.11.2001).
293 See 4.4.1.
294 See 4.4.4.

Musical concepts, which in communication take a form of language (language understood in a large sense of the term), of course, are not music itself, unless we assume an absolutely solipsistic stance, and we do not. But the fact that we explain music by aid of musicological concepts makes us anticipate [295] in music those mental constructs that we *conceptualize* in music. This means that if and when we have been taught that music is **made out of** chords, themes, motifs and the like, then we **must** hear chords in music, we **must** hear themes and motifs in music, etc. The reason is that our attitude towards music in a listening situation is, or has become, chord-theme-motif-concept-etc.-oriented[296].

This is what we have learned and been taught. Concepts, which we universally consider as abstract, although they are existing realities, are the products of systematic cultures. Every culture is also a product of education, partly even a product of manipulative education and communication due to dominant codes and deterministic and purposive educational systems[297]. At least concepts are products of interactive societal communication about the reality manifested in language and signs. Thus, when performing or composing music, we are bound to use those prescriptive tools, those concept formulas related to performance and composition that represent the concepts we have been taught to expect in order to compose a musical piece.

It is a truism to say that music is not what musical concepts represent. But this truism has to be stated anyway because our educational and scientific culture is concept-based on conventions, so much so, that all successful praxis is usually assessed by normative conceptual models and formulae. Structured concepts are the basis and extension of structured and logical thinking. Language is an extension of structured and logical concept-formation. And, as we know, the dominant Western culture is very much a culture of words and language. It is a culture that loves playing with concepts.

In our culture much of the organic dynamic music has notably become, if not a prisoner of structural-logical static musical concepts, at least a servant, with a focus on language, terms, and concepts. This opinion maybe sounds social-semiotical, but let it sound. **Music** – with capitalized M – has been chained in definitions and formulae (=music theory), descriptions (=music analysis), and prescriptions (= compositional and performance studies) – in one word: in concepts. Where? – in institutionalized music activity, education and science. This is very natural for man in any other cultural field as well. Why? Because of outdated understanding of musicological definitions, descriptions, formulae, and prescription. This complaint is not a modern one. It was already expressed in the 1970s both in the West and in the East.

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295 Anticipatory socialization in sociology; see e.g. Burton 1998. *Gender Equity in Australian University Staffing. II Cultural Systemic Impediments* (continued). http://www.wel.org.au/ burton /sii_4.htm (22.11.2001).

296 See semiotic broadcast and dominant codes; reification. Chandler.*Semiotics for Beginners*. Glossary. http://www.aber.ac.uk/media/Documents/S4B/sem-gloss.html (30.08.2001).

297 See Systemicity umbrella 5.10.1.

> Music theory "…in several subjects [of music theory] the pedagogical system became quickly the central matter of course. Music theory created its own terminology, which in turn gained strong normative value. Thus, a group of "conservatory styles" appeared, which oftentimes have hardly anything to do with the existing music."[298]

The old conceptual models and outdated educational methods, in music at least, have not yet been successfully challenged.

In the modern field of linguistic, cognitive, cybernetic, etc. research, however, concepts need not necessarily be a cause of "academized art" in the form of "conservatoired music". It is possible to get out of the situation; it is possible to use concepts in a more flexible way? Modern concept theories point to this direction.

2.2 Music in Language

Music itself (with capital M) is a very flexible systemic means of conceptual expression and experience[299]. But linguistic-conceptual explanations and definitions of music, albeit admirable sometimes, grow pale in trying to capture in language "how music really is". The following passage is from a book defining music:

> "Music, like all gregarious actions, is a form of communication. It is motivated by an urge to 'express' and 'communicate' on the part of an individual. The receiver of the message not only 'understands' but also, being socially conditioned for ages, learns to 'desire' it. And then there is the 'message'. This is in essence a set of signals arranged in a 'recognisable' pattern. This pattern in one, which has developed – both unconsciously and consciously – by a mutual consent between the 'sender' and the 'receiver' of the message. This pattern or 'structure' of the message is the 'grammar', and the state of mind expressed and excited, when common to the communicators is the meaning of the message…" (Source intentionally left out, see later)

Most likely, musically educated Western readers endorse this statement; this is valid for any "good and acceptable music", anything what we consider as music. The interesting thing is that the music described here represents the music of India, not the music of another culture (e.g. Western) but of music which is still inadequately known or understood in the West. The last sentence that I left out in the passage reads: "All this is being said to make the comprehension of raga easier."

Does this all being said make the comprehension of raga easier? For an Indian person? For a Western person? Maybe. At least that is the intention of B.C. Deva, an Indian scholar. There is nothing wrong in the text; it is excellent, succinct, and descriptive. The only thing is the problem of the whole issue:

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298 *OIMTS* Vol. 4: 342, see also the outcry of Deva 1980: Chapter 1.4.2.

299 Compare Väkevä, L. 1999. *Musiikin pedagoginen merkitys David J. Elliottin praksiaalisessa musiikkikasvatusfilosofiassa: pragmatistinen tulkinta*. Musiikkikasvatus 4 (2-3), 44-54. http://wwwedu.oulu.fi/muko/lvakeva/Lisuri/musiikin.htm (10.10. 2001).

abstracting abstracts. Music is abstract, language is abstract, and concepts are abstract.

To continue this experiment further: in the next excerpt, I have left out all the words that 'are of music', or pertain to music. I have left out the musicological concepts and terminology, and have replaced them with other art-category words. Does the text still sound sensible?

> "The main and essential character of Indian _____(dance? poetry?) is its linearity of one-line movement. This is what is meant by saying that the _____(dance? poetry?) of India is _____(dynamic?). Since _____ (gesture? line?) is a movement of one-_____(step? word?)-at-a-time, the progressions of _____(gesture? line?) patterns along the stream of time become significant; and it is such a process, which gives us _____(dance figures? verses?) and rhythms. Through the ages these _____ (dance figures? verses?) and rhythms have acquired grammatical formalization becoming (dance compositions? poems?)…"

It rather does. What remains? Do we conceive the text describing music at all? If yes, what are the "hints"? Here is the original text with my added Italics.

> "The main and essential character of Indian Music is its *linearity of one-line movement*. This is what is meant by saying that the music of India is *melodic*. Since melody is a movement of one-tone-at-a-time, the *progressions of sound patterns along the stream of time* become significant; and it is such a *process*, which gives us tunes and rhythms. Through the ages these tunes and rhythms have acquired *grammatical formalization* becoming raga-s and tala-s…(continued)".[300]

What is our startling conclusion? Etymologically *raga* means "that which colors the mind"[301]. *Tala*, according to the tradition, is a combination of the syllables *ta* and *la* from *tandava*, which means the cosmic dance of Shiva and *Lasya*, the feminine counterpart of *tandava*[302]. If we leave out the 'purely musicological' [sic!] terminology (which necessarily does not define music at all) in the first text, we will have a text that is applicable to almost anything concerning social interaction, communication, etc.

What makes music music, and music description music description? Is it terms and concepts describing music? The answer is seemingly no. Music does not become music through a linguistic explanation; neither is a given music description solely and purely about music because an ontic phenomenon is independent of its ontological description. A description is "only" language. It is words and terms aiming at a contextual and intertextual purpose, relating to other historical and synchronical texts[303]. From the viewpoint of second order cybernetics, music, language, and concepts are abstract ontities. In research of music we encounter the situation of abstracting abstracts.

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300 Deva 1980: 6-7 Raga: the melodic seed.
301 Shankar 1969: 20, 24.
302 Shankar 1969: 29.
303 Chandler. *Semiotics for Beginners*. http://www.aber.ac.uk/media/Documents /S4B/ semiotic. html (29.08.2001).

2.3 Musical Concepts, Descriptive and Normative Musicological Concepts

Taking into consideration the present divided situation of musicology[304] it is self-evident that it seems nigh impossible to define which concepts, words, and terms describe purely musical phenomena – if and when the boundaries of music and its descriptions are fused into other arts and general semantics. I maintain, however, that the 'old' theory-analysis-based musicological conceptual material has not been explored thoroughly. It is not the fault of concepts, whether they are used intelligently or not.

It is vital to make the difference between 1. *Musical concepts*: individual or shared music-related associations, feelings, emotions (emotional concepts[305], emotional intelligence) and the like that music creates in the mind of a music listener; 2. *Descriptive musicological concepts*: expressed by words and texts (also by graphics) that refer not only to "objective" structures of music but equally also to affects, expression, meaning and cultural context of music; and 3. *Normative musicological concepts*: expressed by words, terminology, texts, and graphics in musicological dictionaries and study books that refer to structural (objectivist) concept categories resulting from traditional music analysis and theory[306]. These are the tools udes by, for example, the Generative Theory of Tonal Music of Jackendoff and Lerdahl on the level of information theory[307].

Lakoff, a linguist and category reseacher[308] makes the division of entities (practically, concepts) into two kinds: essential and accidental (or contingent) at the metaphysical level that induces to *definitional* knowledge and *encyclopedic* knowledge at the epistemological level. He writes : "our definitional knowledge of words corresponds to the essential properties of the entities and categories that words designate; our encyclopedic knowledge of words corresponds to the contingent properties of the entities and properties that the words designate." In objectivist thinking this is known as the *dictionary-encyclopedia* distinction, or *literal-figurative*[309] distinction. This division matches roughly my division: normative musicology exists typically in objectivist dictionaries and study course literature, and descriptive musicology typically in encyclopedic musicological literature.

The main focus of this research is the third category, normative musicology, which from now on I simply call musicological concepts, although this does not mean that descriptive musicological forms cannot be examined systematically. They can, and as a matter of fact, the normative concept terminology merges into the descriptive concept field[310].

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304 Referring to applied musicology; see 1.6.2.
305 These are outside of this study; Lakoff refers to them, e.g. p. 38.
306 Of music theory and analysis see e.g. *OIMTS* Vol. 4: 343-347.
307 See 1.6.3.
308 Lakoff 1987: 171-172.
309 See also Chapter 5.9.
310 Chandler. *Semiotics for Beginners*. Codes. http://www.aber.ac.uk/media/Documents/S4B/sem08.html (29.08.2001).

It is hardly possible to define the core and boundaries of a descriptive musicological concept, such as "a noble and courageous first theme in D-major". What is the core and what are the boundaries? This is an absurd question! The problem is the same as with natural products compared with chemical formulas. It is impossible to give the absolutely exact chemical formula of a special wildflower honey produced in a certain part of Mongolia in June 1975. It can be described with an appellation[311], but not with an exact scientifically valid term[312].

Normative musicological concepts function as "idealized" prototypes of structural standards of musical concepts. With them, it is possible to categorize concepts for systemic purposes.

2.4 Musical Concepts Behind Language.

Behind language are concepts[313]. It is generally agreed that concepts are mental abstracts: associations, notions, ideas, and so on[314], which store up mental experiences, information, etc., in some way. Music "contains", or listeners experience in music, many kinds of conceptual ideas, feelings, mental modalities, and processes[315] that are very commonly accepted as a feature of at least programmatic music – arguably of all music. I call these concepts *musical concepts*. These concepts we cannot study directly as such, although we may assume we can.

There is a famous passage on music by E.T.A. Hoffman written in 1813, (quoted in Oliver Strunck[316]; in Borroff[317]):

> "Music discloses to man an unknown realm, a world that has nothing in common with the external sensual world that surrounds him, a world in which he leaves behind him all definite feelings to surrender himself to an inexpressible longing."

This is a feat of words, of metaphors, of concepts **about music**. Its aim was descriptive. He, along with other critics of his time, "sought to capture the effect rather than analyze the technique"[318]. His aim was not normative, although this kind of programmatic concept-description became a norm to Romantic composers. The time it was written was not yet the time of the full bloom of the Romantic era. Writings like this paved the way to it.

A completely Apollonian contrast was from another well-known writer of the Later Romantics. Eduard Hanslick wrote in 1854:

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311 See appellation 4.4.6.
312 For the relationship of appellation and term, see the structural systemic diagram of concept relations in 4.4.7.
313 See Chapter 4.
314 See definition of concept 4.2.
315 Music psychology: listener types, *OIMTS*, Vol. 4: 368.
316 *Source Readings in Music History*, New York: Norton, 1950:. 775f.
317 Borroff 1971: 453.
318 Borroff 1971: 507-508.

> "Das Material, mit dem ein Komponist arbeitet, dessen Überfluß niemals übertrieben sein kann, ist das gesamte System der Töne, mit den ihnen eigenen Möglichkeiten der melodischen, harmonischen und rhythmischen Variationen. Unverbraucht und unerschöpflich herrscht die Melodie über allem, als die grundlegende Form des musikalisch Schönen. Harmonie, mit ihren tausendfachen Transformationen und Umkehrungen, bietet eine immer neue Grundlage. Diese beiden vereint werden belebt durch den Rhythmus, die Blutader, die Leben in die Musik bringt, und erhöht durch den Charme der unterschiedlichen Klangfarben."[319]

Hanslick, as we know, protested against programmatic "flight of fancies". He was interested in "chords of a diminished seventh, themes in minor keys, a rolling bass, etc. – musical forms, in brief, which might signify a woman just as well as a young man, one pursued by Myrmidons instead of Furies"[320]. His most famous sentence is: "Music consists of successions and form of sound, and these alone constitute the subject."[321]. It has been said that he later became less severe in his 'objectivity'; but this sentence became immortal.

Yet, whether we take away the musicological terms and words either from Hoffman's text, or from that of Hanslick, the fact remains: a music description is not purely and absolutely a description only about music. Other extra-musical associations are necessary to help to create the conceptual illusion of "this is what music is about".

Let us now see in more detail how language works with concepts and reinforce what was said earlier.

2.5 Music in General Language, Music in Musicological Language.

Since concepts are mental abstracts in the consciousness – and possibly in the subconsciousness of mind – they cannot be "extracted" out of mind for research. They must be studied indirectly through their referents or representations, most commonly through language, or other concept-representatives, e.g. signs. Especially semiotics treats language as a part of text and sign-system[322]. Musical concepts, or concepts experienced by listeners of music (e.g. "a creepy feeling"), are represented through language, either in general language that can be "everyday language" ("I feel creepy with this piece of music"), or in a more specialized and professional[323] language, such as musicological language (e.g. normative terminology); they are also represented

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319 Vom Musikalisch-Schönen. Ein Beitrag zur Revision der Ästhetik der Tonkunst 1854. Zehnte [vermehrte und verbesserte] Auflage. Leipzig, Johann Ambrosius Barth (überklebt mit: Leipzig, Breitkopf & Härtel 1902) [1901]Leipzig.

320 Cohen 1957: 120, in Borroff: 1971: 510.

321 Cohen 1957: 119; in Borroff: 1971: 510.

322 Chandler, *Semiotics for Beginners*. Sign; Text. http://www.aber.ac.uk/media/ Documents /S4B/ sem-gloss.html (29.08.2001).

323 See 2.7.2.

in graphic notation: note symbols, tabulature icons, etc., which in semiotics are part of sign and text-system.

Let us turn back to the text quotations in chapter 2.2. The first text underlines the nature of music as communication, linking the concepts to the communication theory, the information theory, to cognitivism and sociology. The second one is different, linking the concepts mainly the to structural music theory and aesthetics. The texts were written in the 1970s when structural linguistics (Chomsky et al.) was in vogue in the West; however, the writer is an Indian scholar.

Here is a list of the music-defining concepts extracted from the texts of Deva in Chapter 2.2. Thus, the music of India "is"

A.
gregarious action, form of communication
'express' and 'communicate'
receiver of the message 'understands'…'desire'
set of signals arranged in a recognisable pattern
pattern…has developed – both consciously and unconsciously – by a mutual consent between the 'sender' and the 'receiver'
pattern of 'structure' (of the message) is the 'grammar'
state of mind expressed and excited
communicators
meaning of the message

B.
linearity of one-line movement
melodic
progressions of sound patterns along the stream of time
process
grammatical formalization (becoming raga-s and tala-s)
sophisticated form
aesthetic potentialities
improvization
formal constructions rhythmically bound or free
musical dialects (gharana-s or bani-s)
style and individuality of the musician

Although the text excerpts are not equally balanced, we can see that they reveal two different contextual styles and codes. The summary of the concepts/terms in the list A is very general and 'tastes' very linguistic, semiotic, communication/information-theoretic, etc., while the summary B is more 'technical' including some 'purely' musicological term-concepts. The first list is metaphoric and descriptive (although appearing scientifically objective), the second being musicologically more normative.

2.6 Language–Concept Relation. General Outline

We turn now to the more precise focus of this research: what is behind the musicological language and the sign system in relation to the concepts they represent. Where do we end up by abstracting abstracts? Where is the logic? Is there a system to control conceptual thinking through language and other signs of music?

Language is not directly concepts, although this notion escapes us in the everyday language usage. It is vital to point out the different features of language and concepts. Leaving the specialized theories of concept or language aside at this point, and trying to stretch our mind first by aid of general terminology and dualistic "common sense" reflection, we come to the following basic results of oppositional and integrating feature pairs:

Language		Concepts
expression; representation of mental abstracts	**M**	mental abstracts
inherent mental capacity of man to learn & use language as tool of expression and communication		inherent basic mental capacity to conceptualize "making sense of world and existence" basis: ability to conceptualize consciousness – subconsciousness
language – manifestation of the 'reality' & abstract	**E**	concepts (ideas, notions, values, schemes, memories, associations – "abstract mental world" of observers)
outer expression: language behavior communication	**A**	outer expression: expressive behavior (language, arts, action, etc.)
must be learned & taught (standard & individual)	**N**	experienced & learned through 'life', behavior, language or code
can be examined 'directly' (linguistics, semiotics, semantics, etc., sciences)	**I**	cannot be examined directly (mental abstracts) must be studied indirectly as 'if ' structures and systems
partly stable, partly relative, changing, variant linguistic expressions		may remain stable; denotations, connotations, myths, beliefs
constrained by time, place, culture, society by language users	**N**	constrained by individual and collective mind
general language, special languages, individual usage	**G**	universal/general concepts individual concepts

Where exactly comes meaning? Is it in between language and concept or more related to one of them? Our reason says that language without meaning is 'semantic noise', and concepts that do not make sense are vague illusions that are difficult to express comprehensively in language. The Swedes have a saying: "Dunkelt tänkt är dunkelt sagt." (Dim thinking results in vague language).

Meaning is some kind of a link between concept and language; but in what way? That is the issue of various theories. This is true for concept and language, too. It has much to do with semantics, terminology science, semiotics, and information theories as well as with systemicity. One possibility is to interpret that meaning is affirmation of concepts through language. In this interpretation, the concept of language is metonymical in a broad sense. Meaning seems to be something that keeps the system of language and concepts together. The scope of this research does not allow us to go into the question of meaning. The definition of meaning is not easy; briefly, that it is a proof and manifestation of conceptual complexity.

2.7 Music as Form. Music as Design. Language of Design

The essence and nature of music has been explained in many ways depending on the paradigmatic focus. D.J. Elliott presents a summary of various attempts to explain or conceptualize music[324]. It includes twelve aspects. The reason why I refer to Elliot is that his approach to music is holistic, and even touches cybernetic and systemic thinking.[325] I also endorse Elliot's attitude to the pragmatic ontological questions of music: studying music is essentially studying what people say about music[326].

Lauri Väkevä has condensed Elliott's twelve aspects into the five following main categories: 1. Music as sound; 2. Music as musical patterns; 3. Music as experiences or in experiences; 4. Music as aesthetic contents; 5. Music in language or in scientific discourse. My interests are the points two and five.

The educationists Elliott and Väkevä lay stress on the social, cultural, and psychological-cognitive aspects of music, i.e. music as experience. According to Väkevä, music seems to be summatively to Elliott *a compound of more or less mutually complementary practises, socio-cultural and human action-meaning systems regulating music production, produced and experienced music-sound happenings, artistic constructions of musical patterns which are regulated by certain socio-cultural principles, ways of action and rules affecting them.* To Elliott, music is a concept that escapes exact definitions, and the definition above is a work-concept subject to some modification.

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324 In Väkevä 1999. http://wwwedu.oulu.fi/muko/lvakeva/Lisuri/musiikin.htm (10.10.2001), see also 2.2.

325 For Elliot's idea of memes, see Väkevä, ibid.

326 Ibid., see also Chapter 2.1.

Although Elliott emphasizes that music is an artistic productive activity connected to musical cultural history and tradition (= outside factors of music) he does not exclude the structural and intramusical role of musical patterns. It is important to note that Elliott does not make the difference between the musical and the musicological, as I do. To Elliott, there is music that is purely musical structural happenings, without references outside of music. This he calls design-based music. To him most musical pieces are design-based and referential at the same time.

Elliot divides musical patterns into *syntactic* and *nonsyntactic parameters*. These aspects of the design of music serve musical construction on part of the listeners. Syntactic parameters can be organized into formulas and they give a musical happening the feeling of a closed form. They are melodic and harmonic parameters connected to pitch, as well as rhythmical parameters, and parameters connected to sound duration.

I prefer calling the latter ones *surface rhythm*. Those musical parameters that cannot be divided or added are, according to Elliott, nonsyntactical. They tend to last, or their changes are subjective to syntactical level hints. To these belong timbre, texture, tempo, articulation and loudness, or dynamics. I do not wish to comment on the complete credibility Elliot's division; I only point out that it is systemic.

2.7.1 Form

To Elliott, as well as to most researchers, form is most commonly considered as the structural essence of music. Music is abstract form – although this is not all about music – even pure form that cannot be seen but heard. The most famous definition comes from Hanslick[327]. Notably the question of form and contents has been an eternal debate, although new aspects have partly replaced old issues[328].

A common structural division of music to static and dynamic forms appears in *OIMTS*[329]. Static forms are based on symmetry (such as binary, tertiary periods) and are associated to spatial design (e.g. to architecture), or to linguistic dialogue (question – answer, thesis – antithesis). They are closed logical structures ending with recognizable cadences. Dynamic forms are asymmetrical processes opening towards development (as is the case in polyphony), melodic aperiodic variation, metamorphosis, Fortspinnung, and the like.

Form seems to be the most representative structural holistic aspect of music. At least for the purposes of music analysis, and during compositional activity, the stream of musical forms and configurations are consciously "petrified" into processes of static quantitative structures (models or formulas).

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327 See 2.4.

328 Music is human organized sound and silence, its nature is aesthetic, it is something basing to our earlier musical experiences, etc., see Elliott in Väkevä (ibid.).

329 Vol. 5: 328-329.

Thus, music represented as musicological[330] structures can be considered as musicological[331] artifacts. In this light, form and structure are products of more or less voluntary design in composition, or performance. Elliott does not consider music as an artifact, whereas a designed object, in the field of designing, certainly is an artefact. Design seems to link most commonly with visual forms, or at least with space: as structures, constructions, and models.

The language of design, in any field, uses mostly visual associations. The following is a highly interesting list of "contexts of thinking of form affecting to its conceptualization", as collected by a design researcher, Oili Karihalme[332]. Much of it, in my opinion, relates to the question of form of music as well: *form is manmade or nature-made*, *form is observable*, *form is characterized by properties*, *form is visual*, *form is tactile*[333], *form can be analyzed*, *form can induce to action*, *form has functions*, *form awakes associations*, *form performs and has performational properties*, *form refers semiotically*, *referential interpretation of form is a sign; form makes an object a sign*, *form holds symbols*, *icons and indexes*, *form is based on practical and mental aspects*, *form can be justified (objectively or subjectively)*, *form has alternatives out of which one is optimal*[334], *form has a history*.

Because music is structurally associated with form and design, we, while speaking of music, use many direct or indirect design-related metaphorical, or analogous[335] concepts and terminology such as *musical work*, *music product*, *piece of music*, *score*, *instruments of music*, *motif*, *theme*, *ornament*, *formula*, *form*, *binary/tertiary form*, *static-dynamic*, *cycle*, *suite*, *contents*, *rhythm*, *composition*, *to compose*, *musical material*, *substance*, *texture*, *satz*, *musical symbolism*, *function*, etc. Because the musicological[336] representations of music are predominantly communicated through language it is most valuable to examine that language that is related to the art of design.

It is equally important to be aware of the semantic and semiotic nature of these concepts and terminology as they represent the phenomenon of analogy and metaphor. These, besides being linguistic phenomena, also relate to the issue of systemicity[337].

2.7.2 Language of Design in Art

In her research *Muotoilun teoriasanaston termistyminen* (1996)[338], Oili Karihalme gives a description of the communicative systems of a designer, the "languages"

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330 Musicological conceptual.
331 Ibid.
332 Karihalme 1996: 138; see below.
333 My comment: hearing, according to a theory of biological evolution is developed from tactual perception; experience of music is mental-tactual.
334 Prototype – my comment, see the Prototype Theory 4.6.4.
335 See 5.9 Analogy, Metaphor and Metonymy as Systemicity – Some Musicological Applications.
336 Musicological conceptual.
337 Ibid.
338 Title in English: Specialization of Design Theory Words.

of design[339]. The reason why I choose to use her model is that this division helps us to understand better the role of different "languages" in conceptualization of musicology[340]. Thus, we also become more aware of their possibilities and limits. The language of design is used in a professional context, likewise the language of music and musicology. They can, therefore, be defined as professional languages. Certainly in music and musicology we meet expressions that are not, or are very rarely, used in other than musical contexts. The language of design is first divided into the level of natural language, postverbal (or symbolic) language, extraverbal (or iconic) language, and object language[341]. Each of them is a symbolic system.

Adapted to music and musicology we have the following interesting description[342]: Under *natural*, general language comes *specialized language* and terminology, the definition of which varies[343]. This is the language used by musicians and music lovers of special groups (often possibly jargon) and under it comes, or with it overlaps, *professional language*[344]. Under the category of professional language, we find the language of music practise that is related more or less to the language of *theory of music* used in the theoretical contexts of music (theoretical music research, theoretical literature, oral discussion and education of music theory). This area is the main target of my research. Under professional language also come *process language* (language of music arrangers and composers/music makers, performers), *language of critique* (which is most unspecified and "free", at least in design, but clearly also in music) and language of *music marketing* (advertising and marketing of music)[345].

Postverbal, *or symbolic* language in music(ology) is symbols (notation combined with numbers and letters) representing music, especially musical-technical structures. This is a very important form of language in the traditional Western (classical) music which "needs notation", if not always in performance situations but at least in structural analysis and research. In musicology[346] we can find even levels of "pure *mathematical languages*" (set theory, serialism, generative structuralism etc.).

The *extraverbal or iconic language* level in music is represented by such scores, or iconic presentations that visualize music as dynamic sound happenings and processes. In this connection, we are reminded of the systemic block diagram models of systems thinking[347]. *Picture language* in connection with music could mean the programmatic content transmitted and experienced in a musical piece.

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339 Karihalme 1996: 11-15, Chapter 1.1.
340 Conceptualization of music in all aspects: theoretical, applied and study course musicology.
341 See the end of this chapter.
342 See also *Chart 6*.
343 Karihalme 1996: 34 – 40, Chapter 2.1.
344 See also the connection with concepts in educational communication, 4.4.14.
345 Compare with Karihalme 1996: Chapter 4.1, pages 72-73.
346 Applied and study course musicology.
347 Mela 1999. see Chapter 5.4.4 of this research

The concept of *'object language'* comes from semiotics, where objects are treated as signs referring to something. Thus, an object means something, expresses something, and communicates something[348]. Objects can be read. This is called object language. What an object represents (expresses and communicates) is the interest of semiotics, structuralistic or sociological. In music and musicology[349], object language could mean that what is meant by, expressed, communicated, and experienced *as music* individually and collectively[350]. An attentive listener "reads" music. I agree with this, but wish to stress that what we can study scientifically is not music as it is read but musicological stuff about the experience of this reading. Thus, the object language of music is a semiotic matter (e.g. in discourse analysis and narratology). *Product language* (which comes under object language) in music is, for example the concept of a musical work genre. Thus, the concepts of 'concerto', 'raga', 'pop-song', etc. are products "manufactured". *Concierto de Aranjuez* by Rodrigo is an *individual product* of its genre and its "musical language as concerto" experienced by listeners is unique.

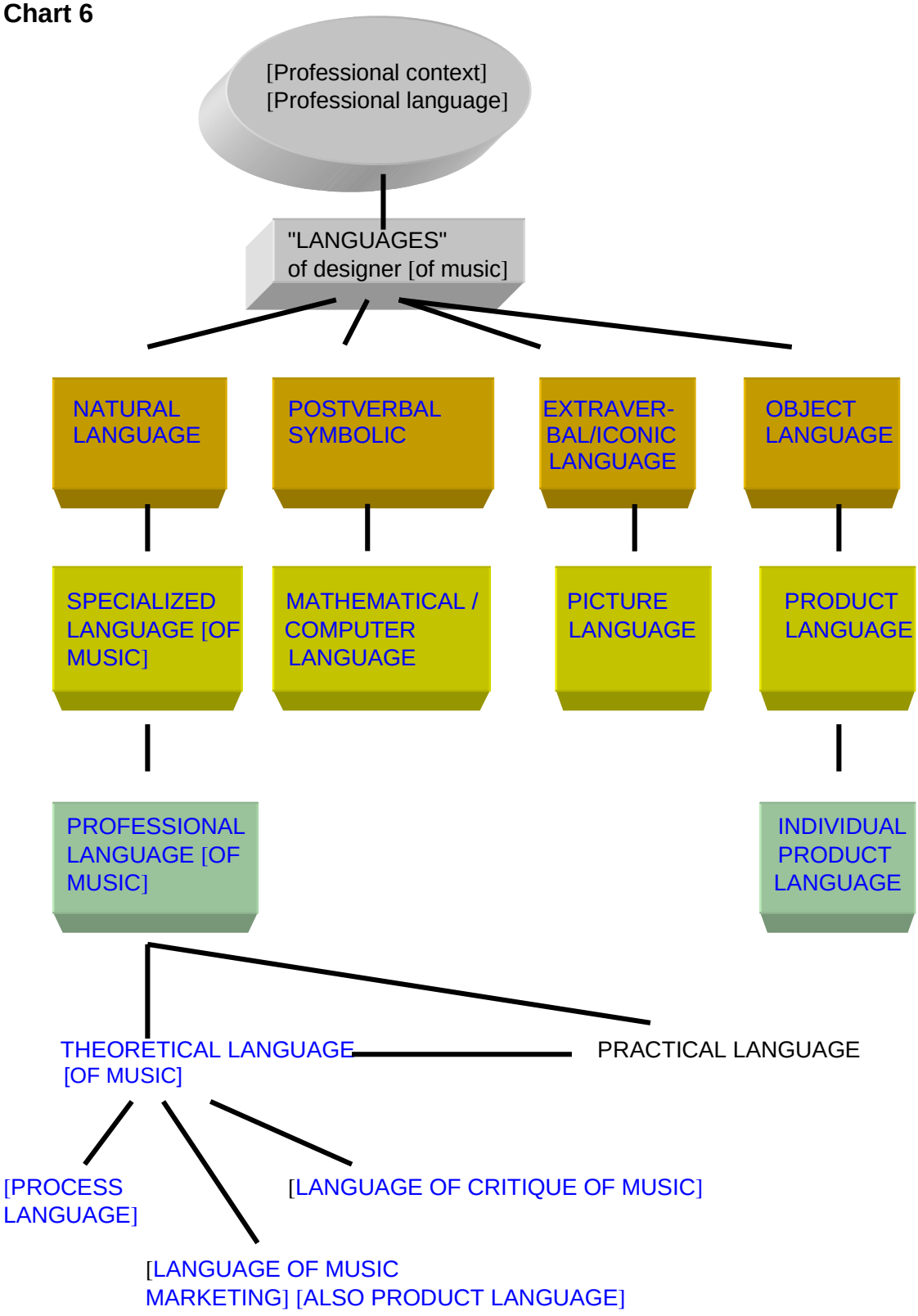
We can see how rich possibilities language offers for the systemic research of musicological concepts. At the same time, we can only conclude that music is a concept that escapes exact definitions, and in order to understand of music we have to study it indirectly through various form and levels of "languages".

It is easy to notice how far the traditional music analysis and theory is from the real music and from understanding music. When we analyze a chord structure, or the logic of a chord progression of a musical piece, we do not usually comment on that a chord or the progression of I – I6 – IV – V7 – VI – II6 – V7 – I means, expresses, or communicates something meaningful, or that we "read" some meaning in it. I think we should try to do so, provided we can link this level to many other systemic levels of the piece.

The conclusion of the abductive survey through the above theoretical material confirms the fact that music is a concept that escapes exact definitions and in order to understand of music it we have to study it indirectly through various forms and levels of "languages". The chart *(6)* below is an adaptation of that of Karihalme [351]. I have added in some elements referring to the text above.

348 Karihalme 1996: 15.
349 Musicological conceptualization.
350 Compare with the idea of musical patterns of Elliott, see Form above.
351 Karihalme 1996: 14.

Chart 6


[Professional context]
[Professional language]
"LANGUAGES"
of designer [of music]
NATURAL LANGUAGE
POSTVERBAL SYMBOLIC
EXTRAVER-BAL/ICONIC LANGUAGE
OBJECT LANGUAGE
SPECIALIZED LANGUAGE [OF MUSIC]
MATHEMATICAL / COMPUTER LANGUAGE
PICTURE LANGUAGE
PRODUCT LANGUAGE
PROFESSIONAL LANGUAGE [OF MUSIC]
INDIVIDUAL PRODUCT LANGUAGE
THEORETICAL LANGUAGE [OF MUSIC]
PRACTICAL LANGUAGE
[PROCESS LANGUAGE]
[LANGUAGE OF CRITIQUE OF MUSIC]
[LANGUAGE OF MUSIC MARKETING] [ALSO PRODUCT LANGUAGE]

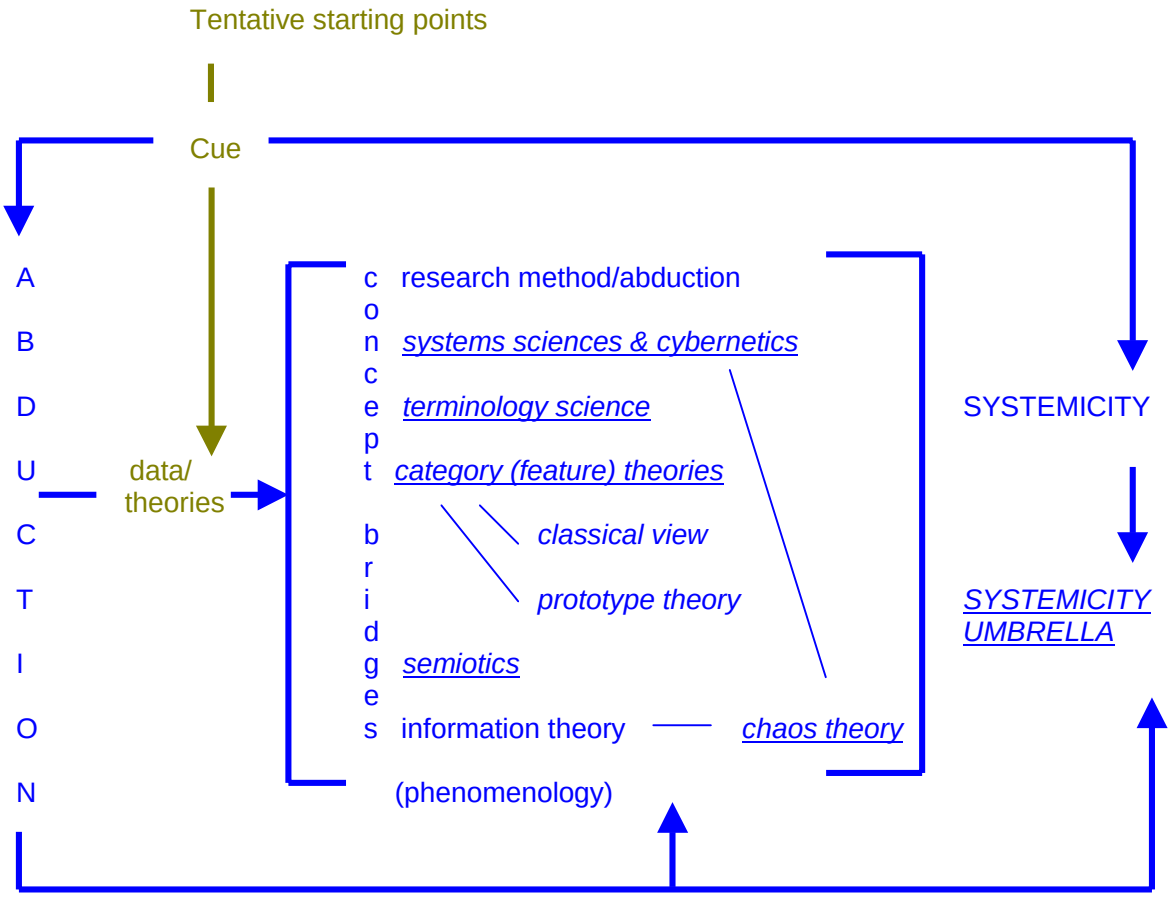
3 HYPOTHETICAL SOLUTION MODELS

3.1 The First Tentative Systemic Starting Points of This Research

The question of musicological concepts along with my pedagogical experiences in using them as a musicologist was the motivating background for my research, in which I felt the necessity to explore the possibilities of systems thinking and systemicity to explain conceptuality. My research started first on a general level – with a cue, as abductionists would say. In order to strengthen the cue I needed to decide the research method that matched a systemic approach. This was the abductive method. For the research data needed to match conceptuality, I turned to terminology science, and selected category/feature theories, as well as the concept carrier: language and signs (semiotics and terminology science). Because concepts represent knowledge and information I also needed to explore to some extent the question of knowledge and information and their relation to systemicity. The abductive reasoning drove my interpretation of the data material to the direction of the main concept attractor: systemicity resulting in the idea of the systemicity umbrella[352] featuring the systemic similarities of systems sciences/cybernetics and semiotics. Minor concept attractors exist between the theories/fields that are linked together with concept bridge attractors[353]. The visual *Chart (7)* below features the data of my research. It also resembles a hermeneutic spiral, or a hermeneutic "vortex", modelling abductive approach. The blue lines and blue fonts indicate the main elements of the concept field/concept system I study. The dark yellow fonts, lines, and arrows indicate what is needed in the abductive research method in general.

352 See 5.10.
353 See 3.2.1; 3.2.2.

Chart 7



The outline of systemic approach developed during my research. The idea is dynamic non-linear systemicity as a concept field, or a systemic-semantic field[354] that comprises certain theoretical data of selected scientific fields. They relate to my research topic that is musicological concepts and systems and their relationships. The selected five fields are cybernetics and systems science, terminology science, concept category theories (mainly the classical view and the prototype theory) and semiotics. I do not treat these equally because they all manifest systemicity in different ways and levels. Because the concrete research material of all these sciences is mainly linguistic (terms, texts and definitions of the above mentioned theories and musicological concepts), it is understandable that I need to refer to several semiotic concepts and standpoints.

The second science that has to do with language is terminology science: of which musicology[355] is very much a part. Terminology, on the other hand, has to do with conceptual categories because terms need to be very much categorical tools. Here it is necessary to touch on concepts and categories through related theories (the classical view, the prototype theory)[356]. The systemic "world view", or paradigm comes through cybernetics and systems

354 See semantic field 1.3 and systemic-semantic field in 6.2.2.
355 Musicological conceptualization.
356 See Chapter 4.6.

sciences[357], and partly through category theories. I comment on my research method, abduction[358], from a systemic viewpoint, and link it to cybernetics and systems sciences. To keep this all together is explainable through the concept bridge idea[359], which means that there are clear conceptual and often terminological links between these sciences and theories. How this all relates to my three research targets: musicology, concepts and systems, was explained in the Introduction and in Chapter 2.

At the beginning of my research I did not have any name or theory for my intuitive approach to musicological phenomena. In the middle of the 1980s, I attended a lecture by professor Martti Mela from the Oulu University, Department of Biochemistry, aimed at pedagogues. Already at that time his ideas struck me deeply, although he did not even mention music; he spoke mostly about systemic flow charts related to technical and environmental sciences. He pointed out that these were systemic models representing actual systems, and that these models could be applied through analogy to explain many other systems with similar features. He also stressed the value of systems thinking in pedagogy[360].

In 1998, I contacted professor Mela and met him afterwards several times for very valuable and inspirational discussions. I understood immediately that this was something important to me. I had found a scientific field matching my intuitive thinking. According to Mela, the things he had tried to prove were not mainstream and were hard for the hearers to accept. Systems thinking was applied by some pedagogues but mainly as deductive formulas; the point of organic dynamic systemicity to serve conceptual innovative thinking had been missed.

When taking the first steps in my way of understanding systemicity, especially in pedagogy, I soon encountered constructivism, which I immediately recognized as a form of systemic approach. The criticism of traditional pedagogy offered by constructivists was noteworthy[361], however, I did not come across with suitable conceptual models (in a large scale) offered by constructivism, mainly general criticism in favor of what I see as systemicity.

At the 3rd Symposium of Music Researchers in Jyväskylä, Finland, along with my criticism on outdated musicological pedagogy[362], I also pointed out the possibilities of systemic approach as a solution.

Towards a Holistic Approach of Musical Description – Searching Conceptual Systems of Music

> *"We have to find new paths in musicological[363] research applicable to more meaningful music education."* Dead-end of musicology[364] in conservatoire/professional music education?

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357 See Chapter 5.
358 See 3.3.
359 See 3.2.1.
360 In more detail, see Chapter 6.
361 See Haapasalo 2000: 62-63.
362 Study course musicology; see 1.4.4.

1. Vicious circle/impossible equation of present musicological-educational goals:

Universally expanding disintegrated/pluralistic music life → Uncontrollable cumulative information on music <-> "A good musician should know the basics of every kind of music" → More atomistic musicological study courses, more specialized descriptions → Generalization & oversimplification of musical reality → Disability to understand musical phenomena, Cultural one-sidedness & elitism → Reflections to cultural music life → Disintegrated/pluralistic music life --> etc.

2. Academic-intellectual level of fresh students is too low at the beginning of their professional musicological studies due to:

** Subject-oriented atomistic curricula in elementary & secondary (music) education*
** Lack of holistic musicological study material in secondary and higher music education*
** Lack of holistic musicological teacher training*

3. The persistence of old rivalry of professional status between the practical instrumental studies and the musicological-theoretical ones:

** Musicological subjects are "the necessary evil" which prevent the students to devote their full time to practical instrumental studies*
** Musicological studies and practical musicianship do not integrate effectively in music education*

4. Present focus of musicological-educational goals should be changed radically.

"From "who, what, where & when" to "how, why, what for, from what viewpoint?"

5. New holistic curricular studies must be planned in musicology. This requires breaking new ground in holistic music research**.**

** From absolute truths to relative truths in musicology*[365].
** From atomistic info bits to holistic systems of musical information.*

Systems thinking	*System theory*	*Constructivism*
Information theory	*Universal theories*	*Structuralism*
Cognitive paradigm	*Complex thinking*	*Semiotics etc.*

→Learning to describe/understand systematic musical phenomena → Learning to understand "what music is about, how various parameters relate to each other?" → Learning to understand music

6. The starting point/triggering impulse of the research is based on the researcher's educational experience and career/background. The focus of the research, however, is theoretical-philosophical because the researcher believes that without well-defined conceptual foundation no solid educational methods can be found.

These provocative notions, searching questions and claims expressed my pressing need of finding answers to the possibility of understanding musicological concepts in the light of systems sciences. However, all the questions together involved were understandably "too big a cake" to be handled in a singular research. Too many theories, as the reader can see, and too many questions, albeit clearly linking one-to-another. And further: how to focus? On philosophical-theoretical questions or on more practical ones? How to combine philosophical-theoretical findings and education?

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363 Applied musicology.
364 Study course musicology.
365 Applied musicology; actually I refer to the need of the theoretical musicology level.

It became obvious that it was necessary to limit radically the focus and data into reasonable proportions and to find the best research method. I had to make my choice, and I chose the theoretical-philosophical side with the wish that it will support later practical applications of succeeding research, either by myself or by others. The practical applications part of this research (Chapter 6) features some examples of my findings.

Yet much of what was stated in the beginning in an idealistic way has, consciously or unconsciously, guided my search. I have not wanted to enter into the rigorous mathematical-logical domain of systemicity, although the original systemicity developed in that field. I have kept myself closer to the humanistic practice, especially to the practical side of language because language is the main tool of all communication, as well as of education, and is connected to concepts and conceptualization. Thus, for example, I shall not deal with (radical) constructivism as an educational means, but I shall take it up in connection with systemic sciences (especially cybernetics) simply because constructivism is a very basic "ideology" behind most of the traditional and present systemicity. Semiotics had to be included because findings in semiotics offer interesting and matching explanations of the conceptual bridges between musicological language and musicological concepts.

3.2 Theoretical Starting Points

In the course of my research I encountered great temptations to erect my tent respectively either in the camp of *semioticians* (starting with Voloshinov/Bakhtin, Peirce and others, and focusing on Chandler's excellent hypertext on the Internet), *constructivists* (because of their valid criticism against the prevailing dominant deductive paradigm in pedagogy, and because of its well disciplined logic), *terminology scientists* (because of their concept of concepts, and attempts to standardize concepts), *cognitivists* (because of their psychological orientation to concepts), or *cyberneticians* (because of their concept of systems). I had to become acquainted –at least to some extent- with *information theories* (Shannon and Stonier) as well as with the *chaos theory*. These proved to be interesting links between systems and semiotics through concept of meaning. I even visited the fields of *phenomenology* (mainly Husserl), which again left its influence in my work. I noticed that in many cases the borders of the camps merged and all these schools shared the same axiomatic conceptual feature: systemicity, although their way of using terminology and language differed. On the level of paradigm there seemed to be an interesting rivalry. The famous paradigm shift, started by Kuhn in social sciences, according to sources, is now the property of at least constructivists[366] and systemic thinkers[367]. I do

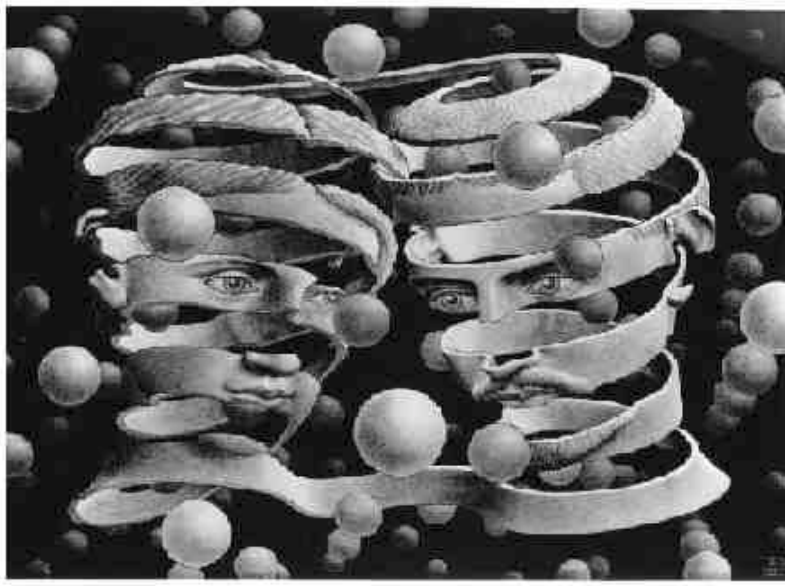
366 E.g. Haapasalo (2000) presents constructivistic viewpoint as paradigm.

367 Banathy 1996/1997.*A Taste of Systemics*. http://www.newciv.org/ ISSS_ Primer/ asem 04bb.html (30.08.2001).

not yet know who else. For me, the connections between all the aforementioned schools coil up to the same axiom: *systemicity*.

Now I can see that I was on the right track already from the very beginning as to the conceptual levels of musicological[368] parameters, which I then named as the primary (e.g. texture scale level[369]), the secondary (e.g. melodic part scale level of texture level) and the tertiary (e.g. one-part Arabic chanting level of melodic part scale level under texture level) systems with examples. Here the idea of conceptual super- and subsystems was already emerging and solidified when coming across the rules of complexity defined in cybernetics (space-, time-, scale dimensions and their combinations)[370].

I could not stay only in one camp of scientific thinking because, for example, cyberneticians write about complexity in a way with which I did not come across in semiotics. Semioticians seem to use extensively the concept of system in many connections without defining it. They also use very rich and connotative language (although evidently intending to be denotative) in order to find out nuances and layers of meanings, but mostly these concepts behind language are taken conceptually for granted. This all forms a complex textual system, and semioticians do have a concept for it: intertextualism, which I interpret as a form of conceptual complexity (in "mental space"/cybernetics). In my opinion, the concept of open semiosis or unended semiotics represents time in the cybernetic sense[371]. Constructivists, on the other hand, have many interesting connections with systemic thinkers.



I decided to take a standpoint on *systemic approach* with the aid of the *systemic umbrella concept*[372] and to examine material from different sources of terminology science and the prototype theory in that light, especially from semiotic readings.

M.C. Escher, a Dutch artist, is famous for his graphics depicting conceptual optical illusions related to relativity, symmetry, metamorphosis, etc. The *World of Escher*, Internet location, has published, among others, Escher's *Bond of Union*

368 Formalistic musicology.
369 On scale level factor, see 5.7.2.
370 See 5.6 on systemic complexity.
371 Rocha 1997. *Evidence Sets: Contextual Categories*. http://www.c3.lanl.gov /~rocha/es_ contx.html (04.09.2000). See especially Chapter 2.1 Cognitive Categorization and Embodied Construct-ivism. (04.09.2000).
372 See 5.10.

(1956) with an explanation: "Two spirals merge and portray, on the left, the head of a woman and, on the right, that of a man. As an endless band, their foreheads intertwined, they form a double unity. The suggestion of space is magnified by spheres which float in front of, within and behind the hollow images."[373] For me, this work of Escher associates with the concepts of open, or undended (endless), semiosis, and intertextuality (interconceptuality), because the minds of people are united through shared but open and endless conceptuality, and although all of us are subjective individuals, we share common concepts to a great degree.

3.2.1 Concept Bridge Idea

The various theories and views taken up in the preceding chapter represent systemicity in various ways, but they also form together a complex concept field (or semantic field in terms of the terminology theory) with *concept bridges*. For example, a bridge between cybernetics/systems sciences and semiotics is complexity-intertextualism; a bridge between semiotics and the traditional terminology theory is language and texts (terms are language); a bridge between the terminology theory and cybernetics/systems science is the concept of system[374]. A bridge between category theories and terminology is the classical category view, which again is a structural system; also, the prototype theory (of Rosch) has conceptual bridges with the terminology theory and cybernetics/systems science. The information theory has conceptual bridges with cybernetics and systems science, as well as with semiotics through the common interest in meaning. The abductive heuristic and hermeneutic reasoning method itself is a form of dynamic non-linear systemicity. An interesting conceptual link between the abductive reasoning and concepts forming can be found in the attractors of chaos theory[375], which concerns systems, as well.

I need to stress one important point concerning my relation to these theories. I am not trying to judge or evaluate between the scientific-theoretical reliability of various branches, schools and theoretical details in their respective fields taken up in this treatise. It is not inside my scope, although these different approaches are part of my research data of systemicity. I admit that it is uncommon in a dissertation to handle several theories at the same time. To me, all these research fields with respective theoretical views are not my research

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373 Reprinted from the text of M.C. Escher – The Graphic Work; with the kind permission of Benedikt-Taschen Publishers. http://www.worldofescher.com/ gallery/ BondOfUnion. html (07.03.2002). Escher has also written interestingly (bold font stressing mine): "I have never attempted to depict anything mystic; what some people claim to be mysterious is nothing more than a conscious or unconscious deceit! I have played a lot of tricks, and I have had a fine old time expressing concepts in visual terms, with no other aim than to find out ways of putting them on to paper." -(Ernst, B. 1985. The Magic Mirror). http://www. worldofescher.com/ newsletter/ archive.html (10.04.2002).

374 The terminology theory favours structural static ("closed") systems; see 4.4.

375 See 3.2.2.

methods or theoretical background; they are my data. My research method has a clear identity; it is abductive[376]. Thus, different semiotic standpoints towards, for example, sign – be they Saussurean, Peircean, Bakhtian (or Voloshinovian), etc., are equal in the systemic sense. The same applies to systems science and cybernetics, or the information theory, the chaos theory, the classical view of categories, and the prototype theory. They represent different types of systemicity. I do not think, for example, that the Saussurean structuralistic view of sign is "totally wrong", although it is inadequate from the Peircean (constructivistic, or positivistic-logical empiristic) and even more from the Voloshinov-Bakhtinian social-semiotic and subject-oriented viewpoint. The differences are due to the matter of definitions and concepts that are never absolute or final, anyway. The Saussurean view is linear structuralistic-systemic (synchronic), and that of Bakhtin-Voloshinov non-linear and dynamic (diachronic and more complex). My aim is to show that there is enough intertextual and interconceptual evidence of conceptual connections between various theoretical schools and interests. This viewpoint does not evolve from suspicion against certain theories; it emerges from the need to understand what is common, what is different, and what is shared.

3.2.2 Concepts and Truth. Attractors as Explanations of New Concepts

I relate the idea of mutually related theories and paradigms[377] "evolving around systemicity" to the idea of attractors of complexity theory and the chaos theory[378]. Their purpose is to explain the *overall predictable behavior* of a non-linear dynamic system in a state of seeming disorder (that in fact is a special kind of order), which, however, does not prove the exact details (of space and time) of a system at a given time. According to Lucas[379], attractors exist everywhere, in the nature and in our minds. "For any dynamic (time changing) system the attractor is where it will end up eventually." Concepts are dynamic systems and they certainly tend to end up with attractors. This is necessary because without concepts we cannot think and communicate intelligently. Lucas states that our mental categories[380] are forms of attractors, and that in our mind exist a huge amount of resident attractors, "one for each concept". – I have referred elsewhere in my research to various mind attractors: historicity attractor[381], systemicity attractor[382], etc. Some attractors in the nature tend to fixed equilibrium. This is analogous with closed structural normative concept system, and the classical category view. Some attractors in the nature follow an

376 See below 3.3.
377 See above.
378 See Chris Lucas' idea of mental categories (as mind attractors) in his article *Attractors Everywhere – Order from Chaos*. http://www.calresco.org/attract.htm (30.08.2001); see also 5.10.4 of this research.
379 Ibid.
380 See 4.6 Cognition and Concept. Concepts as Categories in Feature Theories.
381 See 1.1.2; 3.2.2.
382 See 3.2.2.

orbit (such as the planets) – compare the prototype theory – and some attractors are chaotic, "strange attractors", which never remain the same but follow an overall predictable behavior. Any conceptual scientific paradigm that evolves around its axioms is such an attractor. Lucas also points out that in certain bifurcating situations a slight change, or an impulse can change the path from one attractor to another. This, according to my understanding, happens when we change our ideas and concepts, for some reason, to other ideas and concepts. Alternatively, after such a bifurcation an attractor may cause a system become "locked". This explanation matches the semiotic idea of reification and normative conceptualization.

Systemicity is a tool; it is not an objective or a purpose, or a theory to be challenged. It is itself a mental attractor of conceptualization. It is a way to create non-linear complex conceptual order. Philosophically speaking, the reason of the need of new concepts with new definitions is that old concepts are felt untrue. However, untrue (or more precisely, seemingly untrue, such as closed systemic and structuralistic categorization) definitions are also necessary. Why? Because new explanations found do actually not mean that a new truth has been found. This sounds paradoxical but from the viewpoint of the attractor theory, a new concept and its explanations are new conceptual mutations around the "older" concept attractor[383]. The truth there somewhere remains the same but the user of the new concept assumes that he/she sees the truth in a new way; and the person does see it, therefore what he/she deducts is that the truth is new. We should not ignore wrong information or be afraid of it: we should understand that it is a mutation of another older concept.

This idea of the need of new explanations and new definitions matches perfectly with the Socratean idea of the danger of written texts. Written texts that tend to naturalize and reify (in semiotic terms) matters, need oral and organic explanations around them – this always according to the needs of those who discuss the matter. No definition on any matter is ever final[384].

Does this relate to musicology[385]? It certainly does. Let us take for example a concept with many conceptual mutations, the concept of symphony, the concept of mode, the concept of tonality. We know that they have many different variants in different musicological conceptual contexts. No certain definition of symphony, or mode, or tonality is absolutely final or complete. Their sensible conceptual use is linked with their immediate intertextual conceptual surroundings.

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384 See 1.6.5.

385 Musicological conceptualization.

3.3 Abduction as Systemic Research Method

3.3.1 "The Perfect Camel" – A Metaphor about Scientific Research Methods

This research explores the possibilities of applying systemic approach to musicological concepts. Systemicity is a well-known universal phenomenon in all science, in research and in its results, yet it is not applied in the scope it could and should be applied. In the light of our present knowledge of the complex and dynamic nature of systemicity, it is not reasonable to use the "old" linear-logical systemic research approaches (such as the deductive/or hypothetico-deductive, or inductive methods) in studying systemicity. The research method should certainly be logical, even systematic but at the same time dynamic and conceptually open (even non-linear, and interconceptual) to heuristic and hermeneutic aspects. The abductive method, according to my understanding, fulfils these criteria; therefore in this research I apply the abductive method.

In order to understand the nature of abductivity and its relation to systems thinking, it is necessary to compare it with the linear approaches of the deductive (or the hypothetico-deductive) and inductive methods. Systemicity sheds new light on these latter methods. They are not as such applicable to dynamic systems thinking, whether in research, or modern education that is open to heurism and to creative surprises. Before tackling these theories and their comparison, it is worthwhile utilising an interesting old metaphoric story.

The Perfect Camel (a story)

> Years ago four scholars traveled through the Kavir desert with a caravan. In the evening they sat together at the fire and talked about their experiences. They were all filled with the admiration for the camels. They were amazed by their contentment, they admired their strength, and they found their modest patience to be almost incomprehensible. "We are the mastery of the pen," one said. "Let's write down or draw about this animal this way to praise and honor the camel." As he said these words, he took a roll of parchment and went into a tent that was lit by an oil lamp. After a few minutes, he came out and showed his work to his three friends. He had drawn a camel just getting up from a resting position. The camel was so well drawn that one could almost think it were alive [= *visual systemic intergraphics*]. The next man then went into the tent and soon came out. He brought a short factual depiction of the advantages that camels bring to a caravan [= *induction*]. The third wrote an enchanting poem [= *semiotic narratology*, *or heurism*].
>
> Then a fourth man finally went into the tent and forbade the others not to disturb him [*sic! he wanted to be thorough*, *logical and systematic = "a real scholar"*]. A few hours later, the fire had gone out, and the others were already asleep. But, from the dimly lit tent, there still came the sound of the scratching of the pen and the monotonous song.
>
> The next day, the three waited just as futilely as they'd waited for their colleague on the second and third days. Like the cliffs that had closed behind Aladdin, the tent hid the fourth scholar. Finally, on the fifth day, the entrance to the tent opened up, and the most industrious of the industrious stepped out, dead tired, with black-rimmed eyes and sunken cheeks. His chin was framed by a stubby beard. With tired steps and a look on his face as if he had eaten green lemons, he approached the other men. He wearily threw a bundle of parchments onto the carpet.

> On the outside of the first roll he had written in large letters, "The perfect camel, or how a camel should be…"[= *hypothetico-deductive prescription or prediction*][386]

Whoever originally wrote and invented this story was a genius. The story turns out to be a fascinating depiction of different scientific research methods, identifiable as systemic, inductive, narratological-heuristic and hypothetico-deductive research approaches**.** At the same time the story takes a firm standpoint against the purely deductive, or hypothetico-deductive method. If all the described methods are used intelligently and in appropriate proportions relating a relevant research question ("the camel") and its material, the combination represents abductive systemicity.

3.3.2 Abduction as Systemicity

As stated in Chapter 1.7, the qualitative abductive method has the following features: 1. A guiding principle, cue, intuition, or well-defined hypothesis of an interesting phenomenon; 2. The research material is empirical and it takes into consideration the possible theory behind; 3. Earlier scientific views and theories serve as source of inspiration to new theoretical findings; 4. Abduction is logical thinking basing on a cue that determines the quality of the research material and its interpretations; 5. The abductive method suits well to analysis of systems .

From the very beginning my research method has been *abductive* by nature or by intuition, with a heuristic[387] cue towards which to go (= systemicity) and searching initially a large amount and later any relevant data to confirm the intuition. Exploring more systemicity through directly related disciplines[388], as well as through other such disciplines that clearly indicate systemic features in various ways[389], in turn has given me better means to refine and focus my original data. My searching process has, thus, shown the features of a hermeneutic spiral[390]. Abductive reasoning process happens through dynamic systemic hermeneutics in conceptual space, time and scales[391], applying heuristic intuition.

The awareness of the abductive research method itself did not come to me easily just like that but as a result of abductive meditation process where the data consisted of questions of the nature of research methods: quantity-quality polarity; nature of traditional and later methods of deduction, induction and their combination (hyothetico-deductive/deductive-nomological); as well as the abductive method itself.

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386 Peseschkian 1986: 42. *Oriental Stories as tools in Psychotherapy*.

387 *The Penguin Dictionary of Psychology* 1995. http://www.xrefer.com /entry.jsp?xrefid= 145997& secid=.- (09.01.2001).

388 Cybernetics and systems sciences.

389 Terminology science, prototype theory, constructivism, and especially semiotics.

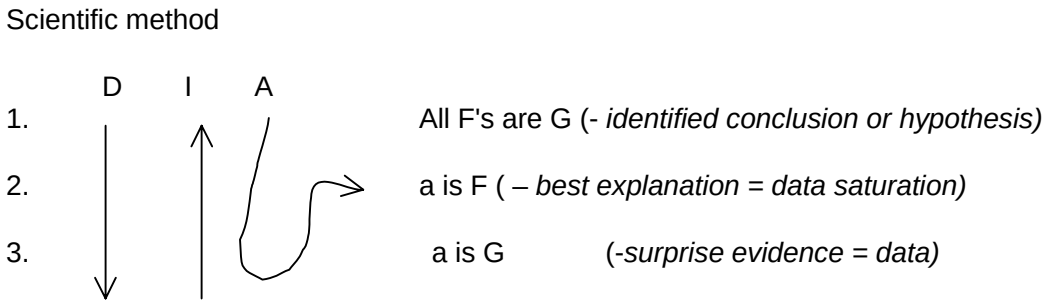
390 See Syrjälä et alii 1994: 125 in Anttila 1998: 137, as well as M.J. Inwood 1995. *The Oxford Companion to Philosophy*. http://www.xrefer.com/entry.jsp?refid=552298 (09. 01.2001).

391 See on systemic complexity 5.6.2.

According to Niiniluoto[392], the abductive reasoning method belongs to the cognitivistic paradigm that excludes the sheer Carnapian neutrality (knowledge for the sake of knowledge) or the behavioristic situational utilitarism. To know more and better is one of the validated objectives of science and according to the line of cognitive thinking. In more modern science, the abductive reasoning is also considered very suitable to systems research[393] and systems research paradigm.

The abductive (A) reasoning method can be seen as a combination of the inductive and deductive processes, where the direction towards a hypothesis is accepted, but it is not allowed to predetermine the results in strict detail. It utilizes the virtue of the pure induction (I) of gaining deeper knowledge and information. It also follows the rigor of deductive (D) rules to some degree. There are various sophisticated applications of abduction. Its main principle as a process can be summarized briefly in the form of a diagram.

This diagram is my modification of the model of Niiniluoto[394] (with my comments in parentheses explaining the nature of deductivity and inductivity from the abductive viewpoint – in Italics). The numbers indicate the order of the logical reasoning process.



The abductive method should be kept apart from another method that is also a result of the combination of the inductive and deductive reasoning, namely the hypothetico-deductive (HD), or the deductive-nomological (DN)[395] method. From the systemic approach viewpoint the abductive method belongs to open non-linear (dynamic) systems and, thus, to cognitivistic paradigm, whereas the HD-, or the DN-method to closed systems, and are outside of the cognitivistic paradigm. They belong to the paradigm of logical positivism, as well as to scientific objectivism[396]. They are also bound to the rules of mathematical-logical languages (symbol strings). In this light the General Theory of Tonal

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392 Niiniluoto 1983: 80-81.
393 Anttila 1998: 132.
394 Niiniluoto, 1983: 154.
395 *The Internet Encyclopaedia of Philosophy*: Carl Gustav Hempel (1905-1997). http://www. utm.edu/research/iep/h/hempel.htm (09.01.2001) , see also other definitions of the HD-method at www.xrefer.com: *The Oxford Companion to Philosophy* (1995); *The Penguin Dictionary of Psychology* (1995);*The Concise Oxford Dictionary of Linguistics* (1997); *The Penguin Dictionary of Sociology* (1994) (30.08.2001).
396 Lakoff 1987: 176.

Music belongs to positivism and objectivism[397]. Abduction allows the intervention of intuition and invention. It is creative and, therefore, closer to psychological processes (and cognition), whereas the HD- and the DN-methods are more mechanistic and technical as thinking processes.

3.3.3 Abductive and Hypothetico-Deductive Methods Compared in Relation to Systemicity

Anttila[398]describes the abductive method summatively: the abductive reasoning results new theories only when there is a guiding principle along with the observations. Unlike the inductive method, it is not the result of only observations. The guiding principle in abduction can be obscure, an intuition (cue), or a clearly formulated hypothesis (in my case systemic approach). This helps us concentrate on certain facts or circumstances that are believed to result new visions or ideas, or a new theory on the phenomenon. This all comes from the findings of the leading early figure of abduction, Charles Peirce.

The picture beside is a wood engraving by M.C. Escher which, in my opinion, aptly illustrates the abductive method with a cue (another world) and systemic approaches towards the cue from various angles giving more light on the issue[399].

In the abductive reasoning alongside with actual objective facts, intuition and subjective experiences are also accepted as actual facts. They are always logical; they should not be doubted. This is a great difference with quantitative logical empiricism and, therefore, with the HD-method that approves only "objective" facts.

The HD-method proceeds along the rather rigid rules of the

397 See 1.6.3.
398 Anttila 1998: 139-140.
399 *Another World II*, Wood Engraving printed from three blocks, 1947. " The interior of a cube-shaped building. Openings in the five visible walls give views of three different landscapes. Though the topmost pair one looks down, almost vertically, onto the ground; the middle two are at eye-level and show horizon, while through the bottom pair one looks straight up to the stars. Each plane of the building, which unites nadir, horizon and zenith, has a threefold function. For instance, the rear plane in the centre serves as a wall in relation to the horizon, a floor in connection with the view through the top opening and a ceiling so far as the view towards the starry sky is concerned." http://www.worldofescher.com/gallery/ Another World II.html (09.04.2002).

first-order logic and is careful in sorting out what can be accepted as natural-objective facts and data and what cannot. In systemic terms, this means much integration of concepts, or connectedness, and little differentiation of concepts, which equals with negentropy[400]. In abduction the data is much more versatile. Yet, abduction is also very critical in that the reasoning process is scientifically systematic, and that the data is logically coherent and points to the hypothetical direction. **To sum up, we can say that in the HD-method the problem is the quality of the data; not the logical accepted rules, which are rigidly set; and in abduction the problem is not the data, which can be versatile, but the logic of the research process.** In systemic terms, abduction involves much differentiation and enough connectedness or integration; the result is organic complexity[401].

It is not necessary here to elaborate the minute details of the deductive and inductive research processes. They are generally better-known scientific traditions available in various sources on scientific research methods. It suffices to say that in view of gaining new knowledge and more imaginative ideas, induction is a necessary method; the deductive method certifies by cases that which is already accepted as a hypothesis. Induction is for quality; deduction is for quantity.

I do not wish to discuss the relationship of the deductive-nomological with the hypothetico-deductive research methods, which, to my understanding, are practically the same thing. My interest is mainly to try to understand the cardinal differences of the hypothetico-deductive and the abductive reasoning. There are certain philosophical reasons for the criticism of the HD-method; for example, the famous Hempel's paradox leaves room for criticism from a non-linear dynamic systemic viewpoint.

How would the HD/DN-research method and the abductive method examine the systemicity of musical/musicological concepts? What are the differences in their paradigmatic premises?

1. The HD/DN postulation must meet the prerequisite: explanation is analogous with prediction. It must consider conceptual systemicity as a ready theoretical hypothesis. The hypothesis would sound, for example like this: because all musicology is conceptually systemic, certain closed conceptual systems can describe aptly all musicological concepts. The research task would be to find those examples of musicological concepts that fit into closed conceptual systems. If you find such conceptual examples that do not fit into the picture, reject them. The result would be various examples meeting with the requirements of the set hypothesis. These results can then be used as normative models for theoretical reproduction and prescription.

2. The abductive postulation uses a cue: conceptual systems approach in general seems to suit well for describing musicological conceptuality. It might give new explanations. The research task would be: what kinds of systems approach apply to what parts of musicological conceptuality? What do they

400 See 5.6.
401 Ibid.

reveal about the nature of musicology[402] in relation with systemicity? How does musicological conceptuality give new light in understanding systemic conceptualization? What is the surprise, what is new? What are the ways, or rules of these approaches? Find enough good and logical data. The result would be a deeper new way of understanding the nature of musicology and of systemicity. All this it would improve philosophical understanding about musicology and music.

3.3.4 On the Applicability of the HD/DN-Methods to Systemic Approach

There are certain reasons why the HD/DN research methods are not applicable to the (dynamic, non-linear) systemic approach and the systemic description. At least they work only partially in a structuralistic systemic approach. The reasons are as follows: the HD/DN-research method works from top to down, from a ready hypothesis or a theory towards cases that affirm that is already known. Contrastively, the abductive research method works from down to top (from cases and data towards a hypothesis) visiting occasionally at the top (the cue).

The HD/DN-research method uses fixed concepts as closed category systems. The terminology related to concepts are fixed semantic meanings, according to the closed /Aristotelian-Kantian category system. They follow certain linguistic-logical-mathematical deduction rules as statement sentences. Contrastively, the systemic approach (e.g. the prototype theory, family resemblance, fuzzy sets, etc.) considers concepts unstable, varying, and fuzzy. They are not strict semantic meaning standards, but function differently in different conceptual and logical systems.

Another weak point in the HD/DN-system is the question of true-untrue premises. For example the famous Hempelian statement: "all men are mortal", or “all ravens are black”, is a belief, not a scientific law because it is impossible in practise to carry out a study covering all the people, or all the ravens in the world, past, present, or the future. It is impossible to prove that all, absolutely all ravens, are black. In conceptual theories, in the world of thought and logic, we certainly can let our stream of thoughts go according to certain rules and turn them virtually around, if we like. However, the true-untrue postulation is a semantic-semiotic question, and involves always the consideration of the premises *from what viewpoint*, *in which focus*, something is defined conceptually. Thus, the DN-model is one of the various models of abstracting abstracts; formulation of conceptual models according to given rules, yet which are not suitable to everything explainable.

The Hempelian true-untrue premise, “all X is Y”, has another very fallacious blind spot, which is the justification of “anything goes for something”. In the field of music we have heard the famous saying: “all sounds are music.” According to Hempel, we can continue logically: this is a sound;

402 At the level of theoretical musicology.

this sound is music, and on these premises we are "obliged to accept" any sound as music. It is nearly impossible to say against this kind of an axiom, unless we understand that it is sheer tautology and that it altogether misses the cardinal points of complex systemicity: scale levels and complexity. However, it is not here the place to prove the fallacy of the Hempelian axiom.

To those who want to read in detail on the unsuitability of the HD-method (and scientific objectivism altogether) in the research of human concepts and language it is worth reading selected passages of the famous book of Lakoff's *Women, Fire, and Dangerous Things* (1987).

4 CONCEPTS, SYSTEMS, LANGUAGE, GRAPHICS, AND MUSIC

Concepts, musicological or other, appear as more or less specific linguistic definitions in various sciences. For my research, I have selected cybernetics, terminology theory, selected feature theories, and semiotics. Cybernetic readings enlighten us on the epistemological development of concept. I examine all this from the viewpoint of systemicity (cybernetics and systemic sciences). At the same time, I keep in mind how various musicological concepts fit into the study frame as examples.

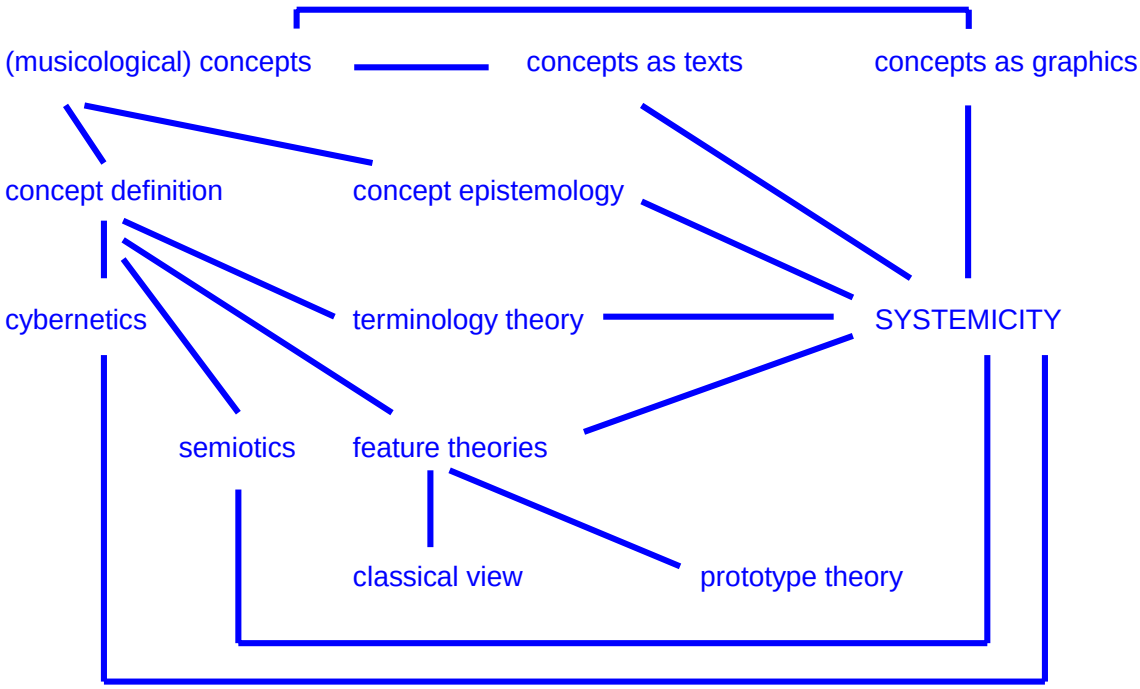
In any field of science and for any purpose of communication it is vital to study and understand concepts because concepts are creative mental tools; they are also mental energy canalized through language. Musicology[403], for example, is concepts and of concepts. Language, on the other hand, is the food, fertiliser and soil for the cultivation of concepts. It is concepts we analyze, it is by aid of concepts that we analyze, and it is concepts we get as results of analysis, but we invent terms and words in language for our concepts. Language feeds concepts and vice versa. Concepts are, however, even more vital for understanding. In order to understand anything we should understand concepts; it is not enough to understand (only) language and its workings. Real understanding means understanding conceptually by aid of language and signs. Constructivistic pedagogues also accept the importance of conceptual knowledge[404].

In light of various theories there are sundry alternatives to examine concepts. Concepts are communicated and described through language; which is partly stable (then we use traditional normative terminology and descriptions), partly relative, variant and changing (then we introduce or invent new language usage, new terms and new descriptions to establish our meaning). For the purposes of this paper, I have selected definitions of concepts from cybernetics and systems sciences, terminology science/theory, semiotics, category research, and feature theories (classical view, prototype theory). At the same time, I interpret interesting conceptual links between them. This enhances

403 In all of its aspects, theoretical applied or study course level.
404 See Haapasalo 2000: 51 – 60 on conceptual knowledge and prosedural knowledge.

us to experience the emergence of a new conceptual vista. The *Chart (8)* below shows summatively the main components of the conceptual model I study in this chapter.

Chart 8



4.1 Ontology and Abductive Reasoning

Throughout this research I have repeatedly referred to the concept of ontology, its relationship to concepts, and to the importance of the interplay and intermingling of ontology with onticity. I also use the abductive method in handling concepts as ontological entities. Before entering into the questions of concepts from the many theoretical viewpoint I have selected I wish to first comment on the nature of ontology and then the role of ontology in abductive reasoning.

What is ontology? In my opinion, this question cannot be answered as such because it would entail separating ontology from onticity. This is not possible because, as I have proved, they are entwined and intermingle with each other in a complex way[405]. It seems that there are many levels of realities ("real world") – not only a dualistic division of onticity and ontology: this is just a rough division of two seemingly distinct "territories." At least for onticity we have concepts like transcendental reality, abstract reality, concrete reality, physical relity, energy-matter-reality, truth-reality, dream-reality, phantasy-reality etc. This may sound vexatious but we need not to be bothered by it.

405 See 5.6.1.

It does not belong within the scope of this research to map the territory of ontology close to its border of onticity. However, we can "move on the safe ground" of ontology when we talk about such things like concepts, information-ontology, knowledge-ontology, intuition-ontology, science-ontology, paradigm-ontology, science-fiction-ontology, myth-ontology, folk-lore-ontology, lie-ontology, truth-ontology, ideology-ontology etc. Ontology, thus, can be understood as an emergence of – I try to select my words carefully – conceptual awareness in form of conscious and formulated conceptuality. All concepts, like that of ontology, are results of conceptual, or of concept, emergence.

The relationship of ontology and abductive reasoning or how the concept works within the process of abductive reasoning seem to be as follows. Any reasoning process aims at a definitional result: at a conceptual tool to be used for manipulation of behavior, eg. of behavior of understanding. Normative understanding seems to be the most imperative goal for any science. As stated in Chapter 3.3.3, at the beginning of an abductive reasoning process there is a cue, a precognition, an intuition of a possible explanation or a possible prototheory. As stated in the introduction[406] " at the start of a research there is a selected core concept, or an idea, which is like an organic concept seed laden with conceptual potentialities, features and inherent logical rules in order to grow into a diversified concept tree with branches, leaves, fruits and flowers."

In abductive reasoning or method this idea is an intuition, a cue, (an ontic "mind-instance", we might say). At the same time it is already an ontological conceptual entity, "a conceptual seed or embryo", the nature of which is as yet concealed. It can be taken from any of the aforementioned forms/fields of ontology (concepts, information-ontology, knowledge-ontology, intuition-ontology, science-ontology, paradigm-ontology, science-fiction ontology, myth-ontology, folk-lore-ontology, lie-ontology, truth-ontology, ideology-ontology etc.) – at least various sciences do so. The ontological cue has, however, a specific function: it is an (concept) attractor that invites other concept trajectories from various fields of ontology to form a (concept) system – if we use creative abductive reasoning. But as the interest of a researcher is to reach a definitional result to be used as a normative tool he/she works with this conceptual seed in a suitable ontological environment (as listed before, see also Introduction) which consists of ready, more or less established and normative concepts, theories and definitions. The work of a researcher is to try to find the right conceptual/concept pieces and match them together to form a concept system. It is like twisting a Rubic cube, or rather building a jig-saw puzzle without knowing in the beginning how many pieces there (= concept field, see 4.4.9) are and how they match each other. However, while the cue as a conceptual attractor emerges it simultaneously gives the researcher hints of which concept-pieces are necessary for the more final picture (concept system) and which ones should be rejected, or are subsidiary ones. The desired picture gradually emerges during the process of finding and matching: the cue

406 See 1 Introduction.

becomes conceptually stronger the more we can match proper conceptual systemic parts to each other, and this strengthened cue guides us to seek for more suitable conceptual parts for the system (this is a hermeneutic spiral): the ontological definition and explanation becomes more and more convincing, and in the ready picture we see the "whole" system as emergent. At some point, we have to decide the saturation level of the picture: then we "understand" what the picture is.

Individual concepts without connections are like loose pieces of a concept jig-saw puzzle; put together they receive their new meaning in a new emergent concept system. Yet, when we look at the picture we are vexedly aware of the boundaries of the pieces although we are satisfied in seeing the final picture as emerged. This is what the systems description will always be if we choose to examine things as systems: we try to reach the whole picture by saying that the whole is more than its parts but we still state simultaneously that the parts are there. This analogy is only a part-truth, because in practice we have not only one conceptual "jig saw puzzle" but several ones on top of and intersecting each other.

4.2 Concepts in Dictionaries and Encyclopaedias

Definitions of concepts in dictionary texts are described as "closed conceptual systems" because they usually are based on clear-cut categories[407]. These are definitions of the conventional usage of concepts/texts. Encyclopedic descriptions of concepts on the other hand, try to "cover everything" of the issue concerned. They can be regarded as relative conceptual definition structures (texts), and therefore, they are closer to "open conceptual systems" – even complex conceptual systems. This is because (good) encyclopedic contents deal with the problems and "fuzzy boundaries" of the issue definition taken up in the text. Here we have a clear link to systemic approach as fuzzy (conceptual) systems. In the following chapters, I present both dictionary and encyclopedic material on concepts.

4.3 Various Definitions of Concepts

Man's interest towards his thinking, his understanding, and his making sense of the world can be traced back along the texts and history of his philosophical and scientific development. Arguably, the most important "units", or "atoms" of abstraction representing what we perceive, are concepts. Along this track of philosophy and science many different definitions of concept have understandably appeared, each a little different from the other depending on

407 See 4.6.1 the Classical Category View.

the focus of interest. Concept formation is the basis of any scientific research purposed to come to the public use. Every science has a philosophical background, and, thus, also the need to formulate its concepts. The most famous old view comes from Aristotle himself, whose traces of concept thinking still echo very dominantly in the modern era in the so-called classical categorization view[408]. Here are some definitions of concept that reflect the different interests of concept definition. It is also enlightening to think how each of them relates to musical or musicological concepts. The classification titles are mine.

4.3.1 Concept in General Philosophy. Some "Common Sense" Definitions

In the common sense, concept is defined variously as an *abstract general conception*, a *notion*, a *universal*[409], an *abstract or general idea inferred or derived from specific instances*[410]. These definitions do not relate much to music or musicological phenomena and are rather useless with no connection to structure, language, terminology, or culture. A better source is *The Dictionary Thesaurus*[411], which defines concepts as *something formed in the mind; a thought or notion*, *synonymous with idea*. It is also *a scheme*, *a plan*. The latter definition gives some examples and expands semantically the meaning toward planning, development and creativity. Scheme and plan also refer to a cognitive and constructivistic interpretation. The definition could be applied to music in the musicological[412] sense (composition, score, form etc. This viewpoint is very much inductive resulting in a "theory" derived from the instances, and the theory is then used deductively to prescribe further instances.

Going deeper into the specific scientific areas we find somewhat similar, and somewhat different definitions of concepts, each depending on the focus of the research interest. When reading these definitions independently, one gets easily confused about the similarity of definition, yet of different purpose of definition. For example, "concepts are inventions of human mind used to construct a model of the world (Sowa)"[413], "…we organize our knowledge by means of structures called idealized cognitive models, ot ICMs…category structures and prototype effects are by-products of that organization (Lakoff)"[414]. In these two statements, the idea of model is treated semantically differently. One describes concepts, the other describes a larger knowledge-organising unit. And elsewhere, "concepts are internal representations of

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408 See 4.3.3 Concepts – Knowledge – Epistemeology. A Cybernetic view.

409 *Webster's Revised Universal Unabridged Dictionary* (1996) (web1913). http://www.dictionary.com/cgi-bin/dict.pl?term=concept (26.08.2001).

410 *WordNet ® 1.6, © 1997 Princeton University*. http://www.dictionary.com/cgi-bin/dict.pl? term=concept (26.08.2001).

411 *The American Heritage® Dictionary of the English Language*, Third Edition Copyright © 1996, 1992 by Houghton Mifflin Company. http://ww.dictionary.com/cgi-bin/dict.pl?term=concept (26.08.2001).

412 Musicological-conceptual sense.

413 Sowa 1983: 344, in Nuopponen, p. 52.

414 Lakoff 1987: 68.

external reality"[415], or "concepts in objectivist cognition are mental representations of categories and objects in the world"[416]. Whatever the wording, common at least with most of them are the factors of structuring, modelling, scheming, planning, categorization, of representation (substitution), reference, description, of symbolic value to knowledge, experience, perception, and so on that have to do with the mind; and of course, these are used for communication through some means, usually language.

4.3.2 Concept in Cybernetics

The Web Dictionary of Cybernetics and Systems in *Principia Cybernetica Web* defines concept in the following way:

> "Concept. A word or phrase used in propositions purporting to describe real world relationships. Concepts are neither true nor false, only more or less useful (Umpleby). The cognitive meaning of a term and the smallest unit of (conscious) thought processes. Concepts are neither true nor false but more or less applicable (a) to recognize an object as an instance of the concept, (see recognition) (b) to produce or to understand sentences in which the concept is expressed and (c) to develop constructs or cognitive systems using the concept in question. Regarding (a) concepts provide decision rules for determining class membership rather than extensional membership lists. E.g. the concept "TV commercial" specifies certain defining features which when present identifies a sequence of TV images as an instant of the concept without prior knowledge of its class membership (see connotation). (Krippendorff)"[417]

This definition sounds technical and refers to a structured and constructed[418], somewhat static concept system. It is connected only to language (words, phrases). Concept represents class[419] membership, and it is treated as a unit and therefore, it can be categorized and used for mathematical probability calculations[420]. The notion of a concept being "neither true or false" refers to fuzzy systems of concepts[421]. Lakoff calls these graded categories with fuzzy boundaries[422]. It also refers (even distantly) to the Saussurean concept of sign. This definition also has certain connections with terminology science, which usually treats concepts as a tool for categorising synchronic purposes in communication[423].

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415 Lakoff 1987: 137.
416 Lakoff 1987: 165.
417 *WDCS. Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ASC/CONCEPT.html (26.08.2001).
418 Associating with structuralism and constructivism.
419 For definition of class, see e.g. Nuopponen 1994: 62.
420 In mathematical logics, fuzzy sets, etc.
421 Rocha 1997. http://www.c3lanl.gov/~rocha/es_contx.html (04.09.2000).
422 Lakoff 1987: 287-288.
423 See 4.4.10; 4.4.11.

4.3.3 Concepts – Knowledge – Epistemology. A Cybernetic View

If we accept the definition of concept as being a unit of knowledge or something that is knowledge, we come again to the issue of epistemology. The complex systemic nature of concept cannot be understood without knowing the various philosophical foundations of knowledge. F. Heylighen[424] gives a concise but comprehensive introduction to the epistemology of knowledge, which relates to the question of knowledge. I quote it here in an essential part.

> "Epistemology is the branch of philosophy that studies knowledge. It attempts to answer the basic question: what distinguishes true (adequate) knowledge from false (inadequate) knowledge… When we look at the history of epistemology, we can discern a clear trend, in spite of the confusion of many seemingly contradictory positions. The first theories of knowledge stressed its absolute, permanent character, whereas the later theories put the emphasis on its relativity or situation-dependence, its continuous development or evolution, and its active interference with the world and its subjects and objects. The whole trend moves from a static, passive view of knowledge towards a more and more adaptive and active one…
>
> **[Ideas or Forms]**
>
> …In Plato's view knowledge is merely an awareness of absolute, universal *Ideas or Forms*, existing independent of any subject trying to apprehend to them. Though Aristotle puts more emphasis on logical and empirical methods for gathering knowledge, he still accepts the view that such knowledge is an apprehension of necessary and universal principles. Following the Renaissance, two main epistemological positions dominated philosophy: *empiricism*, which sees knowledge as the product of sensory perception, and *rationalism*, which sees it as the product of rational reflection.
>
> **[Reflection-Correspondence Theory]**
>
> The implementation of empiricism in the newly developed experimental sciences led to a view of knowledge, which is still explicitly or implicitly held by, many people nowadays: the *reflection-correspondence theory*. According to this view, knowledge results from a kind of mapping or a reflection of external objects, through our sensory organs, possibly aided by different observation instruments, to our brain or mind…
>
> **[Categories of Kant]**
>
> The following important theory developed in that period is the *Kantian synthesis* of rationalism and empiricism. According to Kant, knowledge results from the organization of perceptual data on the basis of inborn cognitive structures, which he calls "categories". Categories include space, time, objects and causality…
>
> **[Pragmatism]**
>
> The next stage of development of epistemology may be called *pragmatic*. Parts of it can be found in early twentieth century approaches, such as logical positivism, conventionalism, and the "Copenhagen interpretation" of quantum mechanics. This philosophy still dominates most present work in cognitive science and artificial intelligence. According to pragmatic epistemology, knowledge consists of models that attempt to represent the environment in such a way as to maximally simplify problem solving. It is assumed that no model can ever hope to capture all relevant information, and even if such a complete model would exist, it would be too complicated to use in any practical way. Therefore, we must accept the parallel existence of different models, even though they may seem contradictory. The model, which is to be chosen, depends on the problems that are to be solved. The basic criterion is that the model should produce correct (or approximate) predictions (which may be tested) or problem-solutions, and be as simple as possible. Further questions about the "Ding an Sich" or ultimate reality behind the model are meaningless…

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424 *Epistemology*, *introduction*. *Principia Cybernetica Web* 1993. http://pespmc1.vub.ac.be/EPISTEMI.html (07.10.2000).

[Constructivism]
…A more radical point of departure is offered by *constructivism*. It assumes that all knowledge is built up from scratch by the subject of knowledge. There are no 'givens', neither objective empirical data or facts, nor inborn categories or cognitive structures. The idea of a correspondence or reflection of external reality is rejected. Because of this lacking connection between models and the things they represent, the danger with constructivism is that it may lead to relativism, to the idea that any model constructed by a subject is as good as any other and that there is no way to distinguish adequate or 'true' knowledge from inadequate or 'false' knowledge…
[Individual and Social Constructivism]
We can distinguish two approaches trying to avoid such an 'absolute relativism'. The first may be called *individual constructivism*…The second, to be called *social constructivism*, sees consensus between different subjects as the ultimate criterion to judge knowledge. 'Truth' or 'reality' will be accorded only to those constructions on which most people of a social group agree… Though these constructivistic approaches put much more emphasis on the changing and relative character of knowledge, they are still absolutist in the primacy they give to either social consensus or internal coherence, and their description of construction processes is quite vague and incomplete…
[Evolutionary View and Memetics]
A most recent, and perhaps most radical approach, extends this evolutionary view in order to make knowledge actively pursue goals of its own. This approach, which as yet has not had the time to develop a proper epistemology, may be called *memetics*. It notes that knowledge can be transmitted from one subject to another, and thereby loses its dependence on any single individual. A piece of knowledge that can be transmitted or replicated in such a way is called a '*meme*'. The death of an individual carrying a certain meme now no longer implies the elimination of that piece of knowledge, as evolutionary epistemology would assume. As long as a meme spreads more quickly to new carriers, than that its carriers die, the meme will proliferate, even though the knowledge it induces in any individual carrier may be wholly inadequate and even dangerous to survival… Like social constructivism, memetics attracts the attention to communication and social processes in the development of knowledge, but instead of seeing knowledge as constructed by the social system, it rather sees social systems as constructed by knowledge processes… From a constructivistic approach, where knowledge is constructed by individuals or society, we have moved to a memetic approach, which sees society and even individuality as by-products constructed by an ongoing evolution of independent fragments of knowledge competing for domination.

We have come very far indeed from Plato's immutable and absolute Ideas, residing in an abstract realm far from concrete objects or subjects, or from the naive realism of the reflection-correspondence theory, where knowledge is merely an image of external objects and their relations…"

From the above it becomes clear that various scientific schools and paradigms have had and still have their reasons to treat concepts in certain ways. The special merit of this cybernetic description is that it simultaneously sums up the nature of knowledge and that of concept. At this point I do not wish to comment on the deep impact these views have on the explanation of musicological concepts and their use. It can be only stated that most traditional musicological conceptuality seem to follow the lines of empirism, rationalism, reflection-correspondence theory, Kantian a priori categories, and pragmatism. I also suggest that most of the modern semiotic explanations (also of music) are systems-wise related to constructivism[425], even to memetics, inasmuch as

[425] Either individual, or social, see Chandler, Modality and Representation: ""Modality refers to the reality status accorded to or claimed by a sign, text or genre….(Modality). http://www.aber.ac.uk/media/Documents/S4B/sem-gloss.html #M (30.08.2001).

semiotic explanations are taken a reflection of the "semiotic behavior" of individuals and society[426]. The older structuralistic music semiotics is perhaps most closely related to pragmatism.

4.4 Concepts in Terminology Science Relating to Musicological Concepts

The conceptual world of musicology[427] is represented dominantly through normative terms and language. Notation, analytical signs and diagrams are also always commented and communicated linguistically. Therefore, language and terms have a dominant place in musicological conceptualization.

I shall use selected parts and follow mainly the logic of Nuopponen's *Begreppssystem för terminologisk analys* (1994) in presenting the issues on concepts and related matters of the terminology theory. I shall also comment on how terminological scientific viewpoints relate to musicology[428], music, and systemicity. I do not go into the details of Wüster's theory behind terminology theory. Its salient points will be dealt with in the rest of the text. Neither do I go into the interesting question of *term* dealt with by Karihalme, but shall consider it as an instrument of communication as it functions in reality. Briefly, according to Karihalme[429], *a term is a kind of concept cluster including concept intension, linguistical convention and also the pragmatic and semantic features of its use.*

4.4.1 Nature of Concept as Concept in the Terminology Theory

Different linguistic styles to define concepts exist in terminology theory. According to Sowa[430], "concepts are inventions of the human mind used to construct a model of the world." Concepts "package reality into discrete units for further processing, they support powerful mechanisms for doing logic, and they are indispensable for precise, extended chains of reasoning"[431]. Sowa stresses that "concepts and precepts cannot form a perfect model of the world – they are abstractions that select features that are important for one purpose but they ignore details and complexities that may be just as important for some other purpose."[432] This notion is very important because here again the

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426 Chandler. *Semiotics for Beginners.* Interpretative community. http://www.aber.ac.uk/ media/ Documents/S4B/sem-gloss.html# interpretative_ community (30.08. 2001).
427 Applied and study course musicology.
428 Mainly at the level of study course musicology, also partly at the level of applied musicology.
429 Karihalme 1996: 135.
430 Sowa 1983: 344, in Nuopponen 1994, p. 52.
431 Ibid.
432 Ibid.

difference of the ontic and ontological reality is hinted at. Concepts are abstractions; they serve certain conceptual purposes but do not necessarily cover some other ones.

Sowa's definition of concept is very compact, but it covers many matters. Much is said in a few lines. The striking thing is that if we leave out the word *concept* and replace it with the word *system*, there is no practical difference of meaning. Thus, to me, *concept is clearly a system and a system is a concept*. In her definition, Nuopponen, who uses Sowa as one of her authorities, does not mention other possible terminological variants of concept, such as *notion*, *universal*, *general idea*, *scheme*, *construct*, *plan*, *a thought*, which appear in other sources.

Sowa's text (a selection of the verbs it uses) sounds happily technical like an explanation of a factory at work: "construct, model, package into discrete units, processing, powerful mechanisms, logic, precise, extended chains (of reasoning), abstractions, select, features, details, complexities..."

Tekniikan Sanastokeskus r.y. , Finland[433], which represents terminology science, defines concept in a different and "softer" way using words such as "concept is a mental picture corresponding to a certain object or object group", structuring knowledge is typical to the thinking of man, be is conscious or unconscious, "concepts are considered to exist only in the world of thinking", in communication "they are referred to by linguistic expressions, e.g. by terms…"

An important fact in these definitions is that in some cases concepts can be language-bound, in others not necessarily. However, different cultures and societies lead to differences in categorization[434].

Whatever the issue, concepts in terminology science concepts understandably need to do the job of structuring or making logic. Thus, concepts must have more or less clear boundaries referred to by concept characteristics such as *construct*, *model*, *package into discrete units*, *logic*, *precise*, *extended chains of reasoning*, *abstractions*, *select*, *details*, *complexities*. For dynamic and complex systemic (heuristic and hermeneutic) purposes the definitions of concept by terminology science are too narrow. They are a good starting point to other definitions.

The advantage of terminology science is that it admits the relativity of concepts. Accordingly, concepts have variants; they are conceptual tools of different sizes and functions. Applied to musicology[435]: one form of a concept as term is an "axe" (tonality; atonality), another a "knife" (modal tone systems; *dastgah* system in Persian music). With an axe, we separate bigger chunks; with a knife, we sort out finer details.

The definition by the *Tekniikan Sanastokeskus* is very useful for our purposes because it also refers to individual concepts. The idea of *object group*, to which a concept refers, links with feature theories of categorization such as Rosch's prototype theory[436]. The definition also admits the role of conscious

433 *Toimikunnista termitalkoisiin* 1999: 174.
434 See the *ISO/FDIS 1087-1:2000*. 3.2.1, Note.
435 Musicological conceptualization.
436 See 4.6.4.

creative concept formation (organising knowledge, as is the case in language, sciences, arts etc.) as well as the role of involuntary concepts (feelings etc.). Organising knowledge in a wide sense refers to constructivism[437]. Concepts that have no standard linguistic expression refer to individual concept formation and the are expressed in language through appellations[438].

4.4.2 Concept – Referent Relation in the Terminology Theory. Referent and Object

According to terminology science[439], anything to which a concept refers out of a universe of items, is a *referent*, which is a single *object* or *set of objects* (object group). A referent can be real or illusory (ghost), material (pencil, hammer) or abstract (beauty), imaginary (unicom), immaterial (conversion ratio, a project plan, property, action, dimension). There seems to be some vacillation in terminology science over which term to apply[440] – referent (which is also used in semiotics), or object.

Applied to musicological concepts: the concepts of music theory and analysis refer, through related terms and texts, to those phenomena and *configurations* (referents, or objects) which exist as abstract entities (inner hearing), or/and as acoustically materialized music, or/and as structural elements examined through related concepts. In semiotic words: a theoretical-analytical verbalized concept of music, such as 'A major chord', is a *signifier* which refers either to a mentally experienced referent (*signified*/Saussure; *interpretant*, or *representamen*/Peirce; *sense*/Nöth), to an acoustically materialized A major chord, or to its graphic note, or to a letter symbol, or because of unlimited semiosis to other signs, or referents/Nöth[441].

4.4.3 Concept Characteristics

Concept characteristics are necessary in describing, forming and examining concepts. They are either abstractions (thinking units) of the properties of objects or referents[442]. Applied to musicology[443]: for example, the characteristic 'cross-section of structure, or texture of music' is a characteristic of texture/*satz*. 'Pitch', 'duration', timbre', 'loudness', etc. are characteristic features of a tone. 'Sound vibration' is one of the characteristics of pitch. 'Periodicality in time' is a characteristic of rhythm, etc. Definition of a concept is a descriptive statement

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437 See 4.3.3.
438 See 2.3; 4.4.6.
439 *Toimikunnista termitalkoisiin* 1999: 174-175; Dahlberg 1978 in Nuopponen 1994: 54; The *ISO/FDIS 1087-1:2000*: 3.1 Language and reality. 3.1.1 object.
440 *Toimikunnista termitalkoisiin* 1999: 174-175.
441 In Chandler. *Semiotics for Beginners*.Signs. http://www.aber.ac.uk/media/Documents/S4B/sem02.html (25.07.2000).
442 *Toimikunnista termitalkoisiin* 1999: 175; The *ISO/FDIS 1087-1:2000*: 3.2.4.
443 Applied and study course musicology.

utilizing the essentials of these characteristics[444]. It is also called the *intension* of a concept[445]. According to the terminology theory[446], concept characteristics can further be divided into *types of characteristics*, *essential characteristics*, and *delimiting characteristics*. I do not go into these details here. Personally, I find it at first difficult to make a conceptual difference between the concept characteristics and the definition of a certain concept because we are not accustomed "to strain our brain" this way in musicology[447]. This kind of mental exercise is, however, absolutely necessary in order to understand something of the semantic borders of concepts.

4.4.4 Individual Concept – General Concept

Concepts can be *individual concepts* – referring to a singular unique object such as the Eiffel tower or the winter war (between finland and the USSR), or *general concepts* – referring to two or more objects with common properties[448]. According to Nuopponen[449], the distinction between individual and general concepts is not unambiguous and terminology theoreticians argue about the difference of these concepts. I think that the matter is related to the question of the difference between concept *intension* and concept *extension*, which, to my mind, is actually directly related to the question of systemic complexity(i.e. the definition of music = intension is impossible if we accept anything as music = extension, which means that complexity approaches entropy)[450]. I shall not comment on the matter here. In practical terminology work, and as Nuopponen states, the distinction can be made. Semiotics, too, explains in great detail the problematics of general concepts (signs and texts) through concepts of transparency, reification, naturalization, dominant and broadcast codes, narrowcast codes, overcoding, preferred meaning, closed texts, etc.[451]

Applied to musicology: an individual musical work (Debussy's *La mer*), or its part, or a musical performance (Elvis Presley, *Jailhouse rock*) is always a singular and unique referent. The compositional identity motive (e.g. Sibelius-motive, Grieg-motive, etc.) of a composition can be considered as an original individual concept. Several traditional concepts of music theory and analysis have originally been individual concepts (Landini-cadence, Corelli-dissonance, and Alberti-bass).

Similarly, the concept of 'music' may be taken, and is usually taken as a very wide general concept, but from the viewpoint of semiotics, or the

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444 See 4.4.6.
445 See 4.4.5.
446 The *ISO/FDIS 1087-1:2000*: 3.2.5; 3.2.6; 3.2.7.
447 Musicological conceptualization.
448 *Toimikunnista termitalkoisiin* 1999: 175; The *ISO/FDIS 1087-1:2000*, 3.2.2; 3.2.3. Concerning general concept see also this research: Concept Field 4.3.9.
449 Nuopponen 1994: 58-59.
450 See 5.6.
451 See Chandler. *Semiotics for Beginners*. Sign. Text. http://www.aber.ac.uk/media/Documents/S4B/sem-gloss.html (30.08.2001).

prototype theory, 'music' should be understood as a concept field[452]. This is due to the problems of the definition of music. The wide and long use of the term 'music' has caused an apriori intension[453], according to which, certain species and manifestations of music are considered as actual music[454]. Narrower general concepts are, for example, the parameters under research here such as texture/satz, tone system, rhythm, and form. With them the problematics of concept intension and extension also appear.

4.4.5 Concept Intension – Concept Extension

In terminology science, *concept intension* means all the characteristics that make up the concept, and *concept extension* means all the objects to which a concept refers[455]. As stated before (4.3.4), the question of intension and extension is not unproblematic. According to Nuopponen[456], these terms are also used in logic and semantics. I prefer stressing that these fields also have a direct bridge with semiotics and systemicity. The linguistic and terminological use of intension and extension somewhat differ[457]. In terminology, the starting point is concept, and intension – extension concerns concept. In linguistics, these are bound to linguistic expression, which varies between and inside cultures. This would mean that when and if a linguistic expression exists in a certain language use (but not in another) then its intension/extension is based on the words, terms, and appellations existing in that language culture. In semantics (and semiotics), the same phenomenon is called connotation and denotation[458]. Semiotic, semantic, linguistic and terminological reasons explain why, for example, the concept of music is understood in different ways by different cultures and peoples, (by different interpretative communities), or why the concept of rhythm mode (Indian music, Turkish music), or raga, is commonly so difficult to understand by Westerners.

To sum up: the terminological scientific starting point of concept is more abstract than that of linguistics, and it will serve my interest in abstract systemicity.

4.4.6 Definition, Appellation, Term, Designation, and Subject Field

Concepts can be defined[459]or designated[460]. *Definition* means a verbal description or a statement of a concept delineating those objects that belong to a

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452 Unstructured set of thematically related concepts, see 4.4.9.
453 See concept intension 4.4.5.
454 See concept extension 4.4.5.
455 See *Toimikunnista termitalkoisiin* 1999: 176; The *ISO/FDIS 1087-1:2000*: 3.2.8; 3.2.9. See also 4.4.7.
456 Nuopponen 1994: 62.
457 Ibid.
458 Ibid.
459 *Toimikunnista termitalkoisiin* 1999: 179; The *ISO/FDIS 1087-1:2000*: 3.3.

certain concept extension. In this sense, it becomes understandable that the concept of music is nearly impossible to define because so many various 'music objects ' are accepted into the subject field of music; its extension is very wide. A certain definition, or description, serves to differentiate one concept from other related concepts.

Designations work through designators that represent concepts by signs such as names, words and symbols. *Appellations*[461] represent individual concepts; *terms* represent general concepts in a specific subject field. *A subject field*[462] is a "domain, field of special knowledge…the borderlines of a subject field are defined from a purpose-related point of view."

In a broad sense music and musicology[463] are subject fields that can be divided into smaller subject fields, such as folk music, Italian Baroque music, ethnomusicology, swing, serialism, Gamelan, etc. This purpose-related point of view serves the closed systems categorization, which in turn serves normative communicative purposes. Therefore, a great part of the general terminology is often subject-field bound.

The handout *ISO/FDIS 1087 – 1:2000* and the book *Toimikunnista termitalkoisiin* give two types of definitions: intensional and extensional definitions relating to the intension and extension of concepts[464]. As to various types of terms, the former source gives, under the title of designation (3.4), a variety of designations to which I give some examples from musicological terminology: **simple term** (in music: chord, texture, drone, raga, *maqam*); **complex term** (polyphony, stile antico, *jawabi sangat*); **borrowed term** (allegro, faux bourdon, exposition, development, swing, blues); **neoterm** (*paluujakso* pro *kertausjakso* in Finnish terminology – my suggestion); **abbreviation** (riten., dim.); **acronym** (D.C. pro da capo); **initialism** (pp, sfz, Am), **clipped term** (continuo pro basso continuo); **blend; admitted term**; **preferred term**; **deprecated term; obsolete term** (*etuheiluri* by Heikki Klemetti for conductor of orchestra); **synonymy** (texture – *satz* /also quasi-synonyms: rebab – kemance; stile antico – Flemish school; learned style – imitation polyphony); **antonymy** (major – minor; tonality – atonality; free rhythm – steady rhythm/patterned rhythm); **equivalence** (*soinnutus* – harmonization; *muoto* – form; B major – si majeur – *H-duuri*); **mononymy** or **monosemy** (enharmony, C major, crochet, semibreve); **polysemy** or **homonymy** (sinfonia, sonata, stretto, madrigal, *maqam*, sequence).

In essence, musicological terminology abounds with borrowed terms and appellations originally from other subject fields that have become accepted reified metaphors or preferred terms in musicology. Such terms are *texture*, *form*, *rhythm*, *dynamics*, *major*, *minor*, *exposition*, *development*, *recapitulation*, *rap*, *punk*, *swing*, *rasa* (in Indian music), *augmented fifth*, *interval*, *rest*, etc. Many musicological concepts are universals having even similar or nearly similar

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460 See the *ISO/FDIS 1087:1-2000*: 3.4.
461 *Toimikunnista termitalkoisiin* 1999: 175; The ISO/FDIS 1087-1:2000: 3.4.2.
462 See the *ISO/FDIS 1087:1-2000*: 3.1.2.
463 Musicological conceptualization of the related music.
464 The *ISO/FDIS 1087 – 1:2000:* 3.2.8; 3.2.9; *Toimikunnista termitalkoisiin* 1999: 176.

conceptual definitions. For example, the concept of *modus* (mode) has conceptual equivalents in other cultures. Modus in the Western conceptuality (of music, of linguistics) means a rule, formula, class, law, and the like; so do the terms *dastgah* (in Persian music) and *maqam* (in Arabic music).

Musicology also abounds with symbols related to structural units and parts of music. Notation alone is a rich system with accepted symbols, part of which even "visually" relate to the phenomena they designate (crescendo – diminuendo agogic marks, tabulatura graphics, clavarscribo, cluster score markings, etc.)

Individual concepts such as Sibelius-triplet (E. Tawastsjerna: Sibelius' first symphony, first movement) receive in terminology the status of an appellation (designation of an individual concept). Admitted terms turn into preferred terms in long established use (sonata form by A.B. Marx).

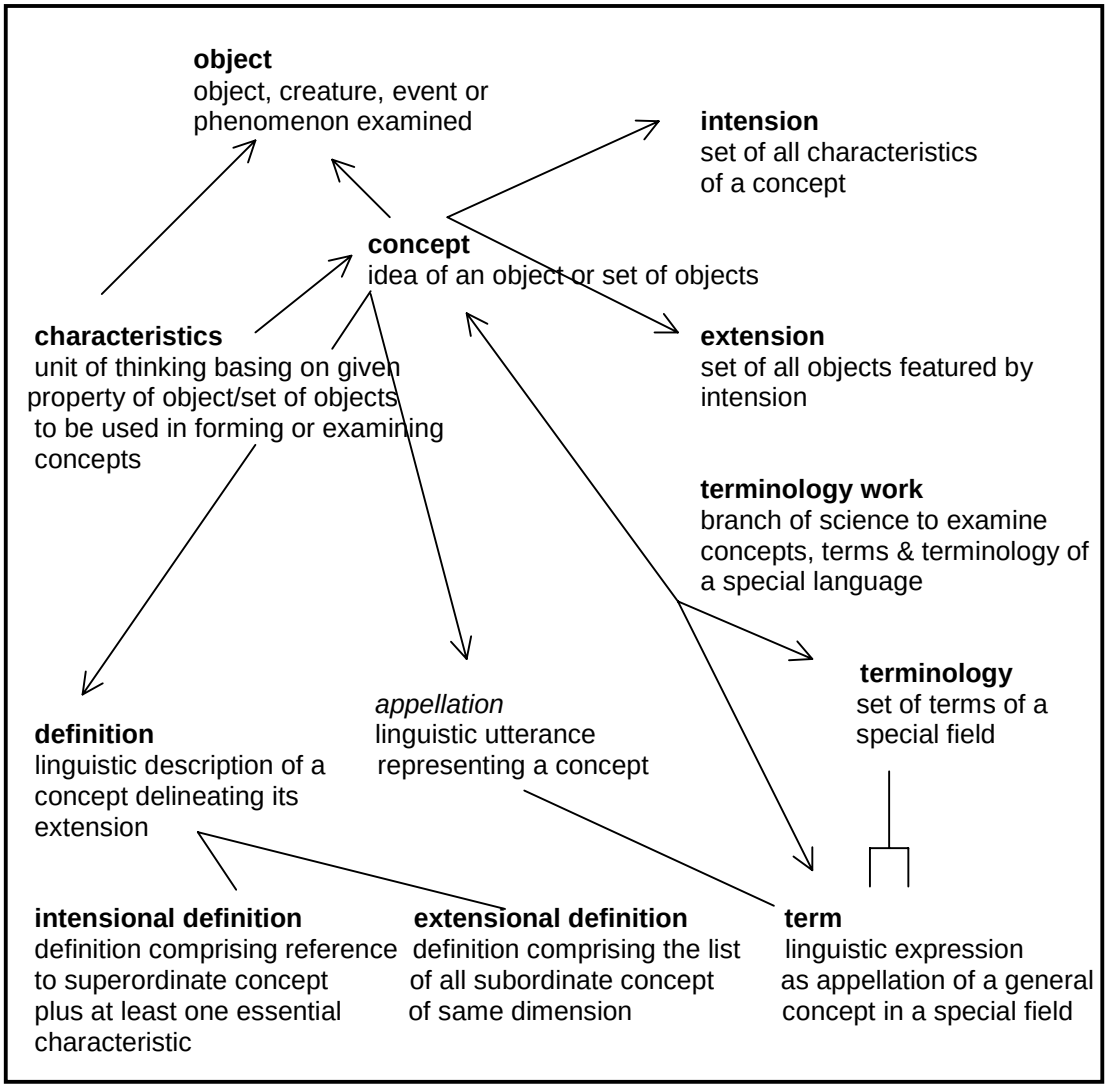
In professional music studies and musicological education (of music history, music analysis, music aesthetics, and music theory), it is very essential to pay attention to the types of terms, definitions, and designations. This kind of systemic approach increases greatly the understanding of musicological descriptions and readings.

4.4.7 Structural Systemic Diagram of Concept Relations

The following C*hart (9)* in the book *Toimikunnista termitalkoisiin* presents a structural systemic diagram of the main concept relations used in terminology science. In the chart one can see how the ontic reality (object, or referent) relates to the ontological concept describing it. A concept needs auxiliary concepts that define its semantic use: characteristics, intension, extension, definitions (intensional and extensional) and designations: appellation or term[465]. In musicology, terms are important to convey desired semantic contents. For how this can be used in understanding a concept system of a musicological concept – see 6.2.3: Systemic Approach to Texture/*Satz* – a Concept Relations diagram.

[465] See 4.4.1 – 4.4.6.

Chart 9



Explanation of graphics[466]:

generic/genus-species relation partitive/part-whole relation associative/pragmatic relation

Source: Picture 1. Associative Relations of Related *Concepts.Toimikunnista termitalkoisiin* 1999: 175.

466 Toimikunnista termitalkoisiin 1999: 179.

4.4.8 Concept Relations

We have already stated the vital difference of the ontic and ontological conceptual levels and their relationships defined by Nuopponen[467]. Commonly and in practise we understand and take the ontological conceptuality as ontic, although they are not the same. Nuopponen[468] also makes the difference between the macro concepts system and the micro concepts system, which also relate to the scope of a concept system.[469] The macro concepts system comprises all concepts of a given subject field (the concept of music is an example of a macro concepts system). It also comprises a large amount of micro level systems characterized usually by only one or a few types of concept relations. Therefore, in this level greater cohesion is possible. A macro system is more diffuse. According to Nuopponen, the terminology theory has described mainly solely micro concepts systems. Nuopponen's dissertation also concentrates on describing micro concepts systemic relationships.

Cybernetics and systems science makes differences between various hierarchical system levels: the metasystem, supersystem, and subsystem[470]. Terminology science makes a similar division (though omitting the metalevel) and gives the terms of *superordinate concepts* and *subordinate concepts*. In this context, I shall omit other types of concepts, and present the relationships of concepts as they appear in the *ISO/FDIS 1087 – 1:2000* with my examples relating to musicological concepts and terms. They are:

> *Hierarchical relation (generic, or partitive)*
> *Generic relation (genus-species relation):* e.g. tone system – major/minor system; exposition – theme; sound – noise/sound – tone; cyclic form – suite/ordre/liedkreis/sonata da camera/sonata da chiesa/German dance suite/concerto grosso, etc.
> *Partitive relation (part-whole relation)* e.g. scale – interval; *tala – chanchar;*
> Church modes – Dorian
> *Associative relation (pragmatic relation):* e.g. symphony – concert; symphony – form; raga – rasa; *vadi – samvadi – vivadi – anuvadi;* tonic – subdominant – dominant
> *Sequential relation (spatial or temporal proximity)*: recitativo – aria;
> prelude – fugue; *alap – jor*
> *Temporal relation (sequential, involving events in time)*: exposition – development – recapitulation (dynamic process of necessary incidents)
> *Causal relation (associative involving cause and effect)*: suspension and relaxation; dissonance – sonance; V7 – I

Terminology theoreticians, such as Wüster, Dahlberg and others, use partly different and more detailed terminology in concept relation description but I do not comment on it here[471]. In modern terminology science it is customary to

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467 See 1.6.5.
468 Nuopponen 1994: 51.
469 See 4.4.17.
470 See 5.4.9.
471 Nuopponen 1994: 67-121.

present concept relationships with the aid of visual graphics in form of trunk and branches[472].

4.4.9 Concept Field – Concept System

It is very necessary to make the difference between a *concept field* and *concept system*. A concept field is an "unstructured set of thematically related concepts" (that) may be used as a starting point for establishing concept systems[473]". I take this definition quite liberally and justify it as a starting point for abductive systemic thinking, where the material is first unstructured but interrelated thematically (as well as semantically) and needs the principle of intertextualism. Defining where the borders of a certain concept system lie in a concept field is a pragmatic question and depends on the use of the system at hand. In my research, the main musicological system themes are tone system, texture, rhythm, and form of music. For these I have tried to find examples and laws of coherent systemicity.

A concept system, according to the *ISO/FDIS 1087 – 1:2000*: 3.2.11, is a "system of concepts, set of concepts structured according to the relations among them." Thus, a concept system has the property of *connectedness* through different relations, and *differentiation* due to its various systemic parts. If there are many various relations and many kinds of systemic parts, the concept system is complex[474]; if there are many different concepts in the system but only very few connecting relations, the system is chaotic (high entropy[475]); if there are very similar parts with one type of connecting relationship, the concept system is very structured (negentropy[476]) – and trivial from the viewpoint of organic and real music. This is one reason why a real musician never plays scales in concerts (although students in music institutions are forced to do so in exams).

4.4.10 A Concept System as System in the Terminology Theory

Nuopponen[477] first comments on the overall use of systems in all scientific work and classification by referring to the existence of various systems thinking and to systems theory. The structuralistic thinking of Saussure of language as signs and their referents became the main basis for Wüster, the creator of the General Terminology Theory[478], who, as a technologist, studied the question of

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472 The *ISO/FDIS 1087-1:2000*: Annex A. See also Chart 14 of this dissertation, part of which is a concept trunk.
473 The *ISO/FDIS 1087 – 1:2000*: 3.2.10.
474 See 5.6.
475 See 5.4.3.
476 Ibid.
477 Nuopponen 1994: 25.
478 Nuopponen 1994: 26

systematization of special language use. The idea of language as a system is very basic for structuralism and for the traditional terminology science.

Nuopponen[479] takes the common standpoint as the basis for systems definition. A system is made up of *parts*; parts have certain *relations*, and all this forms a certain *structure*, order and organization. While categorising terminology, it is essential to pay attention to multifarious possibilities of concept relations; and this results in several types of concept systems; which is Nuopponen's main interest. For example, Wüster divides the concept system into *logical* and *ontologica*l concept relations. Nuopponen develops this idea further. Picht and Draskau[480] state that a system also needs a *design* that gives it a certain form. The users of concepts create this form. Another feature of a system is that its parts *co-operate* with each other. According to Saussure[481], language is a system in which all its parts can and must be examined synchronically dependable of each other. This system never changes totally, only parts of it. A change happens when new concepts come in and older ones are left out. This situation causes the need of redefining the content and relations of the new concept in its systemic surroundings, which may cause the need of redefining one or more older concepts in the system, as well as of finding neoterms. Nuopponen goes on to describe the existence of conceptual super and subsystems. She also makes an interesting statement[482], which also was my intuition from the very beginning of my research: "A concept is already a system as such…", although she does not go into the details of its study. Neither do I. Good answers to the nature of the concept system in the linguistic sense can be found in the field of semiotics, where we could study signs and texts as systems. So far I have not encountered this idea.

4.4.11 Systems Types in Terminology Science

Nuopponen[483] gives the division of systems types in terminology science as follows: a) *ontic* system, or system of objects – meaning objects of reality e.g. music and its systemic relations to, for example society, literature, other arts, etc., b) *concept* system – represented by symbols, language, graphics, etc., and c) *term* system – terms, linguistic expressions of special language terminology, e.g. musicological language and terminology. She uses this as a point of departure wishing to make a difference between the term level and its conceptual level as well as the object level and its conceptual level.

Terminology science makes a difference between *dynamic* (diachronic) and *static* (synchronic) *systems*[484], although the practical terminology work treats terms as a static synchronic system reflecting a certain cultural-social use of

479 Nuopponen 1994: 26-27.
480 In Nuopponen 1994: 27.
481 In Nuopponen 1994: 27.
482 Nuopponen 1994: 28.
483 Nuopponen 1994: 29.
484 Ibid.

terms – which is due to the practical needs of words and their meanings for information and knowledge gathering, as well as for educational purposes. Semiotically speaking, this attitude reflects the roles of *dominant* and *broadcast codes*[485] of language with their good and bad sides.

4.4.12 Possibilities of Systems Description as Semiotic Texts

According to Nuopponen[486], a system can be described and communicated by various methods: as *diagrams* (which I think represent complex systems of intergraphics[487], as well as interconceptualism-intertextualism[488]), *flow charts*, *graphics* and *matrixes*, or through *mathematical methods*, such as numbers, letters, or algorithmic formulas. Here we could add that the traditional Western music notation represents algorithms (notes, numbers and letters), tabulature represents diagrams (icons), and musical score is some kind of flow chart. A concept model can also be *verbal* (texts, intertexts) and *material* (e.g. sound, I would suggest), or based on computer techniques like digital models[489] used in information-theoretical music analysis. All these communicative forms and methods of conceptual systems description can be called *texts*, as is customary in semiotics.

Nuopponen states further that concept systems are abstract thinking models and man-constructed theoretical systems. They are thus *static*, forming the applicable conceptual apparatus that reflects existing knowledge at a given cultural time. New knowledge and new concepts change continually this system[490]. Because of the static synchronic view of language, terminology science and terminology work typically utilizes two-dimensional trunk-branch-type diagrams in order to sort out parts, details, and relations of concepts as systems. Another diagram model utilized by Nuopponen is the satellite-node model[491] resembling mind mapping, or classical taxonomic structures[492].

I agree with her notions concerning the practical use of language and special terminology as a static system. However, I think that in creative language use -which a pedagogical and educational classroom situation is – a narrowcast code is sometimes welcome, in order to make us aware of where the limitations of language lie concerning the conceptualization of music.

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485 Chandler. *Semiotics for Beginners*. http://www.aber.ac.uk/media/Documents/S4B/semiotic.html (25.07.2000).
486 Nuopponen 1994: 30.
487 See 4.7.2.
488 See Chapter 5.10.3.
489 Nuopponen 1994: 35.
490 Nuopponen 1994: 30.
491 For application in musicology, see 6.2.1. See also Haapasalo 2000: 54 on semantic presentations
492 Lakoff 1987: 287.

4.4.13 Concept Systems as Models

In addition to helping us to categorize concepts, concept systems[493] can be used to create *models*. This is my interest, because in systemic approach a model is a very necessary tool[494]. Models are, then, **creative** tools, not only some standard measures. Nyström[495], for example, considers models as necessary for organising, interpreting, and understanding complex reality in a simplified and systematized form. Models "transform data into information."[496]

Nuopponen[497] states something very basic on the philosophic nature of these models:

> "…concept systems, especially the ontological concept systems, aim at construing ontic, realistic, or thinkable systems, as well as relations and functions in them. Sowa (1983: 345) considers conceptual modelling problematic due to the fact that the world is a continuum, whereas concepts are discrete and discontinuous. Models always turn out to be indirect and approximations closing out characteristics, which are essential for other ends. Sowa (ibid.) concludes that a conceptual network can never be a perfect model of the world, it is only a usable approximation."

The above statement is very true. Ontological definitions are never ontic phenomena. In this light, music theory and analysis are, first, not music itself: they are only fragmented ontological conceptual representations of music. Secondly, as construed conceptual models, they are indirect approximations of real ontic music. True enough, they may act as conceptual models in constructing ontic musical pieces, as they do in academic and institutional music education, in standardized courses of composition, harmonization, arrangement, and so on.

4.4.14 Concepts in Educational Communication

Nuopponen thinks that scientific language should be used in communication in a consistent and logical way. It should be economic and exact. She stresses the importance of terminological definition term by term in each scientific work. ‚In musicological[498] education, as in music theory and music analysis, the terminology of structural parts of music[499] is usually consistent. In fact, most musicological terminology has been handed down as such through generations. Its normative terminology is very static indeed. The unfortunate point, however, is that it is too static, and mostly not explained. This kind of language use of musicology starts on the elementary level of music education and continues further to higher levels. Ultra-concise dictionaries of music

493 Nuopponen 1994: 34.
494 See 5.4.3
495 In Nuopponen 1994: 35.
496 Ibid.
497 Nuopponen 1994: 35-36.
498 Study course musicology.
499 Which in fact is a misleading concept; we should say rather structural parts of musicological concepts of music.

terminology á la Lepo Laurila, do not serve the deeper systemic understanding of musicological phenomena. Vollmer[500] divides the concept structures used in education into three levels: 1. *Professional scientific*; 2. *Educational and pedagogical*; and, 3. *Individual* concept structure level of a student. The first level is very complicated and challenging and can be considered as a narrowcast code from the viewpoint of a non-expert. It is not identical with the second one, the educational level (broadcast level), which instead is bound to the norms of a given interpretative community (in semiotic terms). The lowest level is the conceptual world of an individual student who forms his/her conceptuality and understanding based on the second level (dominant code). At this point, Nuopponen takes up the Saussurean division of the role of language: *langage*, *langue and parole*, which matches the division of Vollmer. An interestingly disturbing fact is that a student cannot change or challenge the dominant code used during his/her education. The student has to accept the language, terminology, and conceptual tools used by his teachers, and has to try to make them a part of his/her own concepts and vocabulary. This is the place where the basics of systems thinking should come to help both students and teachers alike. Musicological terminology and definitions should be explored and explained; they should be even challenged during the educational process. Like Nuopponen, I also wish to quote the following extraordinary passage by Ackoff[501], the systems theoretician:

> "Defining concepts is frequently treated by scientists as an annoying necessity to be completed as quickly and thoughtlessly as possible. A consequence of this disinclination to define is often research carried out like surgery performed with dull instruments. The surgeon has to work harder, the patient has to suffer more, and the changes for success are decreased.
>
> Like surgical instruments, definitions become dull with use and require frequent sharpening and, eventually replacement. Those I have offered here are not exceptions.
>
> Research can seldom be played with a single concept; a matched set is usually required. Matching different researches requires matching the sets of concepts used in them. A scientific field can arise only on the base of a system of concepts. Systems science is not an exception. Systems thinking, if anything, should be carried out systematically."

What more can be said? I feel that Ackoff's statement justifies my attempts to match different approaches to systemicity: cybernetics, systems science, semiotics, terminology science, information theory, etc.

4.4.15 Other Uses of Concept Systems in Terminology Science

Here are some other points that Nuopponen sees as possibilities for the use of concept systems with my comments relating musicology[502]:

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500 In Nuopponen 1994: 40.
501 In Nuopponen 1994: 37.
502 Mainly terminology of study course musicology and formal systemic applied musicology.

- *To utilize concept systems in various ways in scientific research*[503]*:* These include comparison of theories, structuring the research field, formulating concepts, formulating theories and methods, working with scientific data, and applying the research results. Nuopponen comments on and compares the use of concepts classification, taxonomy and typology which all represent some sort of concept systems, with more or less strict definitions.

- *To organize and dispose information through classification of terms thematically*[504]*:*

Archives and libraries use various types of thematic systematic classification (e.g. UKD) in order to facilitate conceptually related knowledge. In music, concepts and terminology related to certain musicological[505] structures and systems are often grouped thematically. This serves, among others the curricular interests of education. However, these kinds of curricula are old-fashioned and out-of-date, and serve mainly administrational assessment interests. In this research my starting point has been the thematic viewpoint, according to which I have selected certain suitable musicological concept fields, namely *tone systems, texture, rhythm and form*. These fields have a rich and a rather established terminology, which, on the one hand, is necessary in musicology but, on the other hand, also causes problems in forms of dominant code and preferred reading[506].

- *To organize words lexically*[507]

Terms, keywords, and definitions usually appear in dictionaries in an alphabetical order. When wanting to know something about a musicological concept, say about *tone,* the reader seeks out this word and reads the text. A good source should be encyclopedic, explaining "all" that is known about the subject. This, of course, is impossible because knowledge expands all the time from some point of a semantic conceptual field or system. Another solution is (see, e.g. *OIMTS*[508]) that the text gives semantically issue-related keywords to other articles for the use of the reader; and in order to get the whole picture of the matter, the reader should also read those articles. Unfortunately, concise dictionaries often miss this hypertextual systemic feature. There are also thesauri, like that of Roget with long lists of semantically related terms and keywords. Such lists form semantic conceptual systems (nodal, or satellite systems) that help a reader or a writer to get an overall picture of the issue[509]. *It, however, does not present the hierarchical structure of the concept system concerned*.

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503 Nuopponen1994: 31.
504 Nuopponen 1994: 41.
505 Musicological-conceptual.
506 Chandler. *Semiotics for Beginners*. http://www.aber.ac.uk/media/Documents/ S4B/ semiotic. html (25.07.2000).
507 Nuopponen 1994: 41-42.
508 *Otavan iso musiikkitietosanakirja. Volumes 1- 5.*
509 See an example at *Roget's Thesaurus* on the Internet 6.2.2.

- *To represent knowledge*[510]

According to Nuopponen[511], structured knowledge can be represented through systems in many ways, e.g. through *predicative logic*, *semantic field*, *semantic network*, *concept relations*, *concept net*, *scripts*, and *frames*[512]. In this research, I use scripts, or scenarios[513] that are small fictive stories, intended to illustrate realistic situations of systemic approach in pedagogical activity[514].

4.4.16 Concepts and Meaning: On Problemicity of Concept Extension and Intension. A Necessary Excursion

In addition to the use listed above, Nuopponen also gives the following example of the use of concepts:

- *To examine meanings: semantic field*

According to Nuopponen[515], the difference between the terminology theory and the semantic theory, in a simplified form, is that semantics examines the way words categorize the world, whereas terminology science examines how the world can be structured by aid of concepts, and how these concepts are called. A concept system has an equivalency with a *semantic field*. According to Baldinger[516], a concept system can sometimes be identical with a *semantic system*. The concept of 'semantic field' came into existence in the 1930s. According to the theory of that time, language divides reality into constraints, and for every constraint, there are a certain number of words that receive their meaning in relation to other words of the same constraint.

In these definitions, we encounter some interesting philosophical problems that I do not wish to complicate, but present them here in a simplified way.

I understand this in the following way: in terminology science, examining the world starts from examining concepts represented through readily existing terms. Thus, terms are the data to be studied; and the concepts behind (or "in") them need to be static in order to do their representative job: they must be somehow fixed, and they must be reliable in a coherent discourse. This all represents a "closed", or rather closed, stable structural concept system. The world in a certain discourse appears through terms and words of that discourse

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510 Nuopponen 1994: 47.
511 Nuopponen 1994: 48.
512 See also Papeegaj et al. 1986: 40, in Nuopponen 1994: 47.
513 "A scenario consists fundamentally of the following omtology: an initial state, a sequence of events, and a final state…a SOURCE-PATH-GOAL schema in the time domain…" Lakoff 1987: 285.
514 See 6.2.9.
515 Nuopponen 1994: 44.
516 In Nuopponen 1994: 44.

in a reliable way. *Thus*, *according to terminology science*, *music appears through musicological terminology*, *as reliable musicological concept models used in a discourse.*

In semantics, words and terms have meanings. A word, or a term as a special word, may have various meanings, in denotative and connotative ways. *Denotation* and *connotation* are terms used in linguistics, semantics, and semiotics. If and when various meanings are various concepts, then semantics categorize the world in a more complex and more open systemic way than terminology because certain meanings are not absolutely fixed with certain terms and words. Words and terms in a discourse may mean different things to different people. *Thus*, *in the view of semantics*, *musicological terminology*, *in a given discourse – let alone between different discourses – is not reliable in a certain way*. The variety of the world means variety of meaning interpretations. The more we find semantic meanings that categorize the world, the richer is our understanding of the world. The more we try to penetrate the semantic meaning layers of what have been defined as music through terms, the more we understand about music. *Note: the concept of musicology*[517] *and its tools*, *terms*, *etc. also become "hazier" and conceptually more ambiguous.*

The concepts of extension and intension relate closely to the question of semantics. Extension is not defined unambiguously in terminology science but I take the viewpoint offered by Nuopponen[518]. Thus, the extension of the concept of music covers all *existing music* (all "musical objects"), which means that all concepts relating to, or corresponding with all existing music covers all referents of musical objects. *Thus*, *music is a category class.*

Intension means all characteristics necessary to define a concept. Thus, the intension of the concept of music covers all the necessary characteristics of all existing and diverse music types gathered together.

Taken extremely logically, extension and intension lead to an interesting dilemma. It means that on one hand, music can be defined and on the other hand, if it is not defined, we cannot talk about music. I wonder what the aestheticians of the present music would like to say about this conclusion. How can we assume that all musical objects of the world can be included as music unless we know what music is; which means that we already know what *all* the conceptual characteristics of music are which, on the other hand we cannot know unless we know *all* music!

Behind this dilemma hides the "demon of deduction". Extension, as a concept, represents the Hempelian deductive starting point: all existing music, etc., means analogously á la Hempel: "all swans are white and big birds".

It seems that strictly speaking, in the light of non-linear dynamic systemicity, extension and intension do not exist! They are certainly practical tools for a structuralistic approach, and they represent one form of systemicity. But in the light of complexity, we can say that *they together* represent complexity and complex conceptual systemicity: namely, extension represents differentiation and intension represents connectedness[519]. If we say that all

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517 Applied and study course musicology.
518 Nuopponen 1994: 62-63; compare also the *ISO/FDIS 1087-1: 2000*: 3.2.8.
519 See differentiation and connectedness 5.6 onwards.

possible "musical phenomena" is music (without defining on what basis they are), this represents an extreme amount of differentiation (entropy). If we say that music must be this and that and that, etc., we create a bulk of strict rules of connectedness (negentropy). In a conscious communicative use of all concepts, both extension and intension are always present: the wish of terminological preciseness and categorization as well as the wish for semantic flexibility. This complex situation explains the fluctuation between the standard language and the professional language[520].

4.4.17 Scope of Concept System

Various *concept system* descriptions have been used throughout the history of man's conscious knowledge. Especially for philosophical reasons, the most ambitious concept systems have tried to embrace everything that man was supposed to conceptualize. In this respect, Nuopponen[521] refers to Francis Bacon's famous knowledge taxonomy. Also later researchers, e.g. Hallig & Wartburg in the 1960s, presented an all-purpose universal concept system of the universe and man with their relations. They intended this system for the research and presentation of general language[522]. Their system was, however, opposed by Baldinger[523] with reasonable argumentation: an objective, general, and absolutely valid hierarchical conceptual system simply is not possible. As for myself, I venture to present a universal concept system application in a form of analogy that I call the *cognisphere*, not in order to present a hierarchical conceptual-ontological replica of the reality, but to stimulate our understanding of conceptual complexity and the related factors. The factors in my presentation are not the universe and man with their relations but *truth(s)*, *language*, *understanding*, *knowledge*, *concepts*, *culture and communication*[524].

Terminology science, which has been traditionally developed mainly for limited professional purposes, has well served certain limited conceptual scopes. It, however, needs to open up towards a general and more complex systemicity. For her research purposes, Nuopponen[525] divides the scope of concept system into two types: macrosystems and microsystems. Wüster also uses similar division. A macrosystem includes all the concepts of a professional terminology field despite the types of relations between the concepts. A microsystem is made up of only one or a few term relation types. In cybernetics and systems sciences macro and microsystems equal with super and subsystems.

It seems that the educationists and pedagogues who have written books for teachers and students have, without conscious intention, been working as

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520 See also Nuopponen 1994: 46.
521 Nuopponen 1994: 48-49.
522 Ibid.
523 In Nuopponen 1994: 49.
524 See cognisphere 4.6.1; 4.6.2.
525 Nuopponen 1994: 51.

terminologists producing conceptual literary material that has served (hopefully without a conscious intention) the upkeep of limited, structuralistic and hierarchical concept systems.

4.5 Concept of Concepts in Semiotics

Understandably, I have to try to concentrate on the essentials of semiotics, which is a very vast field. Although semiotic texts do not seem to define the concept of concept as such, they must deal with the issue somehow because semiotics, among others, examines language usage, and language is thought to be the most important carrier of concepts. Besides the issue of sign, other concept-related issues in semiotics are *levels of abstraction*[526] and *marked and unmarked categories*, or binary semantic oppositions[527]. Semiotic reference to meaning (of sign) links it with semantics, which in turn is linked to the science of terminology. Altogether, the social-semiotic viewpoint of concept refers to the issues of representations of the reality through different ideologies (realism, idealism, constructivism), social behavior (experience, roles, purposes), perception psychology, etc., briefly: how signifiers are experienced as signifieds.

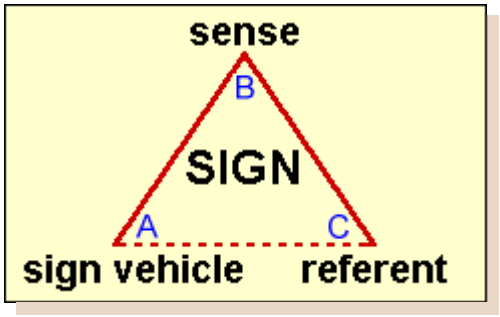
4.5.1 Sign – Concept Relationship. The Signified and Sense Equalling 'Concept'

In semiotics, concept (or conception) is linked most clearly with the idea of sign[528]. Sign, on the other hand, can be defined from various viewpoints out of which the Saussurean and the Peircean viewpoints are the most famous ones.

The dyadic structure of sign, according to Saussure, is made up of *signifier*, (the form taken by the sign) and *signified*, (the concept it represents, concept in the mind, notion of a thing – see Chandler's chart beside). Sign, according to Saussure, "is the whole that results from the association of the signifier with the signified"[529]. The relationship between the signifier and the signified is referred to as '*signification*', and this is represented in the Saussurean diagram by the arrows. The horizontal line marking the two elements of the sign is referred to as 'the bar'. For Saussure, in practise both signifier and signified are present in sign:

526 Chandler, *Semiotics for Beginners*. Modality and Representation. http://www.aber.ac.uk/ media/ Documents/S4B/semiotic.html (25.07.2000).
527 Ibid. Paradigmatic Analysis.
528 Also with *symbol* for Susan Langer, in Chandler, ibid.
529 Saussure 1983: 67; Saussure 1974: 67; in Chandler, ibid.

one presupposes the other; they are totally interdependent. They, however can be distinguished for analytical purposes[530]. According to Eco, Saussure's signified "has to do with the mental activity of anybody receiving a signifier…such ideas must be mental events that concern human mind." To Saussure, actual signs are man-made communicative tools such as "military signals, rules of etiquette, and visual alphabets".[531]



Peirce defines sign as a triad[532]: *representamen* (the form the sign takes), *interpretant* (not an interpreter but rather the *sense made of the sign*), and *object* (to which the sign refers). Peircean-variants, too, are triads: *sign vehicle*/the form of the sign – sense/*the sense* made of the sign – referent/what the sign stands for[533], or 'symbol', *'thought or reference'*, 'referent'[534] – see Chandler's chart beside. Somewhat similar triangles have also designed e.g. Odgen and Richards[535] as well as Frege, already in 1892.

The main differences between Saussurean and Peircean thinking, according to Chandler[536], is Peirce's idea of object or referent (material or abstract to which the sign refers), which in the strict Saussurean original thinking does not exist. For Saussure, a linguistic sign is wholly immaterial, although he did not define it as abstract. Representamen and signifier has similar meanings but signified and interpretant are partly different. For Peirce, interpretant is itself an experienced sign in the mind of the interpreter, which leads to an inner dialogue in his/her mind (mental activity, mental event of Eco?). According to Eco, Saussure's signified is somewhere between "a mental image, concept, and a psychological reality…"[537] To Peirce, besides the Saussurean view of possible signs, natural phenomena or human behavior act as possible signs. This is the aspect that Eco also supports.

The viewpoint of Saussure is perhaps unambiquous because of its structuralistic "clarity", whereas that of Peirce has been subjected to various speculations. For example, to Greenlee[538], whose "primary aim has been to advance understanding of the sign"[539], claims that "much of Perice's thought on signs is impenetrably obscure"[540]. Greenlee is also bothered about the function of representation or reference of sign: "whether all signs stand for objects"[541]. In

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530 See the graphics below, source: Chandler. *SB*. http://www.aber.ac.uk/media/Documents/ S4B /sem02.html (20.02.2002).
531 Eco 1979: 15.
532 Ibid.
533 Nöth 1990: 89, in Chandler, ibid.
534 Ogden & Richards 1923: 14, in Chandler ibid.
535 In Eco 1999: 59-60.
536 Ibid.
537 Eco 1979: 14-15.
538 Greenlee 1973. *Peirce's Concept of Sign*.
539 Greenlee 1973: 133.
540 Greenlee 1973: 5.
541 Greenlee 1973: 9.

Peirce's opinion (according to Greenlee), they do, in Greenlee's opinion they don't. To Peirce, a sign is "something, which always points away from itself"[542]. To Greenlee, pointing to or referring to is not always necessary. For him the concept of sign involves a concept of something plus its interpretation according to a rule or a convention, which are (as explained by Peirce and accepted by Greenlee) involved with habits[543]. This causes, according to Greenlee, that signs are symbolic. Symbolic feature again, as Greenlee states, is a sign function.

In my opinion, the problem of Greenlee's book is its argument that **definitions** (his or Perice's, or somebody else's, e.g. Eco's – I will come to that) **define what, how and why things are.** I do not agree with this. Sign is not what it is because of certain definitions. Greenlee criticizes Peirce for being obscure, or that when Peirce declares that signs stand for objects[544] it means that he conceptualizes about signs. The truth about the matter is not necessarily this way. The same criticism can be directed at Greenlee who states that signs do not stand for objects – this is also conceptualization about signs. Thus, Greenlee's opinion is no better than that of Peirce's. Greenlee's book is a link in the chain or net of unending semiosis on "the case of Peirce". I can add a link in this chain. My explanation on the concept of representation by Peirce is that he "plays with" onticity and ontology and hints at their intermingling with each other. He was a master of abductive thinking and was a much more complex thinker than Greenlee.

In his tentatively theoretical book *A theory of semiotics*, which dates back to the same period as the book of Greenlee, Eco offers other viewpoints of interpreting the aspects of sign. To Greenlee, signification that has symbolic value means sign function, whereas to Eco signification means communication. To Eco, "a sign is everything that can be taken as significantly substituting of something else"[545]. To him, in the semiotic sense, there is "no substantial difference between peanuts and peanuts butter and the words /peanuts/ and /peanut butter/."[546] I disagree with Eco. This idea of substitution is an illusion. In my opinion, a sign always represents a sign from the viewpoint of the addressee, and the addressee in a given communicative situation knows this and this all happens at conceptual level. Sign is an abstract conceptual entity and its proposed constituents – be they Saussurean or Peircean, by Eco, Greenlee, or any other – are also abstract conceptual entities. Thus, depending on the conceptual systemic scale level and degree of conceptual association or hierarchy, we can talk about sign-conceptuality, signifier-conceptuality, signified-concepuality, sense-conceptuality, sign vehicle-conceptuality, referent-conceptuality, and so on.

In my opinion, Eco's statement of something (/peanuts/) substituting something else (peanuts) means the intermingling of onticity with ontology,

542 Ibid.
543 Ibid.
544 Greenlee 1973: 51.
545 Eco 1979: 7.
546 Ibid.

because from the viewpoint of an addressee these two different things are semiotically the same thing. If we assume that there are signs, we must assume that there is semiotics. If semiotics is "in principle the discipline studying everything which can be used in order to lie"[547] then signs are tools for lying. Of course, everything what is conceptually formulated can be used for many purposes. To me, truth and lie are relative. If something is a lie then something must be true, as well. If a truth is relative then a lie is also relative. It seems that Eco's definition of semiotics makes semiotics, not a tool, but a conceptual deductive dictator. It sounds conceptual imperialism[548].

Peirce's idea of interpretant itself as being an experienced sign in the mind of the interpreter and as leading to an inner dialogue in his/her mind, as well as the idea of "unlimited semiosis" derived by Eco through Peirce[549], associates, for me, with the idea of *individual concepts* (of terminology science), whereas Saussure's idea of sign is based on structural linguistic premises of his time and associates with *general concepts* which are in an "objective" relation to other signs. However, Saussure did not offer a typology of signs, whereas Peirce did in a great detail. Thus, the Saussurean ideology reflects structuralistic systemicity with aim to objectivity, whereas that of Peirce represents complex and more dynamic systemicity. Peirce's ideas lead to Bakhtin's and Eco's interpretations of the social and ideological role of signs. Thus, the semiotic tradition has lead to 1. The structural oriented, synchronic "objective" systemicity, which is the present feature of terminology science, and to 2. The dynamic, non-linear systemicity, where individualism in concept forming by an observer is taken into account as represented by post-structural semiotics with its ideas of *codes*, *modality*, etc.

How do I understand all this in the light of systemicity? For me, concepts of 'somethings' exist in the minds of persons conceptualising. Their interpretations also happen in their minds. Various rules and conventions affecting the dimension of the signification also exist in the minds of persons conceptualising, so do habits causing the symbolic function of conceptualized signs. All this is systemic complex conceptualization at various scale levels. Greenlee only sorts out the concepts of Peirce in a new combination explaining what Peirce "really means, or might mean", by introducing new explanatory concepts and inventing new necessary concepts/terms by using analogy (see 5.9.4 Analogy as Tool of Enriching Systemicity Levels). Greenlee tries to bring more structuralistic conceptual rigour to the thinking of Peirce, which he thinks is too obscure (entropic?). This is just fine, but from my viewpoint, it is only a case of a conceptual system that is somewhat different from that of Peirce. For me, any definition of sign is a concept system of deductive categorical conceptualization (either the Peircean or Greenleeian way), the boundaries of which are fuzzy. To Greenlee, Peirce's "fuzzy" categories should be presented in two ways: factorial and hypostatic. This sounds like the prototype theory of

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547 Ibid.
548 See also 4.5.2, where I state that semiotics is suspicion.
549 Eco 1979: 15.

Rosch, which reminds us that around the concept core there are fuzzy concept borders.

As to Eco, he seems to stress the communicative aspect of sign (signification), and the ideological possibilities of semiotics[550]. Semiotics helps us to learn to see signs in "everything", and meaning behind. Taken to extreme, Eco's view is "sign-philosophy", "sign-ideology", or sign-ism" – if you like. Inspired by Eco I could give a jokeful definition. "semiotics is an ideology of meaning-ism in and through sign-ism." Anyway, whatever Greenlee, Peirce, Eco or whoever else state on sign it is only ontological definition, which is never absolute or final. The ontic sign escapes the ontological definitions of sign, and their boarders are fuzzy.

To sum up the idea of concept: in semiotics, it seems impossible to make a difference between the ideas of "concept in the mind" (Saussure); "sense made of the sign" (Peirce), "thought or reference" (Ogden & Richards), or "mental activity" and "mental event"(Eco). If we compare the following three sentences: 1. This is just inconceivable! 2. This does not make any sense! 3. What on earth is the meaning of this! – they are really synonymous in meaning. *Thus, I understand concept, notion, sense, Sinn[551], thought, and reference, to be as parts of either a dyadic or a triadic sign system. They are conceptual systemic variants of the concept of concept.* To make the system conceptually more complex, *a concept may also be a unit of thought, mental picture, mental construct, idea, and scheme or plan as defined by terminology science and cybernetics.* But, how to use these notions in musicology[552] is another issue. In practise it does not really help much if we name the C major chord – which sounds in somebody's mind – a concept, notion, sense, thought, reference, mental picture, or an idea. It would be even more ridiculous to name 'music' as a unit of knowledge, a unit of thought, an abstract general plan, etc. All these concept examples need larger conceptual definitions, at least at the verbal level.

4.5.2 Comparison of Terminology Science and Semiotics Relating to 'Concept'

In terminology science, concept, which is abstract, represents an object or referent that can be either material or abstract. As defined earlier, "such referents may be a single object, a set of objects considered as a unit, or a property, an action, a dimension, etc., or any combination of these."[553] Concept is "a unit of knowledge created by a unique combination of characteristics"[554].

In semiotics, sign (through an inseparable constituent whatever its term, see above) represents a concept (or a notion of a thing), but according to Saussure, a concept does not represent anything material. To Peirce and the

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550 Eco introduces the role of codes in his book.
551 See the triange of Frege, in Eco 1979: 60.
552 Conceptualization about music.
553 Dahlberg 1978; in Nuopponen 1994: 54.
554 The *ISO/FDIS 1087-1:2000*: 3.2.1.

Peirceans, concepts may also represent material entities. It is hard, for me, to decide whether terminology experts or semioticians have a better understanding of the idea of concept. Semioticians do not necessarily link the need of characteristics to the properties of concept as semanticians and terminology scientists do. For semioticians, a concept maybe have no special properties at all: "it just is", or it is "sense", "thought of reference", and the like – this viewpoint is not very useful. In this way they miss the idea of the semantic field that is needed in order "to place" a concept in a proper context, unless we take the idea of *intertextualism*[555] as identical with the idea of semantic field (of terminology science).

To be honest, I sense that for semioticians it is very necessary to go into the psychology of mind in order to justify and prove the existence of language and communication manifested through signs. They seem to need to prove that there really are concepts, notions, sense and thought, and that these are manifested in signs. By interpreting the social use of signs (for political ideology, e.g. Bakhtin; for lying, Eco[556]) they go back into the psychological mind. To put it a bit harshly: semiotics is suspicion about the nuances of linguistic and communicative styles. The focus, therefore, is language (in a broad sense, including pictures, sound etc.) and communication, and "worry about its use". The focus of terminology work and science is not so much to interpret psychologically the social nuances of signs but to develop tools to sort out language usage and to make "systemic sense of the linguistic mess".

My point is not to argue about which or whose definition of concept is more exact or closer to the truth. The question of concept is not an easy one from any theoretical viewpoint. Moreover, I argue, that no definition and nobody's definition is final and absolute[557]. The fact is that there are various overlapping and intersecting definitions and designations, which form a systemic complexity. We should welcome it. The more we bring about different individual viewpoints through linguistic-verbal appellations, on any matter, with various conceptual, semantic and intertextual connections, the more complex conceptual result we will get.

4.6 Cognition and Concept. Concepts as Categories in Feature Theories

Cybernetics, systems science, terminology science, and semiotics deal with the idea of concept in various ways (concepts as systems, as concept types and concept relationship types, as sense, or as thought). Cognitive perception psychology, linked with semantics and linguistics, reveals more of the human theoretical interest towards the issue. In this respect, the idea of conceptual-

555 See 1.7; 3.2; 5.10.2, etc.
556 Eco 1979: 7, also Chandler. *Semiotics for Beginners*. http://www.aber.ac.uk/ media/ Documents/ S4B /sem11.html (25.07.2000).
557 See 1.6.5.

cognitive categories has emerged, along with lists of various theoretical approaches.

One of the famous and rather recent sources is Lakoff's *Women, Fire and Dangerous Things* (1987). At the first reading, the book seem to be a bit confusing because of extreme repetition and variations of conceptual issues. At the closer reading, it appears to be a theoretical-philosophical treatise written in a form of an abductive study (although he mentions nothing of it) in which he presents an array of different theoretical views and results of various researches, interpreting, and matching them towards and in favour of his research philosophy: experientalism. After reaching a sufficient methodological, theoretical, and philosophical saturation (see Chapter 21, Overview of the book II), he applies it to selected case studies (book II). The most modern approach in category study that he supports is Rosch's prototype theory, which he wishes to set into the light Rosch herself has evidently intended it.

The merit of Lakoff's treatment of his research subject is to challenge the traditional approaches and present some new ones. He calls the traditional approach *objectivism*, which means that reason and conceptualization is abstract, mechanical, and disembodied. The world is considered as an objective construction independent of any organism. Symbols, e.g. words and mental representations correspond with the external world and are internal representations of external reality. Mind is a mirror of nature. Thinking is atomistic, and can be broken into "building blocks", and so on.

The conceptual tools of objectivism are categories that can designate things and beings, activities, and abstract things. Classical category view suits well to the needs of most objectivists. However, the objectivistic view cannot explain complex concepts or complex categories, therefore Lakoff offers a new contrastive view that he calls *experiential realism*, or *experientialism*. Experience, in a broad sense, means "actual or potential experiences of either individual organisms or communities of organisms – not merely perception, motor movement, etc. but especially the internal genetically acquired makeup of the organism and the nature of its interactions in both its physical and its social environment."[558] The main features of this view are that conceptual systems are grounded in body movements, perception, physical and social experiences, imaginative thinking, and so on. This means that categories are conceptual categories, not only symbolic tools. The role of imagination is accepted as reality, and concepts can be *metaphorical*, *metonymical*, or other *mental imagery*[559]. Thinking is not atomistic and made out of "building blocks" but it has gestalt properties.[560]

In my opinion, the division of Lakoff resembles to the division of semiotics into the structural (traditional Saussurean) and social (Peircean, Bakhtian, etc.) branches. I do not go into the various details of Lakoff's elaboration. It has clearly new theoretical insight along the abductive reasoning and at a closer

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558 Lakoff 1987: xi-xv.
559 See 5.9.
560 Ibid.

reading it reveals features of systemic thinking. I will refer to the ideas of Lakoff in more detail in the following passages.

There are, of course other category researchers besides Lakoff. I shall present here the most well known approaches but do not put them into any value order. They all defend their place from certain premises, and they have their own adherents. Compared with the concept definitions of the terminology theory and terminology science, the "old" classical category view as well as the later prototype theory, as it is understood (or misunderstood, as Lakoff states) most commonly, seem to represent most typically closed conceptual systems[561].

4.6.1 The Classical Category View

The *Classical view* dates back to Aristotle himself. According to Lakoff, who is a linguist[562], the classical view is an a priori assumption, "an unquestionable, definitional thruth" accepted during centuries and taken for granted as such. It did not even have a status of a theory until it was confirmed by Kant's categories combined to the ideologies of *rationalism* and *empiricism*[563]. It is closely connceted with *objectivism* as one of its forms and it is widely prevalent in the academic world of scientific objectivism[564], especially in the physical sciences.[565] Lakoff[566] sums up the features connected to the classical view in great detail. The main issue of his book is criticism of objectivism (objectivistic world, essentialism, classical categorization the doctrine of objective categories, the doctrine of natural kinds, objectivistic logic, objectivist cognition, objectivist concepts, objectivist rationality, objectivist knowledge, and so on). He also specifies various approaches to the concepts-world-reality relations by introducing different views of objectivism such as nativism and empiricism. I do not deal with them here.

In the light of this research, my interest target is concept. According to objectivist cognition, the world can be conceived as it is and mind and language of man can reflect it; "mind can represent external reality and be said to 'mirror' nature".[567] This is a very interesting feature of the classical view as it also links with semiotics. To me most of the semiotic description and speculation on the nature of sign[568] sounds very objectivist. Signs, which are abstract mental entities (or what ever somewhat similar), either stand for objects, represent them, point out from themselves (Peirce), or substitute something else (Eco). Lakoff writes about objectivist concepts: "concepts are symbols that (*a*) stand in a relation to other concepts in a conceptual system and (*b*) stand in

561 See also 4.3.3 Reflection-Correspondence Theory. Categories of Kant. Pragmatism.
562 Lakoff 1987: 6-7.
563 See 4.3.3.
564 Lakoff 1987: 176. See also its conncection to the hypothetico-deductive method and its criticism
565 Lakoff 1987: 586.
566 Lakoff 1987: 160-169.
567 Lakoff 1987: 163.
568 See 4.5.1.

correspondence to entities and categories in the real world (or possible worlds)."[569] "In general, concepts are elements of cognitive models. Many concepts, for example, are charaterized in terms of scenario ICMs [idealized cocgnitive models].!"[570]

Essential to the classical view is to delimit closed concept systems with well-identified features. It is contrary to other concept categories with different features. "The classical category has clear boundaries, which are defined by common properties."[571]

J. Bruner who studied categorization represents the classical view of concepts. To Bruner, our environment and the world around us is so complex and infinitely full of different things, objects, and impressions that it is impossible for our capacities to register them all and to respond to each of them in a unique way. In order solve this task man has to categorize; he has to find equivalence and similarities through classes and class membership[572]. Bruner was one of the modern researchers of classical view, who, according to E. Pritchard[573], was more interested in problem-solving questions than in studying people's use of concepts.

As I wish to make the comparision of the similarities between category research and terminology science I take here the tenants of the classical view. According to Jesse Prinz[574], the tenants of the classical view are (with my comments in Italics):

> (1) Concepts are Summary Representations. *This definition resembles very much the concept definition in terminology science.*
> (2) These summary representations are comprised of representations of features possessed by category members (sufficient amount of necessary features, says Zitzen[575]). *This sounds the same as concept characteristics in terminology science.*
> (3) The features are individually necessary and jointly sufficient for category membership (= defining features = essential features). *This is a deductive statement according to which, category is a closed structural conceptual system. Terminology and linguistics science uses the terms 'essential and delimiting characteristics'.*[576]

According to Zitzen[577], the classical categorization theory represents a structuralistic view, which proved to be useful in phonology and later in semantics using the so-called binary componential analysis of oppositional meanings. This method is considered equal with the complementary features of the world. Thus, structuralism also rises to a philosophical and paradigmatic level.

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569 Lakoff 1987: 163.
570 Lakoff 1987: 286.
571 Lakoff 1987: 16.
572 Bruner, Goodnow, & Austin, 1956 in Johnson 1999. http://www.psynt.iupui.edu/kjohnson/cognition/CONCEPTS/sld001-0019.htm (04.09.2000).
573 Pritchard 2000. http://www.uwinnipeg.ca/~epritch1/conceptsintro.html (21.08. 2000).
574 Printz, a) *The Philosophy of Cognitive Science.CONCEPTS 1: Against Definitions*. http://artsci.wustl.edu/~jprinz/cog26.htm (22.08.2000).
575 Zitzen. http://ang3-11phil-fak.uni-duesseldorf.de/~ang3LANA/Zitzen.html (22.08. 2000).
576 See also Lakoff 1987: e.g. 161-162; 171-172.
577 Ibid.

It is good to bring to mind the same idea of the binary opposition of antonymy in terminology science; as well as the concept of markedness – unmarkedness in semiotics[578].

The classical view is not unproblematic. Wittgenstein challenged it with his idea of family resemblance, and later Rosch developed what is called theprototype theory. According to Wittgenstein[579], "…category is not structured in terms of a set of necessary and sufficient features, but rather by 'a complicated network of similarities overlapping and criss-crossing: sometimes overall similarities, sometimes of detail'. In other words, the different members of a category are held together by a family resemblance structure, as Wittgenstein calls that phenomenon."

I would like to call such a fuzzy and indefinable structure a [*meaning cluster* – my neoterm] that is a complex conceptual system with sufficient amount of connectedness and differentiation.

4.6.2 The Classical Category View as Systemic Graphics/Systemic Approach. Closed Category System.

The diagram and summary below, *(Chart 10)* is my presentation of the classical view as systemic (inter) graphics basing on the text sources of Lakoff, Zitzen, Rocha, Medin & Schaffer (in Rocha[580]). Applied to concepts in musicology[581]: the traditional conceptual tools of the elementary, and even the professional music theory and analysis, represent typically closed category systems. Concepts that do not confirm with theoretical definitions are outside the descriptive concept system. They are also considered as "mistakes" in normative music pedagogy, such as sonata form analysis, row technique, thorough bass courses, major-minor-tonality, etc.

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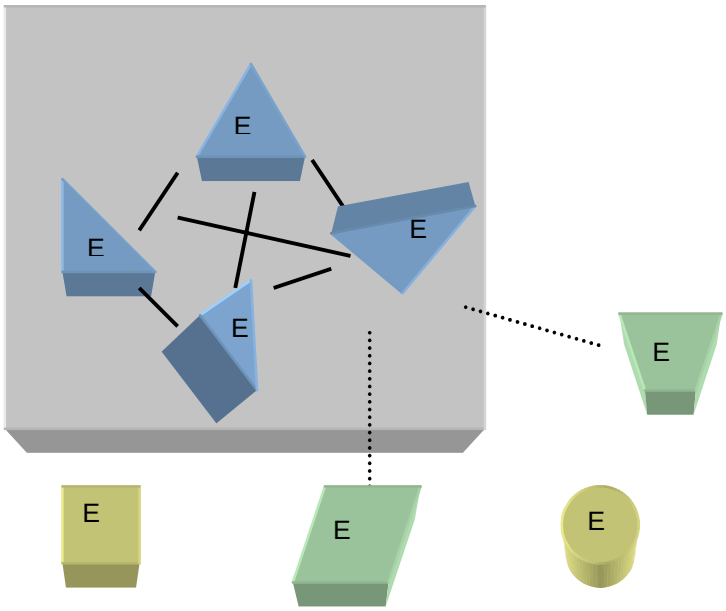
578 Chandler. *Semiotics for Beginners*. http://www.aber.ac.uk/media/Documents/S4B/sem-gloss. html#M (17.09.2000); see also Lakoff 1987: 59-61.

579 Zitzen. http://ang3-11-phil-fak.uni-duesseldorf.de/~ang3LANA/Zitzen.html (22.08. 2000).

580 See also 4.6.5.

581 Applied and study course musicology.

Chart 10



Summary definitions of closed category:
Sharp category edges/boundaries.
Elements have sufficient amount of necessary common properties/features.
Elements have also other different features among themselves.
All elements inside category are equal.
Elements are either in or out of category basing on componential analysis.
Explanation of symbols: E = category element. Square box delineate (closed) category boundaries/edges. Even lines mark cluster of category elements. Dotted lines show weak relations between elements not counted into the closed category and the element cluster inside category

4.6.3 Criticism of the Classical View

A great part of the text of Lakoff's *Women, Fire and Dangerous Things* is strong criticism against the classical view and objectivism, to which he gives ample of evidence. Similarly, according to Prinz[582], most, even ordinary concepts, do not fit into the explanation of the classical view, although some concepts do (bachelor, mother, square). He also states that other theories of concepts differ from the classical view in denying one or more of the before-mentioned three claims[583].

In my opinion, these theories represent more or less reflection-correspondence theories, or pragmatism[584]. Such theories are, for example, the *exemplar theory*, *imagism*, *the theory theory*, and *the prototype theory*.

According to the exemplar theory/approach, "concepts are comprised by representations of particular category instances…concepts are stored in

582 Printz, a) *The Philosophy of Cognitive Science. CONCEPTS 1: Against Definitions*. http://artsci.wustl.edu/~prinz/cog27.htm (22.08.2000).
583 See 4.6.1.
584 See 4.3.3.

memory as specific examples. No abstraction involved."[585] To me, this sounds like the idea of general concept in terminology science.

According to imagism, "concepts are represented by images not lists of features." (Pictorialists say mental images are picture-like. Descriptivists say mental images are language-like)[586]. -In my opinion, features are linguistic definitions, whereas images are not.

According to the theory theory, "concepts are represented by mini-theories rather than mere lists of features."[587], and according to the prototype theory, "concepts are represented by sets of salient or diagnostic features rather than necessary features."[588]

According to terminological science, essential characteristics are indispensable to understanding a concept. The best representative (from the viewpoint of the generalized interpreter such as a child, an expert, etc.) of the category is its prototype. A good question: what is the best representative of the concept of concept?

As we can see, there are several points against the classical view. Still, as also Lakoff[589] complains, it is widely used in everyday and elementary scientific conceptual description.

4.6.4 The Prototype Theory. Rosch's Model of the Structure of Categories and Categorization

As we know, Eleanor Rosch developed *the theory of prototypes and basic level categories* challenging the classical view. Her (along with her colleagues) experimental results can be divided into prototype effects and basic level effects[590]. *Prototype effects* mean that within a category all members do not have the same status: some are more prominent that others. The most representative ones are "prototypical". *Basic level effects* mean those members of a category that are in the middle of the categorial taxonomy: animal = superordinate level, dog = basic level, retriever = subordinate level. It seems that knowledge is usually organized starting from basic level catecories or concepts to other upper and lower levels.[591]

Lakoff argues that Rosch's idea were and still are widely misunderstood by many cognitive psychologists[592] owing to how Rosch herself first presented her original findings. According to Lakoff, Rosch and her co-workers examined prototype effects and "to speak of a *prototype* at all is simply a convenient

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585 Johnson 1999. http://www.psynt.iupui.edu/kjohnson/cognition/CONCEPTS/ tsld 012.htm (04.09.2000).
586 Printz, a) http://artsci.wustl.edu/~jprinz/cog26.htm (22.08.2000).
587 Ibid.
588 Ibid.
589 Starting from the preface (xii).
590 Lakoff 1987: 29-30.
591 Lakoff 1987: 46-47; for more details, see below.
592 Like Smith and Medin refered to above, Kay, Osherson and Smith, etc.; see Lakoff 1987: 136-152.

grammatical fiction; what is really referred to are judgements of degree of prototypicality…Prototypes do not constitute any particular processing model for categories… Prototypes do not constitute a theory of representation for categories… Prototypes can be represented either by propositional or image systems…Although prototypes must be learned, they do not constitute any particular theory of category learning" [593] and the effects of so-called best or better examples of a category are superficial showing nothing about the nature of categorization.[594] Prototypes do not exaxtly mirror category structure and they do not represent categories.[595]

Lakoff takes up variations of the assumed nature of the prototype as results of misunderstanding of the intentions of Rosch like: a prototype is an abstraction like a schema or a feature bundle, or it is a particular example.[596] I do not go into further details of Lakoff views; he thinks the best way to explain prototype effects could be his theory of idealized cognitive models[597]. It is not my task to judge between various understandings of a given theory. For me, Lakoff's viewpoints seem to be closer to systemic thinking than those of the researchers he criticises for favoring structural orientation.

Without going into the cognitive and psychological reasons and theories of why and how people perceive in the prototypical way, it suffices to notice that Rosch's theory clearly represents a systemic hierarchy of system levels and that as a researcher she advanced from a structuralist view towards a complex and – I would even dare to say – abductive and systemic view.

Before presenting an "image system" of my design, I take up some more points. Rosch[598] states "that the task of category systems is to provide maximum information with the least cognitive effort". The important thing is that counting an object into a category is not due to its critical features but due to the existing prototype of that category. The prototype (Rosch) serves as the best, the most representative exemplar. This means that there should be a common idea of the characteristics of that exemplar[599].

Further, a member of one and the same category does not have to match exactly either with all the other examples, or with the prototype, it just has to be sufficiently similar. The question that arises next is on which basis do people measure similarity? Zitzen comes to the conclusions that appearance, frequency of occurrence (variation), and usage, according to Labov's studies, are symptoms, but not the cause of prototypicality. Zitzen[600] sums up the features of prototypicality as follows:

> "Both, Labov's (1973) and especially Rosch's experiments show that prototypicality is a psycholinguistical notion, which plays an important role in human categorization.

593 Rosch 1978: 40-41; in Lakoff 1987: 44.
594 Lakoff 1987: 44.
595 Lakoff 1987: 43.
596 Lakoff 1987: 137.
597 See 4.3.1.
598 1978: 28; in Zitzen. http://ang3-11-phil-fak.uni-duesseldorf.de/ ~ang3LANA/Zitzen.html (22.08.2000).
599 Ibid.
600 Ibid.

> The results of their experiments lead to the following characteristics of prototypicality:
> 1. A category has got a prototypical structure. The prototype, which is regarded as the most representative member, is the central entity around which all other members are organized.
> 2. Prototypical categories cannot be defined by means of a single set of necessary features, since the various members do not share the same amount of features.
> 3. Prototypical categories exhibit a family resemblance structure; as it were, their semantic structure takes the form of a set of clustered and overlapping meaning.
> 4. Prototype categories exhibit degrees of category membership; not every member is equally representative for the category. In contrast to the classical approach, the members do not have the same status. The question of membership is not a question of either – or, but a matter of gradation.
> 5. Prototypical categories are blurred at the edges: i.e. one category merges gradually into another category.
> Wittgenstein has already articulated characteristics 3 and 5. But while Wittgenstein's concept of a family resemblance structure implies a uniform distribution of all category members prototype theory demands a distribution of the members around the prototype."

4.6.5 The Prototype View as Systemic Graphics/Systemic Approach. Open Category System.

The following diagram and summary *(Chart 11)* is my presentation of the prototype view as systemic (inter) graphics, based on the text sources of Zitzen, Rocha, Medin & Schaffer in Rocha, and Smith & Medin[601].

In the diagram below each prototypical category I, II and III (CI, CII, CIII) exhibit internal family resemblances (graphical similarities in the diagram). Their semantic structure forms a concept field, or a cluster of a concept system.

Applied to concepts in musicology[602]: if C I is, for example, tone system, then C II, or C III can represent sound system because a musically sounding tone must also have features of sound. The diagram shows the fuzzy edges of systems overlapping each other. For exampl (E) on the edge of the C I category, could be considered a concept cluster that belongs on the one hand to C I but also to the C III sound/noise-system. My interpretation is this: those properties which can be defined conceptuallyare treated as real properties. A prototype is not necessarily a real "existing" element of the category; various scientists argue about this.[603]

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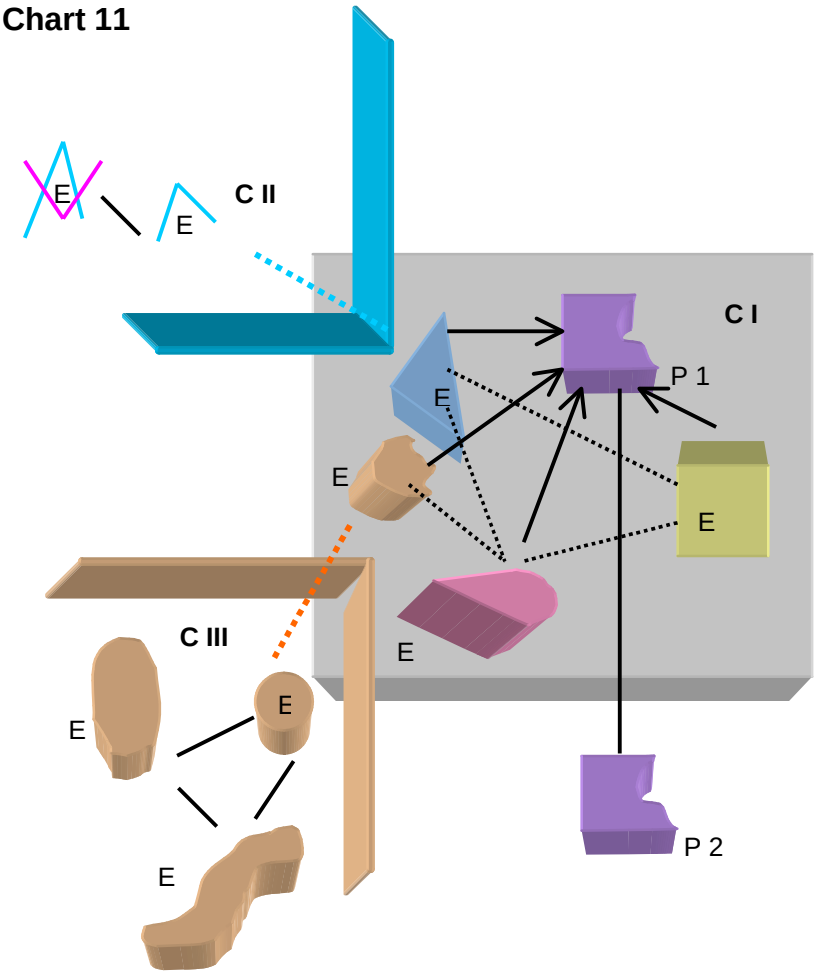
601 Rocha 1997. http://www.c3lanl.gov/~rocha/es_contx.html (04.09.2000).

602 Applied and study course musiclogogy.

603 See Zitzen, http://ang3-11-phil-fak.uni-duesseldorf.de/~ang3LANA/Zitzen.html (22. 08.2000) and problems with prototypes/Pritchard 2000: http://www.uwinnipeg.ca/~epritch1/ conceptsintro.html (21.08.2000).

Chart 11



Summary definitions of open category:
Blurred category edges/boundaries (dotted line).
Elements (E) have a variable amount of necessary common real properties/features (variant symbols in diagram).
Elements also have other individual features.
Elements inside category are unequal (various symbols in diagram).
Prototype (P1) is the central entity, either the best representative element (Rosch), or an abstraction representing "best" abstract characteristics (P2= abstract prototype). In the latter interpretation, prototype is not necessarily a **real** element of the category.
Elements match prototype features and each other (arrows/dotted lines).
Category membership of an element is a matter of gradation of the element (=distance to the prototype), or number of (real) properties. This means representativeness.

4.6.6 Horizontal and Vertical Dimensions of Categorization

The five characteristics of the prototypicality given by Zitzen above are related to each other in respect with two dimensions or with the 'two axes of categorization'[604]. In Rosch's[605] terms, the *horizontal* dimension describes the

[604] Taylor, 1989:46, in Zitzen. http://ang3-11-phil-fak.uni-duesseldorf.de/~ang3LANA/Zitzen.html (22.08.2000).

internal structure of a category, and the second, or the *vertical* dimension, refers to the intercategorial structure. The componential analysis[606], commented above, deals with the horizontal dimension. The vertical dimension, as Rosch argues, exhibits three levels: the *superordinate level*, the *basic level and* the *subordinate level*. With respect to this threefold subdivision, the basic level is considered the most informative one, and therefore, with respect to cognitive processes, it is the most economic level. The fact that the basic level terminology in language usage has a privileged status is reflected in the everyday situations of communication.

Prinz, as well as E. Pritchard[607], counts the prototype theory into the *probabilistic view theories*, according to which the features comprising a concept are: "Salient and highly probable (often non-necessary). Assigned weights (corresponding to their salience and subjective probability). Arrived at through abstraction (i.e., acquired by experiencing multiple category instances; often no one instance has all features represented in the concept)".

Keeping in mind the core idea of systemicity in this research, Rosch's horizontal dimension can be considered as complexity with differentiating and connecting features, and the vertical dimension as the idea of zooming through various scale levels[608]. Here they are defined as three levels, whereas in the basic cybernetic literature (e.g. by Heylighen), as to my knowledge, they are not defined.

4.6.7 Criticism of the Prototype Theory

The prototype theory, as any other theory, has received certain criticism, and, according to Lakoff, this is much due to misunderstanding of Rosch's original ideas. Although this is not acceptable it is very understandable because we know that whatever is defined in an authoritative tone it will find its users who interpret it in their own ways. This is part of the chain of undended semiosis.

Prinz[609] offers four objections against Rosch's theory: 1. Unconstrained features; 2. Instability; 3. Compositionality; and 4. Typicality effects with definable concepts. According to these, it is not often quite clear, what can be counted as features and what not. Barsalou[610] has shown that typicality judgements of concepts vary with persons and with time; compound concepts should be comprised of their constituents – in practise it is not always so (Fodor[611]); some concepts that can be defined, however, show prototypical

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605 In Zitzen, ibid.
606 See 4.6.1.
607 Pritchard 2000. http://www.uwinnipeg.ca/~epritch1/conceptsintro.html (21.08. 2000).
608 See 5.6.3.
609 Printz b) *The Philosophy of Cognitive Science. Concepts 2: Prototypes.* http://artsci.wustl.edu/~jprinz/cog27.htm (26.08.2000).
610 In Printz: ibid.
611 In Printz: ibid.

effects (Armstrong, Gleitman and Gleitman[612]). Pritchard too[613], criticizes prototypes pretty much similarly, concluding, however, "… there is evidence that people will use such information to make categorization decisions." The prototype theory applied to musicology[614], clearly helps us at least to consider cases, where certain musicological parameters overlap and merge into one another[615].

As to Lakoff's ICMs, or idealized cognitive models[616], which are in conformity with the prototype theory, are, from my viewpoint, an evidence of his conceptual systemic approach. He even uses the concept of 'model' that is central in systemicity. He writes: "Each ICM, as used, structures a mental space, as decsribed by Fauconier" – an interestingly "systemic" statement. His example of the concept of the 'Western calendar' is an example of a closed negentropic concept system, whereas the Balinese permutational lunar calendric system is a complex concept system.[617]

4.6.8 To Categorize or Not to Categorize in Musicology – That's the Question

Kathy Johnson[618] gives the following reasons for using categories: 1. Categorising objects reduces the complexity of the environment; 2. Categorising is the means by which objects of the world are identified; 3. The establishment of categories reduces the need for constant learning; 4. Categorising allows us to decide what constitutes an appropriate action; 5. Categorising enables us to order and relate classes of objects and events.

This all sounds quite fine – superficially. The first statement is not really acceptable as such from the complex systemic viewpoint. However, it serves as a possible explanation from the needs of cognitive perception psychology[619] with the criteria of object identification, economy in learning processes, action orientation, and ordering and relating with our surroundings conceptually-categorically. It also points to the principle of structuralistic systemicity.

Applied to musicology[620], the classical view is very much in use in elementary level education, and even in the professional; at least in the West, where concept definitions are clearly delineated for pedagogical purposes in

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612 In Printz: ibid.
613 Pritchard 2000. http://www.uwinnipeg.ca/~epritch1/conceptsintro.html (21.08. 2000).
614 Musicological conceptualization.
615 See also Rocha, L.M. 2001. Dynamic Categories, in *Adaptive Recommendation and Open-Ended Semiosis)*. http://www.c3.lanl.gov/~rochaijhms_pask.html (04.09.2000).
616 See 4.3.1.
617 Lakoff 1987: 68.
618 Johnson 1999. *Representation of Semantic Knowledge focus: Concepts and Categorization. 19 slides*. http://www.psynt.iupui.edu/kjohnson/cognition/ CONCEPTS/ tsld004. htm (26. 08.2001).
619 Ibid.
620 Study course musicology.

model learning[621]. The binary concept opposition approach – although in many cases its results are scientifically inadequate and misleading – is very much used when trying to make the meaning of a given concept clear. Examples of binary opposition in musicology are the following concept pairs of: tonal - atonal, major-minor (happy-sad), half-step – whole step, sharp – flat, homophony – polyphony, dominant – tonic, binary rhythm – tertiary rhythm, static forms – free forms, and male theme – female theme. Tertiary structuring is also common, and it is defended from mythical-ideological viewpoints (e.g. the Holy Trinity). It goes without saying that the classical view falls much too short in explaining music properly from the musicological premises.

I believe I am forgiven for my ironical tone. The definitions of the classical view and the prototype theory match perfectly with traditional music theory and analysis. In the traditional, as well as in some other formal procedures of music analysis (e.g. the generative-structural music analysis), musical compositions are reduced texture-wise into static formulas and feature units: into chord progressions, cadence formulas, voice leading rules, keys ("In which key is this melody?), and modes (Church modes, *maqams*, etc.); that is, into accepted static formulas (first theme, second theme, stretto, etc.), and into various foregrounded and backgrounded levels (e.g. the Schenkerian analysis). This all certainly reduces the conceptual complexity of our musical environment and produces identifiable and preferable prototypes for the purposes of model-learning and model-doing. At the same time, it reduces the need of constant relearning as well as the need of intellectual and creative straining of mind. Such deduction-based descriptive models are then turned into prescriptive models that allow us "to decide what constitutes an appropriate action." To sum up: the traditional musicological categorizing emanating from the classical view enables us to arrange and relate various classes of musical objects and instances conceptually – as always before.However, it goes without saying that the classical view fals much too short in explainign music properly from the real musicological premises.

4.6.9 Expertise and Categorization

I am nor against categorising. I am against one-sided, superficial, limited and plainly structural categorising. Kathy Johnson[622] supported by other researchers (Johnson, Mervis & Eilers) sums up concisely the good points of categorization at the expert level: Experts know more subordinate level categories. They have more than one basic level. They categorize faster; they are aware of more dimensions along which objects can be categorized. Experts recognize more differences among categories.

This sounds sensible; this is complex systemicity and points to the fact that complex systemicity can be understood best by experts who are used to

621 See the given examples in 4.4.6.

622 Johnson 1999. http://www.psynt.iupui.edu/kjohnson/cognition/CONCEPTS/ tsld 019. htm (26.08.2001).

stretching their minds in the ways described above. Various theories, such as the core theory, or the identification procedure theory[623], offer answers to the question of how concepts are identified in the mind of man. It is not my interest to interfere with them in this connection. The essential thing, from my viewpoint, is that all these theories seem to study phenomena that are basically "static", or "statically material"; whose configuration is stable during the period of examination. Their features are experienced as static. At least all the examples given indicate it. The typical examples used in the concept theory descriptions are animals (dog, cat, cow, bird, swan), human beings (boy, bachelor), fruits, numbers, etc., the features of which are static. This is a bit ridiculous from the viewpoint of music. These examples never include concepts such as ' explosion', 'suspicion', 'enthusiasm', 'hope', 'mood', 'fog', 'disintegration', 'development', and the like. I believe this is because it is difficult to say what is the prototype of development, suspicion, or mood. Therefore, category theories do not give much light to the question of organic music and of its emotions, happenings, and processes.

4.7 Concepts, Texts, and Graphics

The concept of *virtual reality* has been a big hit since the 1990s. It has been hailed as a new type of reality, a new conceptual and perceptual dimension, something which has not existent before. This is not quite so. We can consider texts and graphics as the first form of virtuality[624] because they represent the truth and reality in the form of human conceptualization[625].

The *ISO/FDIS 1087-1*[626] standard, which represents terminology science, defines *concept field* as an "unstructured set of thematically related concepts. Concept fields may be used as a starting point for establishing concept systems." The same source defines *concept system* as a system of concepts, a "set of concepts structured according to the relations among them."[627] In my opinion, text and language, by their very nature, are closer to concept field than concept system. Concept systems, on the other hand, can be expressed more economically through graphics than texts. The explanation follows here.

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623 See for example Prinz, a): http://artsci.wustl.edu/~jprinz/cog26.htm (26.08.2001).

624 Louka 1998: *What is Virtual Reality?* http://home.enitel.no/mlouka/vr/vrhiof98/whatisvr/ What8.html (28.08.2001).

625 Without further comments in this connection, in a sense virtual truth, or virtual reality has been taken as something, which it is not: it is a fake, or simulation of ontic reality, see also Harold E. Samuel's statement. http:// www.grovemusic. com/ shared/views/ article.html?section= music. 46710.2.5 (17.09. 2001).

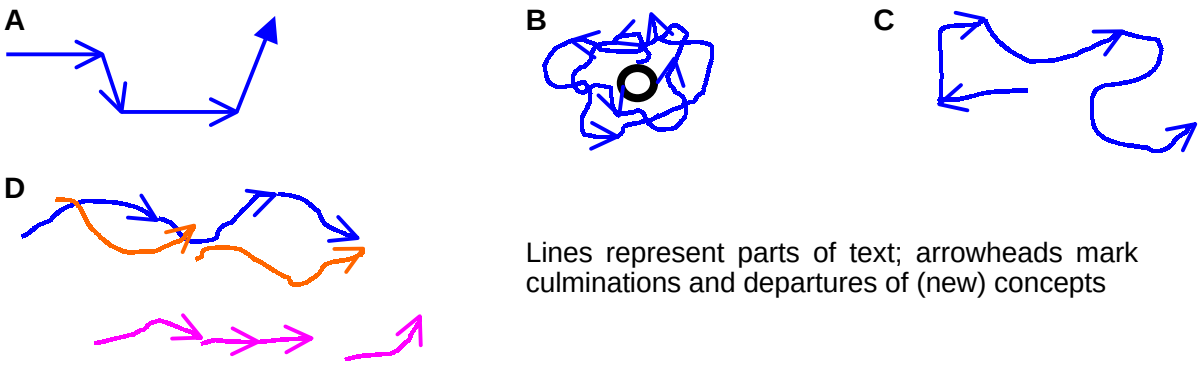
626 The *ISO/FDIS 1087-1: 2000*: 3.2.10.

627 The *ISO/FDIS 1087-1: 2000*: 3.2.11.

4.7.1 Script (Text) as Concept Field

As stated in the Aim of This Research and Research Plan (1.7), the lifeblood of concepts is language. Its literal dimension is text[628]. Text as words, which is "narration in *kronos*", "happens" in time in the mind of a reader (*Chart 12*). The content of a text unfolds linearly in the course of time; it is something that is experienced as a sequence of conceptual associations in time. It is, in a way, one-dimensional, like a line on a piece of paper. A text may be a straightforward path of concepts from one point to another, forming a logical path of sequential arguments, or associations, and closing up a logical textual content (e.g. story, or argumentation) (= A). The understanding of a concept at hand is based on the understanding of the previous concept, or concepts. A text may also spin around a focal conceptual association, describing or illuminating it intensively through variations of related associations (= B), or a text may "run loosely", without a certain strong associative focus, in various directions as a stream of free associations (= C). It is difficult to conceptualize several textual-conceptual layers [*polytext* – my neoterm] at a given time (=D). The same applies to polyphonic music.

Chart 12



Lines represent parts of text; arrowheads mark culminations and departures of (new) concepts

In all these cases, the spoken or literal text represents a dynamic chronological sequence of stated or expressed conceptual associations; but the text as such does not reveal or divulge its hierarchical concept structure. If the structure of a literal text is described by a literal text, it means that the path from one textual-structural unit (association or concept) to another unit (association or concept) of the text under examination, is another, a new one-dimensional text. Thus, the description of text by aid of text means that an additional text – commenting on various parts of the structure of the text – is needed. This happens, for example, in discourse analysis in narratology or in a semiotic research. The explanatory texts represent a chronological sequence of concepts as texts (structure) which should be explained by other texts. This means that a small linear sequence of only a few concepts (of a text) needs a lot of semantic-textual commentary in

628 Text as understood in its most common sense; semiotics defines it in a wider sense.

order to reveal its textual-conceptual structure. In semiotics all texts are considered to link to some other existing texts[629]. To sum up: from this viewpoint, linguistic texts are by their nature, one-dimensional concept-wise, and, as such not easy and economical tools for a complex systemic approach.

An example of a textual concept field could be the following sequence of concepts: biosphere (sun, soil, air, water, the elements, and organisms), and analogically cognisphere (truth, knowledge, culture, language, understanding/ conceptualization, and concepts) as starting points to build up a concept system by the aid of graphics (see *chart 13*).

4.7.2 Graphics as Concept System

Graphics, especially graphics including conceptual terms or verbal expressions in purpose of communication, represent intertextuality[630]. A graph or a picture is ”an intertext”. It is at least “an [*interconcept*” – my neoterm] because every part of a graphic structure represents a concept, or a concept cluster. These concepts become articulated linguistically when we explain the graphics by words and sentences: by definitions, explanations, and interpretation: in other words, by texts[631]. There are, of course, different types of graphics, those which should be ”read out” through a certain “visual trek”, but graphics can also be examined by criss-crossing them concept-intertextually, which reveals more of their meaning layers. The overall advantage of a graphic is that one can examine its conceptual-compositional structure freely and creatively by “jumping intertextually” from one concept to another in the concept system.

How does this relate to music? A musical score – e.g. that of a symphony – is a complex *intergraph*. It is painstaking to learn to read and hear a whole score. A score is truly a complexity of "a thousand words" that should be perceived simultaneously. It is customary in compositional studies that a student should practise to follow a certain written part (e.g. the part of cellos) through the whole piece in order to understand the role of that part in the whole system of the musical piece. The student must also learn to concentrate on certain sections of the score in order to understand the texture and the textural dynamics of the whole form. The student has also to learn to hear and control "everything" in the score at a certain moment, and to anticipate what comes next. What makes certain orchestral conductors unique is their ability to combine, control and stress those layers of the intergraphical score which best suit to their selective aesthetic taste. Interpreting a score by aid of an orchestra is in a way a narratological presentation, or an "intertextual" discourse analysis (by aid of musical layers) realized as a musical performance.

In this way graphics, by their nature, are two-, or three-dimensional, and more suitable to systemic-structural description than mere linear texts. In a

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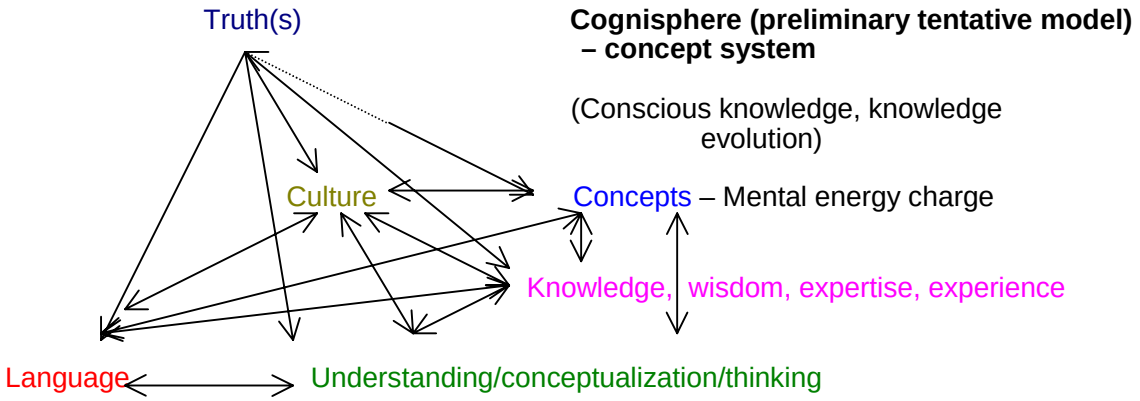
629 See 1.7; 3.2; 5.8.2; 5.10.2, etc., on intertextualism.

630 This is what the famous proverb – ”A picture tells more than a thousand words” – practically means.

631 Text understood in a wider, semiotic sense.

scientific systemic research description, which aims at fulfilling high scientific standards, both texts and graphics are necessary. This kind of graphics is a kind of "word/textual painting". Virtual reality is usually defined as a 3D graphical simulation of the reality, or the imagined reality[632]. In order to show the possibilities of a graphic systemic presentation that utilizes associative intertextuality through the vast amount of conceptuality it evokes; I give here my idea of what I call the *cognisphere*[633].

Chart 13



The chart above is an example of a complex systemic analogy of the cognisphere with the biosphere. It can be used for further exploration of multifarious conceptual connections and interrelations. I give here an elaboration of the associative interconceptuality and intertextuality it describes.

All the components of this conceptual system are interactive and linked to each other. This designed conceptual model is systems-wise partly open and partly closed (at the connection of truth – concepts/partly dotted line). The connections are of two kinds: two-directional, or one-directional. Language, understanding (conceptualization, thinking), knowledge, and culture have four two-directional connections and one one-directional connection from truth(s). They form a closed system. Truth has in fact five one-directional connections: to language, understanding or conceptualization, knowledge, culture, and to concepts, although we experience the last connection as two-directional. The reason is that our conceptuality (as also all the other components) depends on the ontological truth(s) but at the same time, we think in practice that the ontic truth also depends on our concepts. Therefore, the two-directional dependency is only illusory (indicated as a partly dotted connection line in the chart). Concepts also have five two-directional connections, although we think that the truth "needs" our concepts.

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632 Louka 1998. http://home.enitel.no/mlouka/vr/vrhiof98/whatisvr/What8.html (28.08.2001).

633 See a somewhat similar idea of noosphere by Teilhard de Chardin (1956). *Man's Place in Nature* 1971: 80-81.

The reason is that the truth (or or reality, or 'what is') as an ontic and unreachable entity does not depend on our relative ontological conceptuality: on concepts, culture, or language; neither does it depend on our understanding. The truth(s) – or what we conceptualize as the truth – "feeds" them, and they are dependable on the truth via our conceptuality. (The ontic and ontological are intertwined in the mind of man in a complex way[634].) In fact, everything we conceptualize is linked to our belief systems, which are in the background of cultures as cumulative knowledge, wisdom, and mental experience force[635]. Concepts, on their part, are the "elements" through which we construct our understanding. Language is the "water" through which understanding is communicated as knowledge, wisdom, and expertise. Concepts are also the elements which to us represent ontic "units" of truth(s) as ontological reality: therefore the link to truth is two-directional: we take our concepts as truth(s), we believe in our concepts and rely on them "as if truths".

Concepts are necessary for understanding; without concepts, there is no understanding. Understanding manifests itself as knowledge, wisdom, expertise, and experience. This all cumulates and evolves into cultures that change and develop, as much as new concepts (concept combinations and concept "mutations") appear and are found. This is what we may call cultural evolution. Concepts organized as structured understanding, conceptualization and thinking, are represented and appear in language as texts and as signs – as semioticians would say – which function as a communicative tool. Language is a means to collect and store knowledge, wisdom, experience, and expertise in culture.

Because I am interested in the role of language (conceptuality needs language), it is good to point out that similarly as the limpidity of water is crucial to the thriving biosystem, likewise language is a very crucial component in the cognisphere because we communicate our concepts, knowledge, and understanding through language. Polluted water has a drastic effect on plants and animals (organic physical population); likewise, corrupted, stagnated, and ambiguous language is the main cause of the corruption of a culture (organic mental population). In the ecosystem, the role of water is to transmit nutrition. In the cognisphere, the role of language is to transmit, or communicate, concepts and meanings, which are our "mental nutrition. Confucius said that the loss of the meaning and the corruption of language would lead to the collapse of societies and civilizations[636].

Applied to musicology: if musicological terminology and language becomes empty and meaningless, or if it becomes "hyper-meaningful" (=ambiguous), we loose the meanings and concepts they should represent. In

634 See also 2.1.

635 See metasystem 5.4.3 and systemicity umbrella 5.10.

636 *The Analects*, *Vol. VII*, *Book XIII*, ch. III, 4 – 6. *The Analects or The Conversations of Confucius with his Disciples and Certain Others* . London; Oxford University Press, 1958.

addition, certain ideological language usage may start to manipulate concepts and distort meanings[637].

I do not elaborate any further the interesting systemic concept of the cognisphere in more detail in this research. The reader can well understand how much more intertextual text and commenting on it this would require. However, using again the extraordinary graphics of M.C. Escher, we can better understand the mingling of onticity with ontology[638]. According to my interpretation, his lithograph *Reptiles* (1943) below llustrates this well. Although the work plays with the illusions of two- and three-dimensional spaces, as described by Bruno Ernst[639] I rather consider it to depict the worlds of onticity and ontology. The live crawling reptiles in the book, the dodecahedron and the mortar are ontic, whereas the immovable and sketchy (negentropic) drawings of the reptiles on the surface of the sketchbook belong to the ontological reality. The reptiles crawling out and into the drawing represent the fuzzy border of the ontic and ontological systems.

637 See dominant codes, reification, transparency in Chandler. *Semiotics for Beginners*. http: //www. aber.ac.uk/media/Documents/ S4B/semiotic.html (25.07.2000).

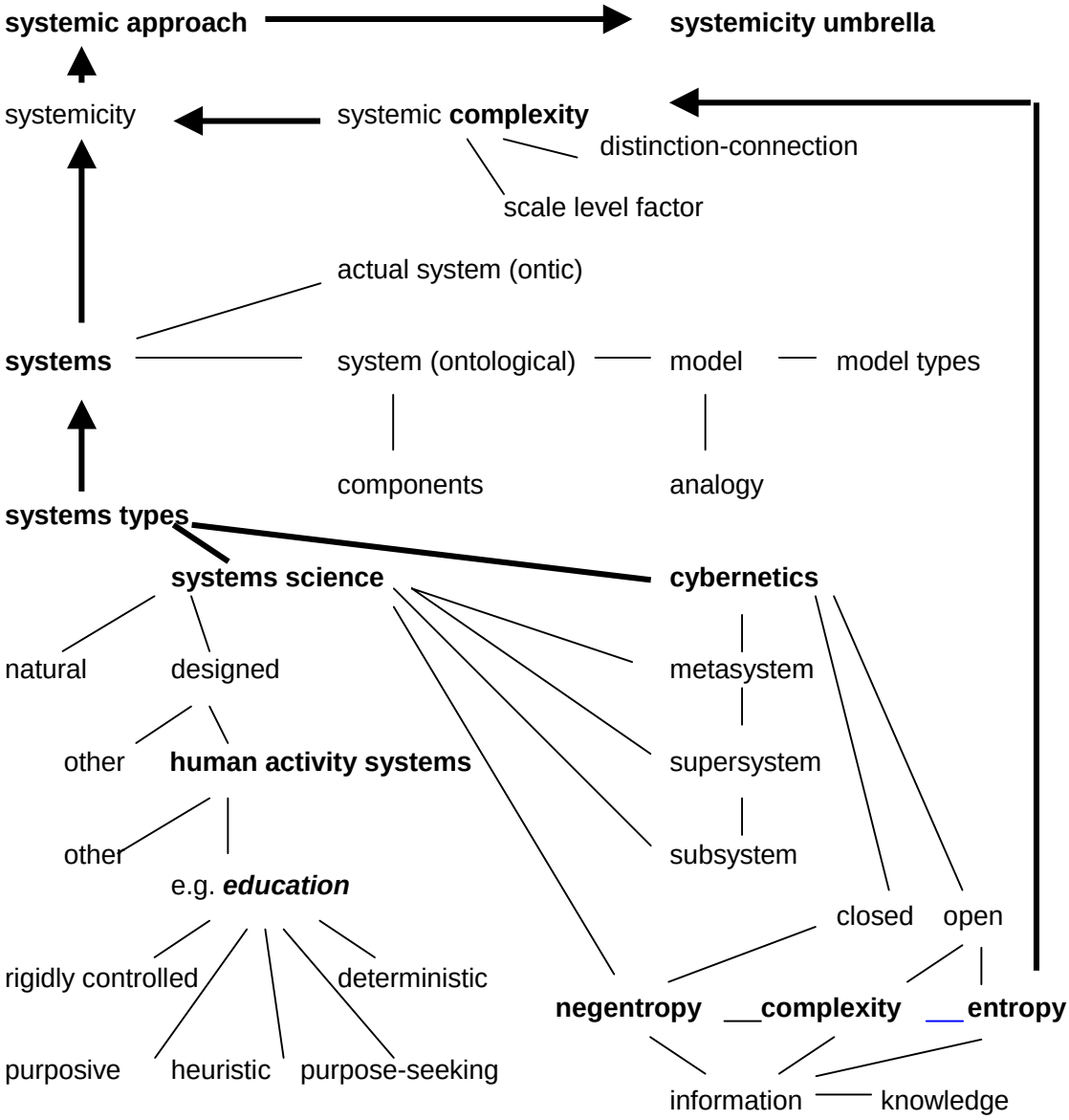
638 For closer explanation, see Mikkonen 2002: *Ontology Intermingling with Onticity and Vice Versa in M.C. Escher's* ***Reptiles***.

639 Page 138 in *M.C. Escher His Life and Complete Graphic Work* 1982 , by Bool, Kist & alii. Also at http://www.etropolis.com/escher/reptiles.htm (06.05.2002)

5 SYSTEMIC APPROACH AND SYSTEMS. RELATION TO MUSICOLOGICAL CONCEPTUALIZATION

The *Chart (14)* below shows summatively the main components (in bold font) of the conceptual model I study in this part of my research. Understanding the components (connected with thin lines) that form the details of systemicity (thicker lines) leads to helping to understand better the metatheoretical level, systemicity and systemic approach. The key concepts for understanding the components of systemicity are in bold font. As before in Chapter 4, at the same time, I keep in mind how various musicological concepts fit into the study frame as examples. Systems sciences and cybernetics share most of the same key terms and concepts, although I deal with them in my text usually either from cybernetic or systems scientific sources.

Chart 14



5.1 Background of Systemic Approach

All paradigms of systems research are seriously interested in finding and presenting something that has profoundly philosophical, even ideological truth value, something that explains to us about life and the universe. In systems sciences they talk about holism[640], in cybernetics one can find the metasystems theory[641], and in information science the General Information Theory[642]. Semiotics, which I consider as a form of systemicity, is often accused for being,

640 E.g. the *ISSS/ The International Society of Systems Sciences*.
641 E.g. F. Heylighen et others, see Principia Cybernetica Web.
642 E.g. Tom Stonier 1990. *Information and the Internal Structure of the Universe. An Exploration into Information Physics. London*: Springer -Verlag London Limited.

according to David Chandler[643], "as 'imperialistic'…trespassing on almost every academic discipline". Semiotic research tends to include the entire culture and it is even experienced by those against semiotics as 'intellectual terrorism'[644]. These trends that wish to explain the universe and the life are proofs of man's yearning and reaching towards the "truth"[645]. In my opinion, systemicity is a very important a mental and intellectual tool for organising knowledge.

The ISSS and the IIAS

Taking into account the long interdisciplinary activity (since 1956) of *the ISSS*, *The International Society for the Systems Sciences* (originally the *Society for General Systems Research*) [646], we can with good reason state that there has long existed a systemic paradigm in the field of science, a paradigm that uses its terminology, concepts and methods from systemic premises and aims at understanding systemic phenomena. The leading figures at the time of the inception of this new society were Ludwig von Bertalanffy, a biologist, Kenneth Boulding, an economist, Anatol Rapoport, a mathematician-biologist, Ralph Gerard, a neurophysiologist, James Grier Miller, a psychologist, and Margaret Mead, an anthropologist.

Although this paradigm has not gained foot in the field of education in the measure it deserves, there are good and urgent reasons for its use on a much larger scale[647]. My research, although systemic-theoretical, aims at serving also educational ends. I shall demonstrate this in Chapter 6.

The ISSS, which also calls itself the Systemic Movement, has members from 30 countries from virtually every recognized discipline and it believes it is "uniquely positioned to take the next step, to foster a more systemic view of science and technology."[648] Organizationally the ISSS has created Special Integration Groups (SIG) to ensure global multidisciplinary scientific co-operation. At the moment, their SIGs include 22 research fields and subjects, such as evolution and complexity, informatics and communication, medicine and health, spirituality, business and industry, climate, psychology, and so on. In view this research, two fields are particularly worth mentioning: Human Systems Inquiry[649] and Systems Design in Education.

Quoting the principles of the ISSS in relation to its SIGs: they (SIGs) "span a wide spectrum of disciplined inquiry, exhibit remarkable tolerance for ambiguity, and tolerance for each other. This is the environment in which it

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643 See http://www.aber.acuk.media/Documents/S4B/sem11.html (25.07.2000).
644 John Sturrock 1986: 89, in Chandler, ibid.
645 See the idea of cognisphere in 4.7.1; 4.7.2.
646 See http://www.isss.org
647 See the article *Developing a Systems view of Education* by Bela H. Banathy. http://www. gwu.edu/~etl/banathy.html (17.02.2001).
648 http://www.isss.org/draft.htm (17.02.2001).
649 From the above, for my purposes, I have taken up especially the field of Human Systems Inquiry, which examines, among other things, education as a human system. I have elaborated the link of education with semiotics and systems sciences in the idea of Systemic Umbrella in Chapter 5.10.

becomes possible to consider philosophy, theory, and practice to be inseparable."[650]

The Introduction of the ISSS states: "The founders of ISSS felt strongly that the *systemic (wholistic) aspect of reality* was being overlooked or downgraded by the conventional disciplines**,** which emphasize specialization and reductionistic approaches to science. The founders stressed the need for more general principles and theories, and sought to create a professional organization that would transcend the tendency toward fragmentation in the scientific enterprise."[651]

According to the platform of the ISSS, it considers itself as

> "one of the few societies world-wide that studies processes that go across disciplinary lines in its search for *systems methods and systems analogies*. Each analogy is based on formal, verifiable similarities simultaneously valid for the many unique systems despite their widely differing scales of magnitude and complexity. The theoretical-empirical studies such as these are commonly excluded from speciality fields by the nature of their defining boundaries, their methodologies, and their focus on only certain dimensions of reality to the exclusion of others. The ISSS was created to provide a forum and base, that is inherently trans-disciplinary, for such increasingly timely and important studies. The systems approach calls for a multi-level of understanding that crosses the boundaries between the humanities, the arts, the sciences, and technologies. It certainly calls for linkages between disciplines, linkages that embrace different ways of knowing, and different ways of being."[652]

Another important and large organization with specialists from practically all important research fields, The International Institute for Advanced Studies in Systems Research and Cybernetics/IIAS[653], initiated in 1980, organizes specially focused symposia, among which is the conference of Systems Research on the Arts[654]. All this makes clear the fact that systems thinking has become a serious challenger to traditional scientific research.

5.2 Systemic Approach – a New Emerging Paradigm

Aside from stressing the importance of holistic scientific perspective, singular systems thinkers and researchers – be they either more or less strict constructivistic cyberneticians[655], or soft systems representatives[656] – more or less openly feel that their research represents the famous paradigm shift taken first up by Kuhn, the sociologist in 1970[657]. Kuhn's meaning of the paradigm

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650 http://www.isss.org/draft.htm.
651 Ibid.
652 Ibid.
653 See http://www.iias.edu/.
654 See http://www.jcrhodes.net/2003.
655 Like F. Heylighen, C. Joslin & V. Turchin; see *Principia Cybernetica Web*. http://pespmc1. vub.ac.be/ (06.10.2001).
656 Like P. Checkland.
657 The concept of paradigm was defined by Kuhn in 1970, and is connected to the idea of development of science. "For Kuhn, scientists work within paradigms, which are general ways of seeing the world and which dictate what kind of scientific work

shift is most commonly linked with the idea of the change from quantitative research (with all its traditional implications) to the qualitative one. Cuba and Lincoln[658] stated already in 1981 that this ongoing change of paradigm concerns all scientific fields. Qualitative research methods are "softer" and "more free", e.g. inductive, abductive, the grounded theory, heurism, narratology, etc. To my understanding, systemic research -be it more strict (traditional cybernetics and related disciplines: e.g. fuzzy logic) or less strict (soft systems) – as such adds richness to scientific interpretations and opens wider perspectives. The shift from the closed, static, and structural to the dynamic, open, and fuzzy also increases quality. It is probable that new ways and methods of examining quality are emerging. I endorse systemic approach andprefer to think that here is also -if not *ipso facto* – the question of the *shift from the categorising paradigm into the systemic one. This is emergence.*

Maybe the most prominent figure among systems thinkers is Ludwig von Bertalanffy, whose General Systems Theory aroused big debates about its scientific validity. His theory was greatly misunderstood in its time, and even afterwards. Its current status, however, is unchallenged. In his foreword to *Perspectives of General Systems Theory by Ludwig von Bertalanffy*, Ervin Laszlo, a futurologist, comments that Bertalanffy, who was criticized and sometimes misunderstood, in fact "created a new paradigm for the development of theories".[659] Although most of his theory dealts with natural sciences (e.g.) he also refers to the sociological and cultural aspects of his theory. His comment on the ordinary language is most interesting, which, according to him has its place in systems theory along with the languages of mathematics and algorithms[660]. Equally interesting is his understanding of the common basis of the "exact" sciences and those of humanities. However, von Bertalanffy does not elaborate the concept of complexity, which is a later development of systems research and a very vital theoretical systemic aspect of my research. For this I take my support from the sources of *Principia cybernetica Web*[661].

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should be done and what kinds of theory are acceptable. These paradigms provide what Kuhn calls 'normal science', the kind of science routinely done day after day. Over time, however, normal science produces a series of anomalies which cannot be resolved within the paradigm. Kuhn argues that at this point, there is a sudden break, and the old paradigm is replaced by a new one, leading to a new period of normal science. In sociology, the term has a still vaguer usage, denoting schools of sociological work, each of which is relatively self-contained, with its own methods and theories." (Source: *The Penguin Dictionary of Sociology*, © Nicholas Abercrombie, Stephen Hill and Bryan S. Turner 1994. www.xrefer.com 2000).
Other definitions of paradigm: (l) an outstandingly clear or typical example or archetype. (Webster's) (2) The total pattern of perceiving, conceptualising, acting, validating, and valuing associated with a particular image of reality that prevails in a science or a branch of science. (Kuhn) (3) A theoretical model to explain a type of social behavior. (*Dict. of Anthropology*) (Source: *WDCS. Principia Cybernetica.* http://pespmc1.vub.ac.be (06. 10. 2001).

658 In Anttila 1994: 42.

659 http://www.isss.org/quotelvb.htm (06.10.2001).

660 Von Bertalanffy 1968: 24.

661 See 5.6 and 5.7.

5.3 Systemicity as Term and as Concept

The systemic paradigm in science is represented through various means and aspects. The language describing and explaining systemicity uses a plethora of terms and concepts that indicate systemicity. The comment by Charles Francois (1998) from the ISSS aptly illustrates the ambiguity of the terminology: 'Systemics' is used as a convenient short shrift [shorthand?] usefully introduced for 'General Systems', which I consider ambiguous or 'Systems Science', which I consider inexact and pretentious."[662]

Systemic or *systems approach* is one of the terms. It is used as such especially in texts on systems, systems theories, and (soft) systems methodology; especially on cybernetics[663]. Parallel terms *systems methodology*[664]; *systems inquiry; systems view; systems thinking*[665]; *systemicity*; and *systems analysis* also appear invariably in various readings. Sometimes they are defined, sometimes not. For example, Mela[666] describes systems thinking as a method for integrating various branches of science on a conceptual level. This is possible by the perception of analogy between phenomena in different disciplines. The key concepts in systems thinking are *actual system*, *system*, *model* and *analogy*[667].

There also seems to be some ambiguity in the scientific-methodological status of systemicity (or whatever the term). For example, Wallén[668] does not consider systems analysis as an actual scientific research method applicable to various research fields as such, although his description resembles the description of the inductive method. Anttila writes: "as Wallén says, in it (systems analysis) the thinking happens in a reversed order: there exists a group of things connected to and interacting with each other, and out of their shared features or properties a unified (theoretical) entity will develop."

I disagree with this notion. The statement is too vague. Having become acquainted with systems and systemicity, I am willing to give the statement a new form: *all scientific methods – traditional or later – represent methodological-conceptual systems and are some kind of systemic approaches.* The well-known deductive, or hypothetico-deductive method, represents a closed (linear) systemic approach; the inductive and abductive methods represent open non-linear dynamic approach types.

This viewpoint is supported by the web handbook/dictionary of cybernetics and systems (*Principia Cybernetica Web*) which states: "…systems analysis is an explicit formal inquiry carried out to help someone (referred to as

662 BIBLIOGRAPHY. http://www.isss.org/bibliog.html (06.10.2001).
663 *Principia Cybernetica Web*. http://pespmc1.vub.ac.be (06.10.2001).
664 E.g. Peter Checkland et alii.
665 See 5.8.
666 Mela 1999: 3.
667 Mela 1999: 8.
668 In Anttila 1994: 147.

the decision maker) identify a better course of action and make a better decision than he might otherwise have made."[669].

According to the same source, the term systems analysis has many different meanings. For the practical purposes of my research, we can divide the field of systemicity into the two "camps": *cybernetics* and *systems science* (theories)[670].

In order to understand systemic approach it is first necessary to know what systems and other related concepts are.

5.4 On Systems and Music

The concept of system(s) appears practically in all fields of science. In musicology the term is, however, rare. The word and term 'system' is also very much used in common language as well, and it is not difficult to understand the basic nature of a system. However, it is vital to remember that as no definition is final and comprehensive, neither is that of system. A system may mean to different scientists invariably *structure; construction; set (of components); organization; order; configuration; representation; model; or process*, etc. In an ambiguous language and concept usage the ontic, ontological, and representational levels are easily mixed. This happens even in scientific research. *In this research, system is considered as an ontological reality, which is separate from actual system and model.* Generally speaking, a system is a set of interconnected and interactive elements forming a whole from an observer's viewpoint. In a closer examination, we can find various types of systems: *open, closed, structured, static, dynamic, simple, and complex*, etc. As the reality or *actual system* is too "large" and too complex, a system serves to structure it conceptually. Depending on the needs of the scientific field, a system is defined in various ways and from various paradigmatic viewpoints. Still, the inherent conceptual features of the concept of system are identifiable[671].

5.4.1 Actual system

Martti Mela[672] gives a concise and illustrative description of actual system. An actual system is anything in the real world, small (a cell) or big (universe), physical (material, energy), or abstract (science, culture, society, a piece of music: "Shape of my heart by Backstreet Boys" – if you like), in all their details (sub-actual systems with boundaries), complexity, and processes. It is "a broad,

669 *WDCS. Principia Cybernetica Web.* http://pespmc1.vub.ac.be/ASC/ SYSTEM_ ANALY.html (06.10.2001).
670 See Chapter 5.5.
671 See also Anttila's (1998: 146) description on system and its types.
672 Mela 1999: 8.

multi-functional and hierarchical whole"[673]. I connect this naturally to the ontic level of the reality[674]. In semiotic conceptuality-terminology this could be understood as signified (Saussure), object (Peirce), or referent[675]. In terminology science, the actual system seems to refer to the "as yet unstructured" concept field[676].

The following point by Mela is important: "It (actual system) can be examined qualitatively through sensory perceptions but calculations of its quantities is not possible."[677] This explains perfectly the case of music. Music (as an ontic reality), is perceived and experienced through senses qualitatively (sad music, uplifting music, jazz music, etc.), but we cannot make quantitative calculations on, for example, "how much a certain piece is jazzy". Calculation presupposes conceptual categorization of instances, and leads easily to the deductive and normative perception of reality. Quality is closer to the abductive and inductive worldview approaches[678].

Music in any form as a qualitative sense-perceived phenomenon is an actual complex system. As stated several times before, music (as an ontic reality) cannot be studied conceptually as such. We need to ”transcribe” it, or part of it, into conceptualized systems (an ontological reality), to design representative models, structural, or other, and to study and comment on those models. But that is not music, or any part of it; it is all systems[679].

5.4.2 System

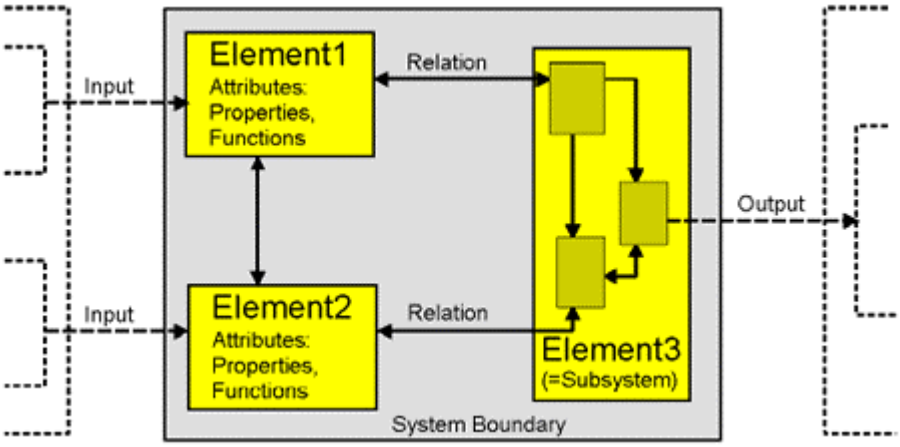
Several definitions of system appear in numerous places covering cybernetics, psychology, geography, systems engineering, and so on. System is designated in cybernetics[680] variously as an *object; set of variables, or components; arrangement of entities; any portion of material universe forming a unity or organic whole observed or perceived*. Various schools of thought exist in systems sciences and cybernetics. Generally speaking, for systems scientists systems seem to exist in reality but for many cyberneticians a system is an observer’s construct. According to Krippendorff, “systems neither exist independent of an observer nor imply a purpose”.[681]

673 Ibid.
674 See 2.1.
675 See 4.6.1.
676 See 4.4.9.
677 Mela 1999: 8.
678 See 1.2.
679 See Chapter 7, Conclusion – referring to categorization, terminology science, semiotics, deductive versus abductive world-view.
680 *WDCS.Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ASC/SYSTEM.html (06.10.2001).
681 Ibid.

The following is E. Igenbergs' definition of system, nearly as it is written, as well as his graphic diagram (*Chart 15)* because they include many useful concepts for our research purposes[682].

> A system is assumed to be *any object of thinking* that is *delimitable.*
> The delimited parts form the *environment*.
> The system has *properties* referring to the environment.
> The system has a *functionality*.
> It can consist of *sub-systems*, *which* interact by means of *relations*,
> thus, a system consists of *elements which have attributes (*properties and functions).
> *Elements interact* by means of *relations*. An element may be a system.

Chart 15



Igenbergs' description and diagram represents a typical *flow chart* systems model with *input*, *throughput*, and *output* sections/systems. The common inference is that by examining the output, the system of throughput can be understood. Thus, for example, it is expected that when we analyze a piece of music (which is the product or output of the brain of a composer) with the tools of analysis, the output of that analysis, or the analytical model, gives information on the musical piece; and we deduct: This is what the music of this composer is! – I do not wish to comment here on the fallacy of such a deduction.

An unambiguous definition of system is not possible because the various definitions of systems form a complex concept field: different scientific fields use systems with different denotations and connotations. We, however, can infer some basic outlines[683].

To cyberneticians, system is an observer's mind-construct, abstract ideas, assumptions, concepts, or thought-objects etc. To systems theorists, who

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682 Igenberg, E. *Systems Definition in Systems Engineering*. http://www.lrt.mw.tum.de/forschung/ systems-engineering/english/whatis_se.htm (06.10 2001).

683 See the comparison of cybernetics and systems sciences in 5.5.

support the General Systems Theory, systems are not necessarily only observer-based mind-abstracts, but also natural existing (actual) systems (e.g. the biosphere). Systems theoreticians design models, structures, types of systems (open, closed etc.), configurations, and the like. Cyberneticians stress the function of systems, systems as processes, complexity of systemic factors, and unreducibility of systems.

I prefer taking a cybernetic viewpoint but not to the point of radical constructivism[684]. To me, a manmade systems description is a tool in order to gain more understanding – be the system description a static-structural model, or a dynamic and organic one. I think that a system is always a complex concept; and a concept is always a conceptual system linked to other concepts and conceptual systems. In language, this is represented through texts and signs as semiotic intertextualism.

Connectedness and differentiation regulate complexity in cybernetics. Configuration, set, organization, etc. represent systemic connectedness. Differentiation is represented by super- and sub-systemicity, by the elements that have differentiating attributes, by systems types, etc.[685]

Mela's definition of system includes certain interesting details. "*A system* is a functional entity comprising subsystems and components. It is isolated from its environment by an imaginary of physical boundary. An entity made up of systems, is an actual system. In order to make calculations and measure functionality of an actual system, it is reduced into systems."[686]

The statement means that in systems thinking one has to use conventional conceptual definable measures, or invent new ones (interpretant, or sense in semiotics) in order to describe a system (or a actual system) as a construction and as an entity. In the case of music the Western musicological tradition has, in the course of its history, invented and conventionalized certain adopted musicological parameters (concepts): melody, rhythm, texture, form, etc., including models to represent them. By aid of these parameters we, for example, "measure the functionality" of certain musical pieces in certain styles: Is this composition closer to the rock-style than the country & western, or that one closer to Monteverdi than Bach? Defining a system is either 1. Confirming that an actual system meets with the criteria of an existing system = deduction; or, 2. Finding a system either through abduction/through cue or induction/through hypothesis. Quoting Mela again: "While reducing an actual system, we need to consider those properties of the actual system *in which we are interested*."[687]

First, this reminds us that there are several possibilities to present an actual system as corollary systems and on various scale levels. No system is the only existing one. This point in my opinion refers at the same time directly to

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684 Ibid.
685 See 5.6.
686 Mela 1999: 9.
687 Mela 1999: 9.

the scale level factor of complexity[688], and is crucial to the outcome of a possible systemic presentation (e.g. a supersystem, or a subsystem of a musical form).

I feel it is very essential to stress and even warn that strictly taken, a given system (which is a mental construction of the observer who is interested in *certain* properties of an actual system) is *one* of the possible systemic interpretations of the actual system examined[689]. Such an interpretation may start functioning as an authority in communication (in science and education) and may become naturalized or reified (in semiotic terminology), as is very usual in a society. But this is a semiotic matter, not the "fault" of systemicity itself.

This also explains why systemicity utilizes the idea of analogy[690]. It is possible to describe the same phenomenon through different analogous systems. For example, it is possible to analyze a texture of music as harmonization, or as polyphony. In this research when presenting systems of musicological parameters[691] and their models, I have had to select those properties I feel essential. I stress here again: those approaches and models are possible descriptions, not "the holy word", since nothing humanly conceptual is meant to be final as such. Mela[692] describes the characteristics of a system. System has a structure (related to properties and couplings between a system's components), and a function (related to stimuli and properties). A function is also a process happening in a system, and the advancement of the process reveals the state of the system at any single moment. At the start of the research of a system its throughput is not yet understood: it is a "black box". As more and more information is gained on the throughput, it turns to "grey" and finally white[693]. The process yields, for example, a mathemathical model for the prediction of the function of the system under study.

It is interesting to note that actually what we read or hear as conceptual explanations, commentary, criticism, etc., on music (such as music analysis – how a composition is made, or what it is stylistically, or what is music), we actually have there the conceptual output of the mental system(s) of those persons who explain, comment on and criticize music. These conceptualizations represent the system of their mentality and intelligence, not the actual system of the music involved and intended! Thus again: music is not musicological or other commentary, or conceptualization, on music – and vice versa[694].

The preceding statement by Mela also illustrates the process I experienced when modelling the examples of systemic approaches on musicological concepts[695]. For example, in the case of the considerable bulk of textual information on raga, I had to select those relevant properties I felt necessary to sort out various components and relationships emerging from the texts (by

688 See 5.6.3.
689 See Mela 1999: 9.
690 See below analogy 5.9.
691 See 6.2 Practical Demonstrations of Systemic Approach in Musicology.
692 Mela 1993: 9.
693 See also 5.8.5.
694 See also 2.1.
695 See Chapter 6.

Deva, Shankar, and Malm). I designed several tentative models going back to the texts over and over again and finally ended up with the saturated final model – which is *a possible* model.

We tend to take the established reified concepts as units of knowledge with which we structure systems. For example, we are used to teaching our students by saying that the major, minor, diminished or augmented chords are built out of the major and minor thirds on top of each other. In other words, the conceptual causation is upwards – from smaller interval systems to bigger chord systems. However, when pondering the question from another angle, we may use the statement by Mela[696]:

> "A system can be a part of a greater entity. Outside the boundaries of the system is the environment. A system can interact with its environment so that matter, energy and information is transmitted over the boundary. This happens in form of stimuli and feedback. Because of this interaction the structure of a system can change; an example of this is adaptation in biosystems. In such a case it is necessary to change the model of the system, or design the model accordingly so that it takes into consideration systems changing factors. In an exam a student commented 'system' aptly: 'A system, as such, does not necessarily survive, whereas an actual system can well do without a system."

To comment on the last sentence above: absolutely! – Music certainly survives without a certain kind of normative musicology. Still, if we wish to use systems thinking in understanding musicological phenomena, we may ask: If chord is a system then what is the necessary environment of chord? Is it texture/*satz*, or form? What are the conceptual boundaries of chord? It is obvious that when explaining chord we need to involve in our explanation all the environmental scale levels related to chord: at least interval, chord, and texture. If and when music is a system, then what is the necessary environment of music? What are its boundaries? What can matter, energy, and information transmit over its boundaries? These fascinating questions are outside the scope of this dissertation. We can give some answers at least in relation to musicological conceptualization. Descriptive (general) language overlaps with and flows into the side of the normative musicological terminology[697]. Semiotic-musicological[698] viewpoints overlap with those of terminology science. Tone system overlaps with and influences on form, on texture, on affect, etc. Concerning the "evolution" of tonality in music – are we entitled to say that tonality has survived but certain atonal systems have withered, or are bleak with anaemia?

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696 Mela 1999: 10 – 11.
697 See 2.7 Language as Design.
698 Using concepts from the field of semiotics.

5.4.3 Model

The concept of *model* is in cybernetic readings somewhat ambivalent, and may even overlap the concept of system; but generally it is considered as a representation of the object observed.

On model Mela writes: "A *model* is an abstract or physical artificial system describing the structure and function of a system. Well-known examples are miniature models and meteorological charts."[699] Models are designed and developed in order to understand systems qualitatively and quantitatively. They are also used in simulation and experimentation.

In musicology music notation, musicological-analytical terminology, formulas (e.g. chord progression I – IV – V7 – I = T – S – D – T, sonata-form description, etc.) and graphics (e.g. tabulatura) serve the purpose of models.

It is commonly presumed that music (actual ontic system) can be understood better through music theory (conceptual ontological system), which uses models (conceptual symbol system). It is likewise commonly taken for granted that music theory *is* music theoretical models. This is valid in traditional (academic and institutionalized) music education where theoretical models are also used as norms for making "good" music. A step away from "graphical music-making" is head arrangements (e.g. in pop-music).

Designing a model starts with a simple tentative model[700]. It should be intelligible and perspicuous but not accurate qualitatively. The dilemma appears while improving the model: How does one gain accuracy along with perspicuosity? This was my problem in designing a usable model for the systemicity umbrella[701]. The process of improving a systemic model appears to be an intellectual and mental process that I call abductive intergraphics, and interconceptual activity[702]. Several concepts and concept clusters are simultaneously present in a graphic model, whereas a verbal text is rather "one-dimensional and linear."[703] Thus, a graphic model is complex and contains a high degree of differentiation and connectedness. It may be scale thick[704], too. It is not quite correct to say that accuracy diminishes clarity. A simplified model rather is scale thin (and less complex), but this seeming simplicity and clarity looses richness in quality (and complexity). A complex model is a challenge for an observer to immerse into its complex conceptuality and intergraphical/interconceptual interpretations. Quoting Mela[705]: "A model is always an approximation. Still, it should include those properties which most influence on the functionality of the system under examination and convey enough information." [706]

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699 Mela 1999: 11.
700 Ibid.
701 See 5.10.
702 See 4.7.2.
703 See 4.7.1.
704 See 5.6.3.
705 Mela 1999: 11.
706 See also 4.4.13 on concept systems as models.

This statement is linked with the question of conceptual categories, especially with the question of prototypes[707]. It is interesting to notice how "identical" Mela's statement is with what Rosch[708] writes about categories: "the task of category systems is to provide maximum information with the least cognitive effort".

It is important to remember that a system (functional entity) is already a selected conceptual reduction of an actual system (a "broad, multi-functional and hierarchical whole") and a model is a simplified, reduced symbolic presentation of a system. This is certainly the nature of all music analysis. Certain musicological-theoretical courses apply this idea conversely: writing in the Palestrina style, Bach style, Mozart style, dodecaphonic and serial style, jazz modality harmonization, etc.

Further, writing on model, Mela[709] makes the following interesting statement: "In general the concept of time is included in mathematical models." In music, for example, an expected chord progression represents the expected sequence of "musical happenings". The sonata form requires the expected process of exposition, development and recapitulation: likewise the unfoldment of a raga: exposition, elaboration and culmination.

How does a model match the equivalent system? It should share the same quantities and magnitudes[710]. This is valid with music theory and the models representing musical theoretical concepts/systems. As already stated, the common understanding is that music theory *is* the models. The statement is highly meaningful and interesting when considering the similarity of the concept of model and of sign (in semiotics). *To me*, *a model is a sign* that envelops a signifier or interpretant/sense; in other words, that by which something is represented and signified: that which is represented. The border between these two aspects is fuzzy. The Peircean (or quasi-Peircean) alternative is to explain that a model is a sign that includes the sign vehicle (the form of amodel, e.g. notation), sense (a musical melody conceptualized by an individual observer), and referent/object/ thought of reference/symbol (the musical melody as ontic reality).

In this connection inevitably the idea comes to mind that if model is sign and model is always an approximation, then sign, too, is an approximation of something it represents. The same applies to the "parts", or aspects, of sign (signifier, signified, interpretant, representamen, etc.) whether in the Saussurean or the Peircean way. They must also be approximations. This viewpoint explains the huge discussion surrounding the nature of sign, its properties, and use (e.g. code, and modality[711]) in the semiotic past and present. *But more than that*, *it is also an explanation of why music notation is never music.*

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707 See 4.6.4.

708 Rosch 1978: 28, in Zitzen, see http://ang3-11-phil-fak.uni-duesseldorf.de/ ~ang3 LANA /Zitzen.html) (22.08.2000).

709 Mela 1999: 11.

710 Ibid.

711 Chandler, *Semiotics for Beginners*. Code. Modality. http://www.aber.ac.uk/media/ Documents/S4B/sem-gloss.html#S (29.08.2001).

5.4.4 Model Types

Models vary due to their structure. Mela[712] lists the following model types: *empirical models*, *block diagram models*, *physical models*, *circuit models*, *and mathematical models*. Niiniluoto[713] names *presentational*, *theoretical*, *analogical*, *imaginary*, *semantic*, *or mathematical models*. As we know, the systemicity of music is conceptualized through various graphical, "mathematical", even physical (musicological) model designs. Music is always voluntary activity of design by man; and compositions and musical pieces always exert an influence on other musicians, performers, and composers. Albeit being pieces of artwork, they also serve as conceptual models.

Many composers have expressed themselves through the painstaking design of music. Some of them have left documents of model designs for posterity. Perhaps the most famous case in classical music is Beethoven, whose compositional sketches, with good reason, can be considered as an abductive systemic search towards complex-logical entities through experimental models (sketches). He himself created his own models for systemic thinking. As the "secret" of Beethoven's seemingly free, even bizarre treatment of form, an explanation of a model has been offered: the principle of compensation[714].

Simplified and reduced models serve mainly the deductive use of representing only one or two levels of the complex reality. E*mpirical models*, on the contrary, are inductive test results in order to find a suitable theoretical system and model. Mela[715] writes: "Empirical models are test results, and do not generally have the same universal applicability as models do." Thus, empirical models can be considered those experiments of composers such as C.Ph.E. Bach or Debussy, which do not and did not necessarily become a model and a norm[716] due to "historical justification". They are and were too individual to be reduced to simplified models. Therefore, conventional academic music studies do not offer courses on, say, C.Ph.E. Bach's compositional style and models. Besides, experimental music (such as style-free individual improvization) is in great demand today and even favored because it does not require ready-made deductive-oriented models. From the historical perspective experimental models of music can be considered as prototypes of a formative era[717] – as we are used to saying now – which do not fit into the ideal model "found" or developed later. Thus, C.Ph. E. Bach was "proto-romantic", D. Scarlatti "proto-classic", and so on. There are, of course, musicians, or researchers – such as Wanda Landowska – who do not agree with these definitions. Neither do I.

The closest to *block diagram models* that come to my mind are the excerpts of notational scores used as parts of the systemic-analytic presentation of

712 Mela 1999: 11.
713 Niiniluoto 1980: 205-206, in Karihalme 1996: 61.
714 See *OIMTS*, Vol: 314.
715 Mela 1993: 11.
716 See my comment on Krohn, Riemann, Schenker, Křeneck towards the end of Chapter 5.6.4.
717 See Borroff; 5.7.1.

musical pieces. The closest to *physical or mechanical models* are maybe the graphic notations (in larger scale from the 1960s onwards and, for example, the cluster notation) which "visualize" how music should happen through performance in time, or the Schenker-analysis reports where one can examine several musicological (textural) layers simultaneously. In musicology, nothing corresponding to *circuit models* comes to my mind. Letters and numbers (e.g. thorough bass, harmonization) are used abundantly in music analysis (e.g. voice leading rules,) and they represent *mathematical models*. Their information value compared with the actual ontic system they should represent is sometimes ridiculous. It is a bit difficult to think what other models are used in musicology. Whatever they are, they certainly are models related to and imposing norms on musicological systems.

It is similarly important to think of the degree of the conceptual abstractness of models. The gradation from the concrete to the abstract seems to be roughly: physical – mechanical – block diagram – circuit – mathematical. To prove this is just to give a line of chords marked in thorough bass and ask who is the composer. Absurd indeed! The closest, so far, to the "visual reality of" movement of music in the dimension of time is score notation and music graphics.

5.4.5 Traditional Models in Music Analysis

The problem of modelling life music is that there are always several factors present: form, texture, rhythm, timbre, dynamics, narration, and affect, text – music relationship, etc. A musical piece is a complex actual entity and a system. As stated before, modelled complexity often contains too much information at a time. Therefore, typical music analysis uses one or a couple of model levels at a time.

The typical process and factors of a traditional theory-based analysis of a musical piece and its systemic levels are:

Actual system level: a composition as played by musicians and heard by listeners. To help this, the musical piece is often written in the form of notation, in minor or major detail (depending on the musical style), for the performers.

System level: systemic conceptualization of the musical piece by a listener. In order to be understandable and believable as performers, expert musicians must conceptualize the musical piece logically in their minds. On this level, an expert listener may find several identifiable systemic factors (of musical parameters).

Model level (mainly used for educational and scientific-professional purposes): in unnotated music, or in head arrangements, the models are communicated verbally through the agreed terminology and concepts and by playing the necessary systemic models. In case of notated music, a score ("block diagram")

is used as a helpful tool in finding the necessary systemic factors. In such a case, a score acts as an intergraphics. The scores of complex musical textures, say the orchestral pieces of Richard Strauss, or Debussy, are useful tools for examining various conceptual levels, but reading them requires much practise. It is understandable how difficult it is to analyze, e.g. a Gamelan music texture without a written score. The same is the case with a great part of modern Western classical music where systemic models are missing or difficult to reduce. In such cases it is not easy, or it is even impossible, to talk about models in the systemic sense[718]. This is perhaps one reason for the rise of narratology in explaining music, which allows various inductive verbal descriptions of music.

The typical parameters taken into consideration in the traditional deductive music analysis of a composition, or a musical piece are:

Form (overall form and details: movements, sections, periods, thematic and other structures even to the level of kernel motifs, type motifs) and "explanation of the narration" of the musical piece. Combined with this comes:

Textural analysis: texture types, texture contrasts (explained as harmonization, polyphony, heterophony, drone, etc.) This overlaps with form.

Rhythm: usually basic beat/metre, and idiomatic surface rhythm patterns. This overlaps with form in some details.

Tone system: key structure of the piece, important tone (or tonal) systemic sections relating to the overall form and detailed form of the piece, idiomatic tone (or tonal) formulas, and other details.

The parameters with less universal descriptive systems include *dynamics*, *orchestration and timbre*, *narration related to music*, *text – music relationship*, *affect and moods* (emotions), *aesthetical contents*, etc. Some of these are used as verbal "decoration" to clothe the deductive model skeleton in order to make the total model sound individual and original to the composer. The best model-based explanations of musical pieces can be very good and imaginative, if the systemic and complex possibilities are used intelligently by linking them to aesthetical, philosophical and cultural-mythological values and interpretations. Still, in all their conceptual complexity and colorfulness they are musicological reductions approaching *belles lettres* and other levels of human abstractions.

In order to see how I present possibilities of the systemicity of music as models (intergraphic diagrams) see Chapter 6.

718 See the properties of model 5.4.3.

5.4.6 Component

Mela[719] states that components are basic elements of systems and components "have characteristic units of the system." Although the latter part of the definition is a bit vague, it can be compared with the definition by Igenbergs in 5.4.8[720]. For the purposes of research, components can be isolated. Coupling components gives the system its structure. Components, or elements, with their properties or characteristics, are necessary in developing models of systems. Here once more is what Igenbergs meant with system:

> A system is assumed to be *any object of thinking* that is *delimitable.*
> The delimited parts form the *environment*.
> The system has *properties* referring to the environment .
> The system has a *functionality*.
> It can consist of *sub-systems that* interact by means of *relations*
> thus, a system consists of *elements which have attributes (*properties and functions).
> *Elements interact* by means of *relations.* An element may be a system.

This describes music well as an ontological system at the musicological level based on classical categorization with accepted conceptual limits[721]. Ontologically speaking music, thus, is a musicological system, the components (or elements) of which are (when we wish so to observe) the above mentioned musicological parameters that couple between each other. On the other hand, the component parameters themselves are characteristic units, or systems that can be reduced to models (such as harmonization to chord structures). Commenting on component Mela writes: "The functional equation of each component is generally well-known or the equation can be defined empirically by measuring force and flow…"When the structure of a system is known it is possible to develop a mathematical model for the whole system in grounds of defining equations of components"[722] – This sentence is a splendid explanation of the "invention" of serial music. It is evident that for the purposes of serial composition, music was considered as a system of "mathematical" components. And as the "functional equation of each component *was* generally well known the equation could be defined empirically by measuring force and flow" (=dynamic movement of music, as it was experienced from the traditional premises).

Mela[723] writes on the nature of components: "Components are *active* or *passive*. An active component brings energy to the system from its environments. A passive component dissipates, stores, transfers, or delivers the energy of a system ."We may think that the "energy" of music is mental moods, feelings, emotional expressiveness, and narration of feelings. We may think that the "environment" of music is all other mental culture, especially literature, arts, history, etc., from which the "energy" flows into music.

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719 Mela 1999:14.
720 Igenbergs uses the term element and properties in the same meaning.
721 See 4.6.1.
722 Mela 1999: 14.
723 Mela 1999: 14.

In this light, perhaps the most active component of music has been melody, which has brought "energy" (as defined above) into music from the features of human language[724]. Another active component is timbre, or tone color, especially a certain timbre. In several traditional music cultures and styles, instrumental timbre simulates human voice, sounds, and other features of natural "noises". In the modern (art music), I feel, the timbre is meant to simulate percussive sounds and noises. An example of a passive component of music is any musicological parameter that transfers expressive (of movement?) capacity or energy to another parameter. For example, a musical piece can be very expressive (e.g. aggressive) rhythmically while the melodic element is subdued, similarly in an expressive recitation the melodic contour "draws the energy" from rhythm.

In order to compare how similar ideas of component exist in the sciences examining concepts, categorization, etc., see also 4.4.3 on Concept Characteristics, 4.6.1 on the Classical Category View (especially componential analysis), as well as 4.6.5 on the Prototype Theory and Category Features.

5.4.7 Analogy

In defining the role of analogy in systems thinking we need to go back to the definition by Mela: "Systems thinking is a method that can be used to integrate different branches of science *on a conceptual level*. The integration is based on perception of phenomena that are analogous in different disciplines."[725] This is exactly the point I am driving at. Systems thinking is the tool by which the theories and disciplines I have selected can be matched against each other. Mela gives several good reasons why analogy should be used in developing systems thinking[726]. I have slightly modified the text.

> "Analogical systems are functionally but not necessarily structurally similar. Functional similarity means that resembling [mathematical] equations describe different systems. Parallel analogical systems have resembling components. Analogy differs from model in the sense that analogy does not have physical similarity; thus, the units of variables describing otherwise analogical systems are different…Generally speaking, analogy facilitates analysing the functions of new unexplored systems by comparing them with the functions of already known systems. Analogies have an essential role in systems thinking because they facilitate standardization of quantities, graphical symbols, and [circuit] models of systems. In addition, analogies enhance the simulation of the dynamic behavior of systems. The use of models and analogues may uncover features of systems which are otherwise difficult to measure or observe."

As the reader has noticed, an extensive use of analogies is a prominent feature of this research. They are most necessary in proving the complexity of conceptual reality and in opening up new creative possibilities of presenting

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724 See *OIMTS*, Vol 5: 330, Chapter *Tekstisidonnaiset muodot* = text bound forms.
725 Mela 1999: 3.
726 Mela 1999: 14 –15.

conceptual musicological knowledge in science, education, and pedagogy. For a more theoretical presentation of the concept of analogy, see Chapter 5.4.7.

5.4.8 Some Conclusions on Systems Definitions

It is important to make the difference between the *observed object* (which is the ontic reality; for Mela it equals actual system), the *perceived object* (which is the conceptualized ontological reality), and the *model* that is the symbolic representation of the perceived object. The last sentence implies the constructivistic paradigm. Cybernetics is very much constructivism. *In this light musicology is the conceptualized ontological reality constructed by observers.*
The readings on psychology[727] treat system from the cognitive viewpoint as a "more or less well structured set of ideas, assumptions, concepts and interpretative tendencies, which serves to structure the data of an area of science…"

Readings on geography[728] treat systems as "places" of circulation, flow (input, throughput, and output), or movement of sets of interrelated parts giving and receiving (energy). In geology, it appears that the systems boundaries of phenomena and the interactive geological elements of that system are difficult to establish. Geological happenings are usually related to the concept of entropy[729], which is an element of complexity. The importance of systems hierarchy (supersystem – subsystems) is essential as well.

5.4.9 Systems Types in Systems Science and Cybernetics

The following division of systems scientific and cybernetic systems types is not meant to be taken absolutely categorically. These are examples of presenting the main goals and needs of these fields in various ways.

Rigidly Controlled, Deterministic, Purposive, Heuristic, and Purpose-Seeking Systems in Systems Science

For systems scientists systems are not only natural mechanisms but also very much sociological, cultural and psychological "facts" explaining the function of a society and an individual in it. Bela Banathy[730] gives first the two major systems types: the *natural systems* and the *designed* ones. To designed systems belong everything man designs, *material* or *abstract*. To abstract conceptual systems belong such things as theories, philosophies, mathematics, etc., and

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727 *The Penguin Dictionary of Psychology* 1995. http://www.xrefer.com/entry/156972 (06. 10. 2001).
728 *A Dictionary of Geography* 1997. http://www.xrefer.com/entry.jsp?xrefid=611040 (06. 10. 2001).
729 See 5.4.9.
730 Banathy 1996/1997. http://www.isss.org/taste.html (06.10.2001).

their representations (books, records, descriptive and prescriptive models), as well as *human activity systems*, which means human organized activity with its material and abstract systemicity.

Education and pedagogy belongs to human activity systems. Banathy divides human activity systems into *rigidly controlled*, *deterministic*, *purposive*, *heuristic* and *purpose-seeking* types basing them on the degree of their closure or openness, mechanistic or systemic nature, unitary or pluralistic position in the society, as well as on the degree of their complexity. He also gives various examples of different types in the field of education. Centralized (national) educational systems are deterministic. Public (local-aerial) education systems are purposive, usually unitary, although they are very complex. Experimental educational programs – with their own goals under some biased policy guidelines – may be somewhat pluralistic (complex and systemic) but they have the possibility to be heuristic. Purpose- seeking systems are complex, systemic, open, and pluralistic. They have a vision of the future, "they define their own policies/purposes and constantly seek new purposes and new niches in their environments." Examples of purpose-seeking systems are "communities seeking to establish comprehensive systems of learning and human development and to integrate their social service functions, and societies/nations establishing integrated regional systems."[731]

The division above represents clearly so-called "soft systems". I have used these systems type definitions for my purposes in Chapter 5, where the human activity systems by Banathy appear *showing the connection of (music) education with systems sciences (musicology as theory and philosophy), as well as with semiotics (musicology as a scientific, possibly dominant, code).*

From a systemic approach viewpoint, rigidly controlled and deterministic educational systems should be absolutely abandoned in the "ideal" music education and more room should be given to heuristic and purposive-seeking educational systems.

Closed System, Open System, Supersystem, Subsystem, Metasystem, Entropy and Negentropy in Cybernetics

I have not found in texts on cybernetics the categorization of systems types as defined above. At least to Krippendorff "Systems neither exist independent of an observer *nor imply a purpose* (compare with purposive/purpose seeking systems above). He also states: "Unlike in general systems theory, in cybernetics, a system is an observer's construct."[732] – At least for Banathy, who represents systems sciences, designed systems are very much an observer' s constructs.

The more or less pure cybernetic view stems from technology, automatism, and machines. Systems are mainly an observer's mental constructs and structures, in one form or another. This attitude appears in the typical

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731 Ibid.

732 *WDCS.Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ASC/SYSTEM.html (06.10. 2001).

cybernetic writings. Purposes, purpose-seeking heurism, and the like are not easily accepted. Therefore, the cybernetic view sounds "clinical" and observational with less interest in the past or the future. Systems are considered mainly as mechanisms the functions of which can be observed from outside. This also concerns human, biological, social, or psychological systems.

From cybernetics I introduce the following important systems types: closed system (out of which I comment on autarky), open system**,** supersystem, subsystem, and metasystem. I also comment on the interesting nature of entropy, knowing of which is necessary for understanding complexity as well as the nature of information. A *closed system* has clear boundaries letting nothing in or out. It has no interaction with its environment. Its behavior is explainable from within. In such a state the state of entropy neither decreases. Systems closed to energy are autark[733], systems closed to information are independent, and systems closed to organization are autonomous.[734]

In musicology, some normative theoretical study courses in certain institutions (e.g. thorough bass course, counterpoint course, form analysis course, etc.) have become closed conceptual systems[735]. In extreme cases, the theoretical-conceptual rules have become fixed and no exceptions are allowed. New information ("mind energy) is considered a danger and the conceptual system is isolated. This is linked with the educational or pedagogical status of the institution (established style or school), or a teacher. Such an institution, or such a teacher, wants to be autonomous and independent.

An *open system* is flexible; it is open to new input, it may grow and change, its boundaries are open, and it receives input and produces output. Open systems change their behavior due to the conditions outside their boundaries. Most systems are usually closed or open to certain influences. "Adaptation, learning and all manifestations of intelligence require some openness to information".[736] "In the study of communication, a system is called 'open' if any arbitrary message can be expressed. In this sense, only human languages([737]) are truly open."[738] This means that the complexity of human language makes it possible to create new concepts and expressions for them. Due to their organic complex nature it is impossible for linguistic definitions of concepts to be final. These are some of the reasons why the closed concept systems in musicological pedagogy are doomed to fail, sooner or later. Examples of complex concept

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733 *WDCS.Principia Cybernetica Web*. http://pespmc1.vub.ac. be/ASC/AUTARKY.html (14. 12.2001).

734 *A Dictionary of Geography* 1997. http://www.xrefer.com/entry/608667 (06.10.2001); *WDCS.Principia Cybernetica Web*. http://pespmc1.vub.ac .be/ASC/OPEN_ SYSTE. html (06.10.2001).

735 See an example, 6.2.4.

736 *WDCS. Principia CyberneticaWeb*. http://pespmc1.vub.ac.be/ASC/OPEN_SYSTE. html (06.10.2001).

737 "Human language is such a complex phenomenon that linguists have found it impossible even to agree on a theory that adequately explains what language is, much less a comprehensive description of the rules that make it work." *Compact American Dictionary of Computer Words* © 1995, 1998. http://www. xrefer.com/ entry. jsp?xrefid= 623188&secid=.-&hh=1 (14.12.2001).

738 *The Penguin Dictionary of Psychology* 1995. http://www.xrefer.com/ entry.jsp?xrefid= 153198&secid=.- (06.10.2001).

systems in musicology are systemic-fields of thesauri[739] that give long lists of term-concepts associated to a term.

A *supersystem*, according to Krippendorff[740], is "the larger system that contains the system of interest within a subset of its variables… System and supersystem as well as subsystem and system are related by a part-whole relation." Conversely, *subsystem*[741] is "part of a larger system and defined within a subset of variables of that larger system." Krippendorff, points out that "subsystems may be delineated by an observer but they may also maintain their own identity and boundary (see autopoiesis) independent of the distinctions drawn by an observer." On the substructure level, overlapping may exist representing interdependencies. This explains, for example, why texture/*satz* of music can also be considered as a form of narration, or tuning as a component of tone system.

Supersystem should not be confused with metasystem[742], which (modified from Krippendorff's explanation) means the involvement of the human mind at its highest level acting upon the lower systemic levels. These are generally accepted rules of behavior, decisions, moral codes, motivation, consensus, beliefs, and taboos imposed on individuals by the society.

When comparing the cybernetic metasystem theory with the social semiotic principles, many similarities can be found. For example, various semiotic codes serve the interests of metatheoretical social ends (science, education, etc.). My conclusion, too, is that scientific paradigms are a part of the metasystemic complexity. Any philosophy, theory, ideology, and worldview that regulates the values of individuals and groups can be called a metasystem. Musicology, or any school of musicology, functions as a conceptual metasystem for scientific and educational purposes. This is not a bad thing, it is necessary. Yet, it is similarly necessary to become aware of its workings, and there semiotics can help us to become aware of the influences of metasystems.

In order to understand the idea of systemic complexity it is necessary to introduce the concept of *entropy* (Greek, 'transformation). This concept is very interesting but also problematic because of different, even contradictory interpretations of its nature[743]. It aims to explain the behavior and prognosis of systems, especially of isolated systems. The term has been originally used in physics, i.e. in the study of heat (second law of thermodynamics); and it is described by mathematical calculations of the disorganization of a system. The usual deduction means: the more entropy the more disorder. The concept of entropy has also been used in the cognitive theory (associated with uncertainty), in the psychoanalytic theory (associated with the degree of

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739 See an example, 6.2.2.

740 *WDCS. Principia Cybernetica Web*. http://www.pespmc1.vub.ac.be/ASC/SUPERSYSTEM.html (06.10.2001).

741 *Web Dictionary of Cybernetics and Systems. Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ASC/SUBSYSTEM.html (06.10.2001).

742 *WDCS. Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ASC/ METASYSTEM.html (06.10.2001).

743 See entropy, for example, in *WDCS. Principia Cybernetica Web*; www.xrefer. com, or Stonier 1990. *Information and the Internal Structure of the Universe*.

psychic energy), and in social psychology (associated with social change, and social progress)[744].

In the texts on geography one can find the following definition including the concept of energy, which to me, is analogous with communication of concepts through language: "As an isolated system tends towards equilibrium, entropy increases; thus, it is the tendency of a system to move from a less probable (ordered) to a more probable (less ordered) state. As the amount of entropy in a system increases, the amount of free energy in that system decreases."[745] This means that in an isolated closed system (which does not take new input) the energy flow is stagnated. Human language, as stated above, is by nature an open system. However, there can be situations when language ["*communication energy*" – my neoterm] no more serves a scientific or educational change and progress but becomes a cause of conceptual stagnation. The conventional and conceptually isolated use of musicological terminology[746] may turn against itself: it does not inform any more. Examples of this kind of stagnation are musicological glossaries where, for example, a sonata is described as "a musical work of three or four movements for a chamber group".

Bloomsbury Guide to Human Thought[747] defines entropy in three ways: 1. Connected to the second law of thermodynamic "nothing ever works with perfect efficiency"; to me it means that the functions of the parts of a system do dot perform their work maximally: 2. Entropy measures "the number of ways that as system can arrange itself…a measure of disorder"; to me it means that in an entropic system nothing can be identified as prominent; neither as differentiation or connectedness – if we use the criterion of Heylighen's definition of complexity. 3. Entropy measures the amount of information, as endorsed by Shannon[748]: the more entropy the less information, the more structured and coherent the more information. More of the interesting relationship of information and on the controversiality of entropy can be read in the following chapter.

For my purposes, I prefer the concept of entropy in light of complexity as explained by Heylighen[749] because in his definition he uses defineable systemic factors of distinction and connection: they can be somehow measured, they connect to the scale level factor which is very necessary in explaining hierarchies of concepts, whereas the concept of disorder as a sole explanation of entropy is semantically too vague and immeasurable. Complexity taken into an extreme approaches entropy, the state of disorder, which is the fate of all isolated systems in the course of time: a lot of differentiation but very little connections of those very different elements. If a musicological-conceptual

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744 Arthur Reber in *The Penguin Dictionary of Psychology* 1995, © 2001 xrefer.com. http://www.xrefer.com /entry.jsp?xrefid=149589&secid=.- (06.10.2001).

745 Susan Mayhew*A Dictionary of Geography*, Oxford University Press, © Susan Mayhew 1997 © 2001 xrefer.com. http://www.xrefer.com/entry.jsp?xrefid=609177 (06.10. 2001).

746 Especially formalistic musicology.

747 © Bloomsbury 1993. © 2001 xrefer.com.

748 Ibid.

749 See 5.6.1.

analysis of a musical piece uses very versatile, including rare, or invented neo-concepts, multifarious linguistic styles and analytical methods the result for a reader is extreme complexity, the coherence and reliability of which is difficult to assess. The opposite of entropy is negentropy where everything is rigid and well–structured: little differentiation but a lot of connections of those few different elements. In musicology especially elementary courses of music theory consist of negentropic concept structures.

5.4.10 On Entropy, Energy, Concepts, Information and Knowledge

Entropy is also the interest of information theoreticians. *The Penguin Dictionary of Psychology* states: "when an ensemble is highly structured and not characterized by randomness both entropy and information are low."[750] According to this, the more a system includes different elements (of what is distinct), the more it gives information to the observer. However, a different idea is given by the *Bloomsbury Guide to Human Thought*[751] "Entropy may also be considered as a measure of information. If we know that all the particles are in the corner, we have considerable information about them. However, if they are spread out, all we know about a particular particle is that it is in the box somewhere! Paul Shannon has shown that entropy and the transmission of information are closely related." Tom Stonier, an information theoretician, disagrees with Shannon, as also does Erkki Karvonen (see below).

Stonier[752] considers that as there is energy in various forms: mechanical, chemical, electrical; heat, sound, light, or nuclear energy, similarly there is information in many forms. He also thinks that information is connected with organization: the more organized (=less entropic) system, the more information we have[753]. To him structure in general represents the product of information interacting with matter[754]. From this I infer the following application to conceptuality: *concepts are systems and systems are organizations, or structures, therefore concepts are a form of information.*

As stated above, when the amount of entropy in a system increases, the amount of free energy in that system decreases. Similarly, as there is less organization, thus information does not flow and cannot exist in various forms. Respectively, knowledge cannot develop because informational data/material is lacking in amount, or it is missing. Taking the matter to the metasystem level: it seems that in philosophy, in a scientific paradigm or field, in education or pedagogy, the metasystem behind can become, for some reason, isolated, and closed. This happens especially in the application of the deductivist-positivist

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750 The Penguin Dictionary of Psychology 1995, © 2001 xrefer.com. http://www. xrefer. com/entry jsp?xrefid=151210&secid=.- (07.10.2001).
751 http://www.xrefer.com/entry.jsp?xrefid=343870 (06.10.2001).
752 Stonier 1990: 9.
753 Ibid.: 15, 25-26
754 Stonier 1990: 74.

paradigm. In musicology[755], this has resulted in the "academization" of musicology[756].

In many places of this research I have referred to the concepts of information and information theory. Knowledge is another concept that in everyday language and concept use overlaps with information. It would be a long and elaborate story to go deeply into the question, meaning, and difference of these concepts. Earlier, in the time of Shannon information was closely connected to the use in communication technology, and this trend lead to more sophisticated fields of, for example, artificial intelligence, computer science, cybernetics, coding theory, etc. In practise they have to do with quantifying, coding, and transmitting the data representing information (through characters, numbers and symbols) as formal code systems used for its transmission and storaging. In this sense, the information theory is interested in measuring and modeling the amount of randomness, probability, and surprise value of the data representing the amount of information by the aid of various mathematical logic, procedures and symbols. The most common tool for this is the concept of bit. However, this branch of information theory is not concerned with the importance, meaning, or content of that information (ibid.) because at human level this may vary individually. This is at least the case with the reception and perception of music. Although in this research paper I do not go into the mathematical principles of the information theory because I examine information and knowledge from non-technical and basic philosophical-theoretical viewpoints I am interested to link them to the cybernetic and systemic concept of entropy.

After perusing several texts on information (xrefer.com-sources[757], Shannon, Bateson, Krippendorff, Hornung[758], and Stonier) I came to a frustrating conclusion: various definitions of information are contradictory and can mean at least any of these: information is *content*, *form*, *organized data*, *understanding*, *facts*, *experiences*, *knowledge*, *that which reduces uncertainty*, *that which changes us*, *energy*, etc. Concerning the nature of information cybernetic texts usually stress the formal and mathematical aspect of information as a calculable probability of change of an array of a structured system. This is naturally related to the cybernetic idea of entropy – negentropy, and thus related to complexity and systemicity.

In his article Ovatko ohjelmanpätkät "tietoa"?[759], Erkki Karvonen points out that in general language knowledge is description of the world as it is, and information is communication of this description. He stresses the importance of distinguishing conceptually between the technical definition of the information society and the contents-wise definition of the knowledge society. In his Internet lecture *Johdatus viestintätieteisiin. Luento 2. Tieto ja informaatio*

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755 Applied musicology.
756 See also above closed system.
757 *The Penguin Dictionary of Psychology* 1995; © 2001 xrefer.com. http://www.xrefer.com /entry.jsp?xrefid=151210&secid=.- (07.10.2001).
758 *WDCS. Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ASC/ INFORMATION. html (07.10.2001).
759 http://www.uta.fi/~tierka/hsinfor.htm (07.10.2001).

(Introduction to media sciences. Lecture 2. Knowledge and Information)[760], he explains in more detail the difference of the concepts of information and knowledge, agreeing with Tom Stonier (see below). For me, this means that **knowledge is more of content** (and quality: meaningfulness, and differentiation) and **information is more of form** (and systems; which means connections) representing the possibilities of necessary systemic complexity. *This also means that the world is an actual system which is reduced to systemic conceptual knowledge, and is communicated through reduced conceptual models (= information) representing systems.* Related to music: music belongs to the actual system level, which in the minds of man is reduced into systemic-conceptual knowledge (e.g. programmatic content of a musical piece) and communicated through reduced conceptual modfels (e.g. leitmotivs, themes, sections, etc) of a musical piece.

To me, the most interesting texts were those of Stonier, who sensibly can make the difference between information, knowledge, and meaning[761]. He points out that information is connected to the aspects of conveying, and surprise value[762]. It is most valuable for an educationist, also in musicology, to understand the necessity of logical surprise value in pedagogical situations because it increases conceptual complexity and enhances better understanding on the part of the students.

It interesting to note that, in fact, Stonier seems to mean – although he does not say it directly – that high information is neither entropy (as Shannon et al. think), nor negentropy (as the Neo-Shannonites, e.g. Brillouin, think) but between the two: it is *organized complexity*[763]. The more differentiation and connectedness is present, the more information[764] we have. My conclusion is this: from the viewpoint of the concepts research and *for the purposes of this dissertation I take information as complexity of conceptualism manifested in semiotic intertexts.*

Stonier's view of the role of information is visionary. The ultimate thermodynamic death of the universe, because of the increase of entropy, is a widely accepted scientific view. Stonier, who is interested in developing a General Theory of Information, states[765]: "Although entropy may be increasing throughout the universe, so is information. The universe, rather that ending up as a uniform soup of particles with very low energies – the entropic death – may instead, end up in a state in which all matter and energy have been converted into pure information."

The point of Stonier's book is to prove that information is an existing thing, and not an abstract constructivistic-cybernetic idea without any reality. Towards the end of his book, Stonier presents his idea of *infons*:[766] particulate forms of information comparable with phonons and exitons. Thus, his

760 http://www.uta.fi/~tierka/Viestverk/vvperusk.htm (12.03.2002).
761 Stonier 1990: 17-18
762 See Stonier 1990: 55 and . P.o. 26
763 Compare e.g. Stonier 1990: 41
764 See also F. Heylighen on systemic complexity 5.6.
765 Stonier 1990: 53.
766 Stonier 1990: 131-132.

philosophical standpoint is somewhere between a systems scientist (who accepts natural systems) and a strict cybernetician.

To add my own spice to the soup, I define the difference of information and knowledge in the following way: knowledge and information are the formulated and articulated (ontological) conceptuality (about the ontic truth). However, knowledge and information are not the same thing. Information is **"value-neutral"** formulated conceptuality; it has not necessarily the same truth-value as knowledge has. A lot of information about a matter does not necessarily add to its truth-value as digested knowledge. On the contrary, the more information offered, the more susceptible may become the information receiver, who finally closes his/her ears to the information. Knowledge is knowledge because of its function; which means to exercize power of influence with authority. Knowledge has authority; it is authority; it is influencing. Knowledge governs and affects on the behavior of man, who is the knowledge holder and knowledge receiver. Knowledge causes conceptual and behavioral changes in man. When somebody *knows* something (e.g. "I know"), he feels and believes he possesses the truth about it. We cannot say, "I inform" in the same sense. Knowledge is transmitted through communication as concepts. (Information is also information transmitted as concepts.) The most commonly accepted and honored knowledge is vested in the form of science. Science is knowledge by and of an authority. It gains and sustains its authority through the act of pedagogy and education. Public scientific activity is always some sort of education of society. Authority empowers knowledge with energy (= power of effect and change). Knowledge is mind energy. It is active conscious conceptual capacity to change its receiver and its sender.

My point here is not to try to prove any given information theoretical viewpoint as the only one but to show how semiotic intertextualism works resulting in various interpretations of a systemic conceptual phenomenon, of information. As we can see, the concepts of information and knowledge, as many other concepts, are not at all clear; their conceptual-systemic boundaries merge into one another. We could say daringly: *information is a conceptual mixture of ontic physical and ontological conceptual complexity; information is transformation between ontic and ontological*[767]. Therefore we should also consider concept (= information) as a complex system.

5.4.11 Information Theory and Music

Information theory was favored in music theory circles and linguistics especially in the 50ies and 60ies and it was continued by some individuals in the 70ies. One of the most influential book to start this movement was Leonard

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767 An interesting, very different viewpoint of information- in relation to concept of knowledge can be found on the ISSS opening web page: " Knowledge is not information...Knowledge is transformation." – Ona Billboard. http://www.isss.org (07.10.2001).

Meyer's *Emotion and Meaning in Music* (1957)[768]. Information theory has been used in music analysis and the aesthetics of music in attempts to analyse musical content, style and perception.[769] Among the many researcher along these lines, besided Meyer, have been Youngblood, Moles, Krahenbuel and Coons, Hiller and Bean, Böker-Heil. The range of music thus analyzed has covered mainly traditional folk music and classical established music of Renaissance, Baroque and even later up to the music of Schoenberg and Berg. More recent application of information theory has been done by Conklin, Witten and others in the 80ies and 90ies. Its applicability in the research of arts is based on probability and expectation because "in the arts what information theory calls 'redundancy' (namely, confirmation of expectation, non-information) plays a special role in creating form and structure."[770] Today information theory is closely linked with computational procedures, and as we know, computer helps in dealing with great amounts of feeded data very effectively and accurately which manualy is painstaking and elaborate.

To my understanding, the application of information theory favors deductive viewpoint and is suitable in interpreting deviation from the expected rules of music in limited contexts. If we, however, wish to measure the amount of information of a completely new musical style it would require a huge amount of fed data of the cumulated in the musical styles of the musical histopy of man. This task sounds downright baffling. This also raises the question of what kind of information can be considered as artistic information, and at what point the quantity of information turns into quality of art. Is it the amount of deviations of expected, or the quality of the deviations?

5.5 Cybernetics and Systems Science with References to Musicology

According to *Principia Cybernetica Web*[771], cybernetics can be defined in various ways: the science of *communication and control* in the animal and the machine (Wiener, a mathematician and social philosopher); the science of *government* (Ampere); *experimental epistemology* concerned with the communication within an observer and between the observer and his environment (McCulloch, a philosopher); the science of *effective organization* (Beer, a management consultant); *study of form and pattern* (Bateson, an anthropologist); *a way of looking at things and a language for expressing what one sees* (Margaret Mead, an anthropologist and social psychologist). Cybernetics is interested in an

768 Huron D. (2001). *Information Theory and Music*. http://dactyl.som.ohio-state.edu/Music 829D/ Notes/ Infotheory.html (30.11.2003).
769 *Grovemusic*. Information theory. http://80-www.grovemusic.com (18.11.2003).
770 *Grovemusic*.Analysis, §II: History. 5. 1945-70. http://80-www.grovemusic.com (18.11. 2003).
771 *WCDS. Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ASC/CYBERNETICS.html (08.10.2001).

interdisciplinary approach to organization, irrespective of a system's material realization. *Principia Cybernetica Web*[772] states:

> "Whereas general systems theory is committed to holism on the one side and to an effort to generalise structural, behavioral and developmental features of living organisms on the other side, cybernetics is committed to an epistemological perspective that views material wholes as analysable without loss, in terms of a set of components plus their organization…The disinterest of cybernetics in material implications separates it from all sciences that designate their empirical domain by subject matters such as physics, biology, sociology, engineering and general systems theory. Its epistemological focus on organization, pattern and communication has generated methodologies, a logic, laws, theories and insights that are unique to cybernetics and have wide-ranging implications in other fields of inquiry."

In simpler language: systems sciences/theory strive at generalization, finding similarities and universalities holistically in "the ontic multitude"; cybernetics strives at finding methods to analyze and explain wholes how they are composed and organized together from the epistemological viewpoint of an observer, be it animal, or human being. The latter viewpoint inescapably means a wish to control the reality by intellect and concepts. As to the definition attributed to Margaret Mead (above), I think it is vague.

We can conclude that if and when musicology is anything conceptualized about music – e.g. music history, music aesthetics, music sociology, music theory and music analysis across any musicological field and science – then it belongs to the interest of cybernetics. Music making and music education belong to human activity systems, which is rather the field of systems sciences[773].

It is customary to divide cybernetics into two fields of interest, *first*- and *second-order cybernetics* (von Forester). First-order cybernetics[774] examines systems from outside; second-order cybernetics involves the observer as well. I have used for my purposes the tenets of second-order cybernetics. **"**Second-order cybernetics is a more recent development, [it] involves the observer as a constitutive part of a circular organization and is concerned with self-reference, epistemology, autonomy, self-government, autopoiesis to name just a few phenomena (Krippendorff)."[775] Conceptuality is self-referring, observer-dependent, epistemological, etc. Thus, musicology, by and large, belongs clearly to the field of second-order cybernetics.

Heylighen, Joslyn and Turchin[776] point out that in practise cybernetics and systems science (General Systems Theory) form a "fuzzily defined academic domain" which touches practically every traditional discipline from

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772 Ibid.
773 See 5.4.9; 5.10.1.
774 *WCDS. Principia Cybernetica Web.* http://pespmc1.vub.ac.be/ASC/FIRST-_CYBER.html (08.10.2001); see also Geyer 1994. http://construct.haifa.ac.il/~dkalekin/cyber1.htm (08.10.2001).
775 *WCDS. Principia Cybernetica Web.* http://pespmc1.vub.ac.be/ ASC/ SECOND_ CYBER. html (08.10.2001).
776 Heylighen, F., C. Joslyn, C. & Turchin, V. 1999. *What are Cybernetics and Systems Science? Principia Cybernetica Web.* http://pespmc1.vub.ac.be/CYBSWHAT.html (08.10.2001).

mathematics, technology and biology to philosophy and the social sciences. Its most recent interest is "sciences of complexity", including AI, neural networks, dynamic systems, chaos, as well as complex adaptive systems.

Cybernetics and systems science use pretty much the same concepts and terminology. The main difference is stated in the beginning of this chapter. The systems theory, or systems science, is looking for the observer-independent general systemic principles by which existing systems could be analyzed and used to solve practical problems. This viewpoint sounds very much Hempelian and hypothetico-deductive. I quote here a passage from the text by Heylighen, Joslyn and Turchin, where they comment on the differences and similarities of these two sciences:

> "The systems approach distinguishes itself from the more traditional analytic approach by emphasizing the interactions and connectedness of the different components of a system. Although the systems approach in principle considers all types of systems, it in practices focuses on the more complex, adaptive, self-regulating systems which we might call "cybernetic"…In its present incarnation of "second-order cybernetics", its emphasis is on how observers construct models of the systems with which they interact (see constructivism).
>
> In fact, cybernetics and systems theory studies essentially the same problem, that of organization independent of the substrate in which it is embodied. Insofar as it is meaningful to make a distinction between the two approaches, we might say that systems theory has focused more on the structure of systems and their models, whereas cybernetics has focused more on how systems function, that is to say how they control their actions, how they communicate with other systems or with their own components, . Since structure and function of a system cannot be understood in separation, it is clear that cybernetics and systems theory should be viewed as two facets of a single approach."[777]

I choose to incline myself towards cybernetics but I do not endorse the radical constructivism (according to which "world" is a result of conceptual constructions.) Applied to musicology: music theory is a systemic structure represented through sign models and formulas. Systemic function is music analysis, i.e. **explaining** a musical piece with these formulas. Thus, we can summarize roughly: music theory is *ipso facto* systems theory and music analysis is cybernetics. Using the approach of Carl Dahlhaus[778], we can also consider systems theory as comparable with the speculative musicology (music theory) and cybernetics with the regulative or practical musicology. Cybernetics seems to have taken "a regulative standpoint" on explaining the systemicity of "the world" altogether [779]. Similar mergence happened, and happens, when music analysis turned and turns to prescribing music making and composition, or when the speculative music theory gives norms to the practical music theory.

In the scientific field of activity (central associations, conferences, journals) systems science and cybernetics are on par. Strict subdivisions no longer exist.

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777 Ibid.

778 See 1.1.1.

779 One may read the several philosophical and manifesto-like articles published in *Principia Cybernetica Web*, e.g. http://pespmc1.vub.ac.be/PCPUNKNO.html, or ftp://ftp.vub. ac.be/pub/projects/ Principia_Cybernetica/Texts_General/ Short_ Intro.txt.

However, the systems-oriented domain is fragmented and many different approaches exist side by side.[780]

I conclude that the situation of cybernetics and systems science is equal with the situation of semiotic research that is fragmented owing to many different theoretical approaches; similar in some respects, different in others; existing side by side, yet being connected through intertextualism. The same is with cybernetics and systems science; they link through intertextualism. Common to both is systemicity[781]. The situation of cybernetics and systems science may be used analogically to explain the similar co-existence of the structural music analysis and the theory model-based music making (or speculative and regulative music theory), which seem to feed each other. As semiotics seems still to be a rather isolated philosophical field of connoisseurs and experts, the same is with the academized music research and music making. Quoting once more the text by Heylighen, Joslyn and Turchin:

> "Many of these 'schools', such as autopoietic systems, anticipatory systems, living systems, viable systems or soft systems, are associated with a particular theorist or thinker, respectively Maturana, Rosen, Miller, Beer and Checkland. As a result, the cybernetics and systems domain lacks clear foundations. Yet, we, in the Principia Cybernetica Project, believe that the commonalities are much larger than the differences, and therefore it is worth attempting to integrate the different approaches in a common conceptual framework."[782]

I agree with this and believe that in musicology the "old" traditional school and the "new" one can gain a lot of from each other, provided they are examined in the light of systemicity.

5.5.1 The Nature of Cybernetic Systems with References to Musicology

The cardinal theoretical principles of cybernetics and systems science consider themselves as a metatheory and applicable to "anything"[783]. The focus of their interest is complex systems. The human mind is complex and multi-dimensional; it is adaptive, and it belongs to the network of information systems. "Cybernetics presumes that there are underlying principles and laws which can be used to unify the understanding of such seemingly disparate types of systems".[784] Cybernetics, thus, challenges traditional scientific and philosophical methodologies. I think this involves necessarily the emergence of the abductive systemic approach, not only in musicology[785] but also in other

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780 Heylighen, Joslyn & Turchin, 1999. http://pespmc1.vub.ac.be/CYBSWHAT.html (28.07. 2000).
781 See also Systemicity umbrella 5.10.
782 Heylighen, Joslyn & Turchin, 1999. http://pespmc1.vub.ac.be/CYBSWHAT.html (28.07. 2000).
783 Joslyn, C. 1992. *The Nature of Cybernetic Systems. Principia Cybernetica Web*: http:// pespmc1.vub. ac.be/CYBSNAT.html (28.07.2000).
784 Ibid.
785 At least at the level of theoretical musicology.

sciences along with educational application. Some of the characteristics of cybernetic systems, according to Roslyn, are:

> *Complexity:* cybernetic systems are complex structures, with many heterogeneous interacting components.
> *Mutuality:* these many components interact in parallel, co-operatively, and in real time, creating multiple simultaneous interactions among subsystems.
> *Complementarity:* these many simultaneous modes of interaction lead to subsystems which participate in multiple processes and structures, yielding any single dimension of description incomplete, and requiring multiple complementary, irreducible levels of analysis."[786]

Applied to musicology: no structural musicological formula is a complete conceptual model of music. The reductive analysis of music alone is not acceptable; all analytical levels should be present. A correctly performed Schenkerian analysis pays attention to several layers. The Schenkerian analysis is notably difficult to master because of these many levels, and this difficulty becomes understandable by the cybernetic explanation of complexity. Roslyn continues:

> "*Evolvability: c*ybernetic systems tend to evolve and grow in an opportunistic manner, rather than be designed and planned in an optimal manner."

This is the feature of abduction. The abductive systemicity accepts heurism, as well as the hermeneutic spiral process of reasoning.

> "*Constructivity: c*ybernetic systems are constructive, in that as they tend to increase in size and complexity, they become historically bound to previous states while simultaneously developing new traits. "

True. The complex development of the Western tonality during the Late Romanticism exhibited this tendency. The same matches the explanation by Edith Borroff on transcendental geniuses, such as Beethoven[787].

> "*Reflexivity:* cybernetic systems are rich in internal and external feedback, both positive and negative. Ultimately, they can enter into the 'ultimate' feedback of reflexive self-application, in which their components are operated on simultaneously from complementary perspectives, for example as entities and processes. Such situations may result in the reflexive phenomena of self-reference, self-modeling, self-production, and self-reproduction."

The last sentence clearly associates with the abductive method. One can find other valuable readings on systemicity, systems science and cybernetics on the Internet. A very good and compact article is *A Taste of Systemics*, by Bela Banathy, a member of the *ISSS*. His article[788] also gives interesting ideas on systemicity and education. As complexity is a very vital feature of systemicity, it is necessary to comment on it in the following chapter.

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786 Ibid.
787 Borroff 1971: 686, see 5.7.1.
788 http://www.newciv.org/ISSS_Primer/asem04bb.html (28.11.2001).

5.6 On Systemic Complexity

5.6.1 Distinction and Connection

The idea of *complexity* has already appeared on these pages many times, and, as stated several times before, the most essential factor in understanding non-linear dynamic systemicity is the issue of complexity. Complexity is more than any structure or any system as such. The Latin word complexus means "entwined", "twisted together". Through structuralistic thinking we can categorize concepts into hierarchies and classes in the "old classical" way. The idea of complexity lets us understand better the real complexity of music through the study of the musicological conceptual world[789]. For example, the concepts of sound, timbre, and tone are intertwined together. Heylighen[790] describes complexity as a combination of the two factors of *distinction* and *connection*. The difficulty of grasping complexity, according to Heylighen, is that the "components of a complex cannot be separated without destroying it, the method of analysis or decomposition into independent modules cannot be used to develop or simplify such models. This implies that complex entities will be difficult to model, that eventual models will be difficult to use for prediction or control, and that problems will be difficult to solve. This accounts for the connotation of difficult, which the word "complex" has received in later periods."[791] Complexity lacks symmetry and no separate component of a complex structure can be used as such to predict the properties of the other parts.

Distinction and connection of complexity relate to *entropy* (symbolized by the letter *S)* and *negentropy* (symbolized by the letter *H)* because the extreme distinction, leads to the border of chaos (entropy); and the extreme connection, leads to negentropy, or to a perfectly ordered static structure. They also relate to the dimensions of space, time and scale.[792] The *scale level factor*[793], on its part, is a tool to zoom in and out of various hierarchical conceptual systemic levels. Therefore, the issue of complexity is really complex. Heylighen writes "Complexity can only exist if both aspects are present: neither perfect disorder (which can be described statistically through the law of large numbers), nor perfect order (which can be described by traditional deterministic methods) are complex. Therefore, it can be said to be situated in between order and disorder, or, using a recently fashionable expression, "on the edge of chaos"[794]. Complex descriptions are inevitably difficult to conceptualize because they require, on

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789 E.g. see reference to Schenkerian analysis in 5.6.3.

790 Heylighen, F. 1996. *What is Complexity? Principia Cybernetica Web*. http://pespmc1.vub.ac.be /COMPLEXI.html (08.10.2001).

791 Ibid.

792 See 5.6.2.

793 See 5.6.3.

794 Heylighen, F. 1996. *What is Complexity? Principia Cybernetica Web*. http://pespmc1.vub. ac.be /COMPLEXI.html (08.10.2001).

part of the observer, paying attention to the factors that differentiate and to the factors that connect.

5.6.2 Differentiation and Integration Relating Space, Time, and Scale

The aspects of distinction and connectedness can also be expressed as differentiation and integration, as Heylighen himself writes. He (combining his ideas with those of Havel and Edmonds) introduces the dimensions of *space*, *time*, and *scale* connected to these features. By understanding the functions of these dimensions we can understand more of the complexity of musicological concepts, their evolution, their parametric hierarchies, etc.

According to Heylighen, complexity increases when the variety (distinction), and dependency (connection) of parts, or aspects, increase. And this in several dimensions, at least in space-geometry, space-scale, time-dynamics and time-dynamic scale. He writes: "The complexity produced by differentiation and integration in the spatial dimension may be called "structural", in the temporal dimension "functional", in the spatial scale dimension "structural hierarchical", and in the temporal scale dimension "functional hierarchical".[795]

To give an example: in music (or musicology – to be exact) the so-called historical development of tone system (which involves the temporal functional hierarchical scale dimension) from the major-minor tonality towards the freer use of the twelve enharmonic tones in chromaticism (or later in dodecaphony) was the result of the increase of the variety of tones (from 7 to 12) carrying functional musical information. Likewise, the number of their connections increased causing new tonal interpretations and tonal chromaticism. This complexity is structural complexity combined with functional hierarchical complexity.

Chart (16) beside (my design) represents visually the idea of complexity. The yellow area represents distinction/differentiation and the blue area represents connectedness or integration. The green area is the area of complexity that is most intensive in the darkest green section.

795 Ibid.

5.6.3 Scale Level Factor in Complexity

It is vital to remember that when we maintain that a system "is this or that" or it "has these or those features", it does not mean that the reality itself necessarily behaves according to and because of a system. A system is a conceptual "model"[796] a tool, or a configuration of the notions of an observer. But as soon it is "found" (as happens in the speculative music theory, see 1.1), it is also usually used for prescription (as happens in the regulative music theory, see 1.1), and it may lead to reductionistic deductionism.

As stated in the previous chapter, in discussing systemic complexity Havel (in Heylighen) presents the concepts of space, time, and scale dimensions and their combinations, including the idea of "scale-thinness (-thickness)"[797]. These are *scale level factors*. Strikingly enough, terminology science[798] concept relations also manifest differentiation and integration very much as in complexity. In terminology science concept relations can be divided into generic/genus-species, partitive/part-whole, and associative/pragmatic relations. In the last category, chronological, (and further sequential and temporal), causal, genetic, and instrumental relations can be differentiated. This depends on how detailed relations are sought[799].

All these features can be found in systemic analysis of music. For example, a higher scale level, as the supersystem level, gives information about the system on a general and more abstract level (e.g. tonality-atonality-feature on the tone level system). A lower level is more detailed (e.g. tendency tones in the major-minor system, or ornamental figures of a tonal melody). When we look only at details – e.g. the details of the variant scales of the major-minor tone system – we easily miss the whole: that the major-minor system can be interpreted as a case of modality; as a subsystem of the higher hierarchical modality system. This is all due to the structural hierarchical scale effect described above.

A lower systemic level (subsystems) is always more detailed than the higher superystem. Traditional scientific analytic approaches and research processes tend to examine a whole system from low levels to higher levels (upward causation). Accordingly all that is needed: if you know precisely the state and the functions of the parts, you should understand the whole. This is a reductionistic view. The Hempelian hypothetico-deductive view is similar: you take a system as an accepted fact, as a general law or a hypothesis, and prove the existence and the genre of that system by examining the parts of the system[800].

However, each level in the hierarchy of systems and subsystems has its own laws which, according to Heylighen, cannot be derived directly from the laws of the lower levels, because of the law of complexity. Thus, each scale has

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796 See the different use of the term of model by Mela, 5.4.3.
797 See below.
798 E.g. *Toimikunnista termitalkoisiin* 1999: 178, *The ISO/FDIS 1087-1: 2000*: p. 4-5.
799 See Concept Relations 4.4.8.
800 See 3.3.; 3.3.4.

its own laws. Therefore, we cannot explain, for example, the phenomenon of tonality (supersystem) only by the laws of general bass (subsystem), although we need many different details and cases of the lower scale level from which we can induce abductively towards the general hypothetical laws of tonality. That means that also the laws of the higher levels should be considered simultaneously. In cybernetic explanation this is possible in the light of complexity rules, according to which, it is possible to model various systems of order, for example, through the concept of symmetry, or invariance of a pattern under a group of transformations[801].

5.6.4 On Scale Thinness

According to Havel[802], a system is "*scale thin*", if the dimension of scale has only one or a small amount of layers (scales). He gives a practical example: "a perfect geometrical form, such as a triangle or circle, is scale-thin: if we zoom out, the circle becomes a dot and disappears from view in the surrounding empty space; if we zoom in, the circle similarly disappears from view and only homogeneous space remains." In musicology, this refers to the well known reductionistic analytical methods and concepts that show recursive systemic patterns; e.g. the systematic *Formenlehre* of Ilmari Krohn[803], the Schenkerian texture analysis methodology[804], Riemann's *Formenlehre*[805], the row-analysis and technique (Křeneck and others), serialism, or the generative structural music theory of Jackendoff and Lerdahl.[806].

These kinds of systemic approaches represent more or less closed conceptual systems where certain systemic principles and laws are taken as valid on all scale levels and which do not easily allow "exceptions in the rules". They are scale thin. They also produce big amounts of uniform (and prescriptive) information but do not necessarily enrich the quality (=variety) of knowledge. This situation is due to the evolution of our entirely scientific paradigmatic tradition, where these kinds of research and analytical methods have long been dominant.

5.6.5 Principle of Scale Zooming – Connection to Abduction

The change from one observational level to another in systems hierarchy happens by *zooming in or out* from a sublevel (more detailed, e.g. a major chord

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801 Heylighen, F. 1996. *What is Complexity?Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ COMPLEXI.html (08.10.2001).

802 1995, in Heylighen, see http://pespmc1.vub.ac.be/COMPLEXI.html (08.10.2001).

803 See Chart 23 in Chapter 6.

804 Based on the hierarchic idea of Vordergrund, Mittelgrund and Hintergrund, see e.g,. *OIMTS*, Vol. 5: 152-155.

805 Based on the idea of musical logic of chordal functions, periodic form of music, etc. see e.g. *OIMTS*, Vol 5: 44-44.

806 See 1.6.3.

structure) to a superlevel (more general, e.g. "rules" of tonality), or vice versa[807]. The process and nature of zooming is not explained in the article. I venture to conclude that because the scale levels are connected together, they naturally form a complex system ("flow" – from the concept of a flow chart), where the observational starting level is input, the process of zooming is throughput, and the observational arrival level is output. The zooming itself is an action, an observational process. It can best be explained as an act of abductive observation by which the move of the conceptualization from one level to another happens. Thus, it is a systemic approach method because, according to Heylighen, a system may also be an active process. This ability to zoom conceptually in and out is a result of systemic abductive practise and learning. One must practise it in the same way as one needs to practise the correct use of a telescope or a microscope. Wrong use causes a missing of the intended level, or misobservation/miszooming of the phenomena of the intended level.

Conceptual zooming in and out of various scale levels presupposes that the observer has the ability to distinguish the elements of different levels. For example, it is not possible to understand the superlevel of a musical texture without understanding the nature of the parts of that texture: one needs to know according to which, systemic "rules" various types of texture are built. One cannot understand the nature of a forest without knowing the nature of trees, and vice versa. The Schenkerian analysis confirms this view. According to Lauri Suurpää[808], the Schenkerian analysis is a hierarchical construction, the basis of which is the triad chord structure tonality interpreted in the Schenkerian way. The analysis means "writing out the triad". A musical work examined is a construction of hierarchical levels that are interrelated and they manifest the tonal triad features in different textural details. No single hierarchical level can replace any other level. The Schenkerian analysis, thus, is not reductionism. The analysis itself is a very complex process, and its rules (of counterpoint and harmonization) should be well mastered. For me, this all represents a typically complex systemic approach.

807 Havel in Heylighen, F. 1996 *What is complexity? Principia Cybernetica Web*. http://pespmc1.vub.ac.be/COMPLEXI.html (08.10.2001).

808 Representative of the Schenkerian analysis at The Sibelius Academy, Helsinki, Finland.

In the field of application, e.g. in training the systemic thinking or approach, it is necessary to make sure that the learners master a sufficient amount of basic concepts, terminology and descriptions pertaining various systemic scale levels that according to Brown[809], are properties of familiar entities. Through their aid, the learners are able to understand abductively the connections and laws of various systemic levels, as well as, their descriptive formal tools. If they do not master them well enough, systemic understanding is not possible.

An additional notion: I do not quite believe that it is possible to "invent such a conceptual macro telescope, or a nano-level microscope", by which it would be possible to reach the ultimate core of concepts. The problem of examining concepts by aid of concepts reminds me of the famous Heisenbergian axiom[810] of uncertainty, according to which, the research tool practically destroys the object it examines. This happens when examining very small details and objects.

I chose M.C. Escher's *Bond of Union* (in Chapter 3.2) to illustrate visually the idea of unended, or open semiosis, along with the ideas of intertextualism and interconceptualism. Another work of Escher suits well to illustrate the concept of various scale levels of conceptualization, and their integration. His *Three Worlds* (1955) has the following explanation: "This picture of a woodland pond is made up of three elements: the autumn leaves which show the receding surface of the water, the reflexion of three trees in the background and, in the foreground, the fish seen through the clear water."[811]

5.7 Impacts of Complexity on Musicology

In addition to the comments on and references to musicology in the texts above dealing with complexity and its features, I choose to concentrate in more detail on commenting on its impact on musicology; first from the viewpoint of cultural development as usually understood as the evolution of music or as musical styles (in a society through the works of composers and musicians) and secondly from the point of the parameters of the tone systems and rhythm of music.

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809 Brown 1998. *Conceptual Comparison and Conceptual Innovation*. http://www.ditext.com/ brown/ ccci.html (08.10.2001).

810 See http://www.xrefer.com/entry.jsp?xrefid=344907 (08.10.2001).

811 Reprinted from the text of 'M.C. Escher – The Graphic Work'; with the kind permission of Benedikt-Taschen Publishers. http://www.worldofescher.com/gallery/ThreeWorlds Lg.html (07.03.2002).

5.7.1 Complexity Relating to the Development of Music

Systemic thinking/the systems approach (as well as the abductive reasoning and research method) represents a form of conceptual complexity because it requires free variation (distinction) of new conceptual ideas introduced into a familiar conceptual environment.

There seems to be a tendency, according to some researchers, for cultural evolution to fluctuate between chaotic/disordered and ordered systems. This can be explained in the light of complexity. For example, in musicology Edith Borroff presents the cycles of *formation*, *culmination* and *transcendence* that feature the overall development of music (styles) and its idioms. In the light of complexity and systemic science, the formative period represents distinction (chaos, entropy – xperimental composers like de Machaut and C. Ph. E. Bach), the culminating period represents consensus (connection, order, and negentropy – composers like Desprez, or W.A. Mozart), and the transcendental period represents complexity (high distinction and connectedness – composers like Monteverdi and Beethoven). Borroff[812] writes:

> "Most composers work in sympathy with their times, and the creative cycle calls for different kinds of genius. When a new musical language is being worked out, a formative genius is needed. Confusion is virtually inevitable at such times, because composers have rejected basic concepts of the immediate past but have not yet determined new concepts to replace them. Many composers must experiment, with small success and failures, before a new style can be forged. Their inventive geniuses who guide new ideas through their initial stages are generally, and, in this concept, inevitably, little known, but they are fascinating in historical perspective.
>
> In contrast, consensus illuminates the great periods of musical culmination. During these periods, composers are in basic agreement concerning the essentials of musical language and the forms it should have. It is such a time that can produce a Josquin or a Mozart.
>
> And finally, when forms are fulfilled and in danger of losing their excitement, a third type of genius is needed to discover a final expansion. Composers of this type, who lead a musical language to further (generally emotional) meanings, can also seem like transitional figures. Dufay, Monteverdi, and Beethoven are examples of such men."
>
> Thus, each of the six historical periods [*Medieval Era*, *Renaissance*, *Baroque Era*, *Classicism*, *Romanticism*, *new music – my clarification on Borroff*] can be seen as a cycle of formation, culmination and transcendence, broken at the last by decline and aesthetic confusion (chaos to the ears of the conservative) that led to a new period of formation. And such a view is useful. But, in addition to the basic cycles, Western music contained many overlapping rhythms, developments and counterpulls. These formed complex [*sic!*] interactions, even though individually each tended to simplicity."

Borroff's text is written with great intelligence and insight. She uses directly terms which refer not only to the musicological[813] structure of music but also to the systemic concepts behind them: *new musical language*, *basic concepts*, *new ideas*, *the essentials of musical language*, *forms*, *emotional meanings*, *transitional*, *simplicity*, etc.

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812 Borroff 1971: 686.

813 Musicological-conceptual.

A strikingly similar description of the development of science comes from Kuhn[814], who distinguishes three types of stages:

> "*Preparadigmatic*[815] stage, characterized by theoretical dispersion, existence of several rivalling theories and schools, lack of unified premises and axioms, uncertainty in choosing relevant research problems… *normal science*, during which the research is solidly based on previous scientific achievements approved a certain scientific society as foundation for later research… the scientific society commits itself to generally accepted rules and standards of research, as well as to certain theoretical and ontological presuppositions contained by the "matrix" of the scientific branch in question… *science of critical era*, which emanates from the dead end of normal science due to anomalies existing between the theoretical predictions and observations. While aiming at accommodation to anomalies the theory comes, sooner or later, at a crisis, because its complexity increases faster than its precision…Abandoning a (scientific) matrix presupposes the adoption of a new matrix (contradictional to the previous one). Replacing a matrix by another is a *revolution of science* …"

5.7.2 Scale Level Factor in Musicology. Commentary and Some Applications

B. Edmonds gives the following concrete and illustrative example of the scale level factor:

> "… the definition of complexity as midpoint between order and disorder depends on the level of representation: what seems complex in one representation, may seem ordered or disordered in a representation at a different scale. For example, a pattern of cracks in dried mud may seem very complex. When we zoom out, and look at the mud plain as a whole, though, we may see just a flat, homogeneous surface. When we zoom in and look at the different clay particles forming the mud, we see a completely disordered array. The paradox can be elucidated by noting that scale is just another dimension characterizing space or time (Havel, 1995), and that invariance under geometrical transformations, like rotations or translations, can be similarly extended to scale transformations (homotheties)."[816]

In my opinion, the concept of scale levels can be considered as a hierarchy of systems, as dimensions of supersystems and subsystems on top or inside of each other. The properties of the scale set the limits (e.g. a certain dimension), within which the phenomenon is observed. In music, the musicological-analytical parameters (e.g. texture, rhythm, tone system, form, etc.) are subsystems of an accepted normative musicological-analytical metasystem. An individual parameter, such as musical form, functions as a supersystem in form analysis. The dimension of the supersystem of musical/musiological form is the whole musical composition, as a structural form. For example, an opera, or a raga, is the dimension of the supersystem of musical/musicological form inside which we can find other dimensions of subsystems of form (e.g. the structure of an aria in an opera; or the structure of the *alap* in a raga). This is the spatial scale dimension or the "structural hierarchical" dimension level of space. Likewise, when we pay attention (when listening) to certain happenings in the form of a

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814 In Niiniluoto 1983: 208-209.
815 Niiniluoto suggests a replacing term: prenormative.
816 (1996) in Heylighen *What is complexity? Principia Cybernetica Web*. http://pespmc1.vub.ac.be/COMPLEXI.html (08.10.2001).

musical piece, e.g. the envelopment of a sonata form: exposition – development and – recapitulation and their thematic processes with individual details and their logic, we make observations in the temporal scale; or in the "functional hierarchical" dimension[817].

For practical reasons and due to the fact that many scalar layers are difficult to handle at a time, a practical musicological analysis situation focuses on a certain scale level (such as form, or texture, or other layers inside them) at a time, despite of the fact that the various parameters of music (tone system, texture/*satz*, orchestration, form, rhythm, etc.) intertwine forming a complex system. For example, the melodic texture (type) is closely intertwined with tone- or tonal functions and surface rhythm (tone duration). If we have, in a musical piece, a very rich tone structure with many tones and their variants (= extreme variety) combined with a high amount of tone combination possibilities (= minimal dependencies), the amount of information (= forms of "musical knowledge) increases highly. Then the observer cannot differentiate all the possible supersystems and subsystems (scale levels) because the amount of information of structural hierarchy rises highly and complexity becomes maximal and approaches entropy (disorder). This happens easily with free atonal music with free unpredictable form.

The explanation of the existence of the scale level factor of complexity shows that the role of an observer is very critical in understanding systems. Conceptual systems exist for and serve the needs of an observer.

Here is not the place to go any further into the question of complexity, although the chaos theory along with the idea of attractors gives an interesting explanation of the general behavior of non-linear dynamic physical systems. What Edmonds & Heylighen explain is possibly that the sufficient amount of objectivity of a concept among its users (= a general concept) as well as its subjectivity manifested by "mutations around the concept" (= various individual concepts) are linked together with certain core concepts (= the prototypes) that act as attractors[818].

5.7.3 Scale Level Complexity (Supersystem – Subsystems) in Tone-Tonal Systems

While applying the scale level factor in the tone system of traditional Western music (major-minor systems plus chromaticism), we can differentiate various hierarchical levels in it; for example,

1. tone – non-tone (sound, noise) scale level, under which
2. tonal – non-tonal (atonal) scale level, under which (under tonality)
3. major-minor – free tonality/bitonality scale level, or

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817 See before 5.6.2 Differentiation and integration as features of complexity relating space, time and scale.

818 See before 3.2.2; see also 4.4.4; 4.6.4.

4. major-minor – modality scale level (depends what we mean by modality), under which
5. e.g. in modality: natural modes – synthetic modes scale level, or
6. in the major -minor system: enharmonic major-minor – natural (tuning major minor) scale level, etc.
7. in explanation of tonal phenomena we can come to the "smallest unit of a tonal phenomenon", such as a tendency tone leading to the target tone (*Si et fa, la tota musica* – attributed to J. S. Bach[819])

This description shows that this kind of a tone system is "scale thick", which means that there are several hierarchical scale levels on top and inside of each other[820].

5.7.4 Scale Level Complexity (Supersystem – Subsystems) in Rhythm Systems

The adopted normative Western description of musical rhythm is so far "less scale thick" and more close to "scale thin". In it, we can find the following scale levels:

A. *On the level of beat:*

1. measured rhythm – free rhythm (e.g. recitativo, or unpredictable measures á la Stravinsky) scale level, under which (in measured rhythm)
2. divisive – additive (Sachs) scale level, under which (additive)
3. aksak rhythms (general term) – rhythm modes (individual term, e.g. *teental*/16 beats in Indian music, or *raksan*/15 beats in Turkish music) scale level, or under divisive
4. binary – tertiary beat scale level

B. *On the level of surface rhythm (tone duration)*

1. rhythm phrases: symmetrical – asymmetrical, under which

2. measures (with duration idioms/fixed note lengths, or duration modes, or free duration combinations), under which

3. *iskuala* (Krohn's term for the smallest beat unit): binary – tertiary rhythms.

819 See also 6.2.9.
820 See 5.6.3.

5.8 Systemicity in Various Forms

In Chapter 5.3, I introduced systemicity as a term and concept pointing out the variety of terminology referring to systemicity in various readings, such as *systemic or systems approach*, *systems methodology*, *systems inquiry*, *systems view*, *systems*, *systemicity*, and *systems analysis*. Systemicity or systemic approach needs the complexity of systems and related issues presented in Chapters 5.4 and 5.6. In Chapter 5.5 I gave a comparison between cybernetics and systems science showing that the thinking in these fields merge into another; and I indicated that due to the interesting ideas of systemic complexity, my main attitude and conceptual material comes from cybernetics.

5.8.1 Systems Inquiry in Systems Science

A very holistic and interesting presentation of systemic approach, or systemicity, comes from a systems scientist and member of The Primer Group, Bela Banathy, who, in his manifesto-like article *A Taste of Systemics*[821] describes systems inquiry in a great detail. The main points of the text are that systems inquiry serves the systems worldview, which has a very high paradigmatic and philosophical status**.**

Systems inquiry is considered a discipline and a conceptual system having four integrated and essential aspects: philosophy, theory, methodology, and application. It is "in contrast with the analytic, reductionistic, linear, single cause-and-effect view of the philosophy of classical science."[822] Systems philosophy is not only non-linear and dynamic (as cybernetists would say) but it represents "synthetic, expansionist, dynamic, and multiple/mutual causality modes of thinking and inquiring, how things work more than what things are."[823]

I have earlier introduced the concept of analogy necessary to systems thinking, and will elaborate it more theoretically in Chapter 5.9. Here it has other conceptual variants defined by Banathy: "alikeness (or isomorphy) of principles, concepts and laws that exist in the various realms of experience. We integrate, within the framework of systems theory, the findings of the various disciplines. That is the unique power of systems theory."[824]

The theory behind is the General Theory of Systems (GST), which attempts to transcend disciplinary boundaries. The systems methodology used in research is very flexible and are selected to match logically the requirements of a given research situation. When contemplating the description by Banathy,

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821 Banathy 1996. *A Taste of Systemics*: http://www.newciv.org/ISSS_Primer/asem04bb. html (30.08.2001).
822 Ibid.
823 Ibid.
824 Ibid.

one must come to the conclusion that *systems inquiry represents abductive reasoning.*

5.8.2 Systems Analysis in Cybernetics

Systems analysis is a term used in cybernetics. Krippendorff[825] defines briefly six different focuses of systems analysis: policy analysis, decision analysis, feasibility analysis, cost-effectiveness analysis, cost-benefit analysis, and risk-benefit analysis. I do not go into further details of these types of analyses because they do not relate my present interest. I only wish to quote him further to show that systems analysis can be considered as a definite method, if necessary. For me, it relates closely with Banathy's description of systems methodology of systems inquiry. "The diagnosis formulation, and solution of problems that arise out of the complex forms of interaction in systems, from hardware to corporations, that exist or are conceived to accomplish one or more specific objectives. Systems analysis provides a variety of analytical tools, design methods and evaluative techniques to aid in decision making regarding such systems."[826]

5.8.3 Analytic and Systemic Approach Compared in Cybernetics

As my purpose is to introduce various possibilities of systemicity and its creative use, I shall present here an illuminating comparison of the analytic and systemic approaches by J. de Rosnay[827]. Both of them are conceptual processes aiming at new conceptual results from a conceptual scale level to another. The comparison reveals that behind the analytic approach are the views of closed categorization and the Hempelian hypothetico-deductive thinking as opposed to a systemic-holistic and abductive approach. Very similar comparisons have appeared from other researchers with strikingly similar results[828]. According to de Rosnay, the analytic and systemic approaches complement one another but neither is reducible to the other.

The analytic approach aims at reducing a system to its components so that their nature and interaction can be studied. "By modifying one variable at a time, it tries to infer general laws that will enable one to predict the properties of a system under very different conditions. To make this prediction possible,

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825 *Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ASC/SYSTEM_ANALY.html (10.10.2001).

826 Ibid.

827 De Rosnay 1997 in *Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ANALSYST.html. (10.10.2001).

828 See Haapasalo's (2000: 74- 75) comments on the conceptual working of the hemispheres of the brain; Banathy 1996. *A Taste of Systemics*. http://www. newciv. org/ISSS_Primer/ asem04bb.html (28.11.2001).

the laws of the additivity of elementary properties must be invoked."[829] This well suits homogenous systems with weak interactions between similar components.

The analytic approach does not suit the study of highly complex systems with very heterogeneous components (or elements) and strong interactions (e.g. a musical work). They must be studied through new methods that fall under systemic approach. A system is, thus, examined as a complex and dynamic whole. One method is simulation, i.e. "animating" a system. The study of a simulated system leads to the determination of the rules modifying the system or designing new ones. In this light, we could very well state that compositional exercizes in a certain musical style are simulated complex musicological conceptual systems "simulating" certain composers and their works.

De Rosnay gives the following table of comparison:

Analytic Approach	**Systemic Approach**
isolates, then concentrates on the elements	unifies and concentrates on the interaction between elements
studies the nature of interaction	studies the effects of interactions
emphasizes the precision of details	emphasizes global perception
modifies one variable at a time	modifies groups of variables simultaneously
remains independent of duration of time; phenomena considered are reversible	integrates duration of time and the irreversibility
validates facts by means of of experimental proof within the body of a theory	validates facts through comparison the behavior of the model with reality
uses precise and detailed models that are less useful in actual operation (example: econometric models)	uses models that are insufficiently rigorous to be used as bases of knowledge but are useful in decision and action (example: models of the Club of Rome)
has an efficient approach when interactions are linear and weak	has an efficient approach when interactions are non-linear and strong
leads to discipline-oriented (juxtadisciplinary) education	leads to multidisciplinary education

829 De Rosnay 1997 in *Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ANALSYST.html. (10.10.2001).

leads to action programmed in detail	leads to action through objectives
possesses knowledge of details, poorly defined goals	possesses knowledge of goals, fuzzy details

De Rosnay comments on his table avidly: "This table, while useful in its simplicity, is nevertheless a caricature of reality. The presentation is excessively dualistic; it confines thought to an alternative from which it seems difficult to escape. Numerous other points of comparison deserve to be mentioned. Yet without being exhaustive the table has the advantage of effectively opposing the two complementary approaches, one of which-the analytic approach-has been favored disproportionately in our educational system."

It is evident that the present traditional musicological education favors analytic approach, unfortunately. My research seeks to give alternatives in presenting examples of systemic approach to musicological[830] parameters. A separate chapter (6) is dedicated to demonstrations of practical applications suitable to pedagogical purposes, as well.

The difference between the analytic (reductionistic) approach and a systemic (holistic) approach can also be explained in a deeper way. Heylighen[831] calls the former an "upward causation" – where only "the laws governing the parts determine or cause the behavior of the whole" (reductionism), and a "downward causation" – where " interactions are not simple, linear cause and effect relations, but complex networks of interdependencies" (systemicity). This explanation involves the above-mentioned scale lever factor[832]. The essential thing is that "each level in the hierarchy of systems and subsystems has its own laws, which cannot be derived from the laws of the lower level. Each law specifies a particular type of organization on its level, which "downwardly" determines the arrangement of the subsystems or components on the level below. When we say that the whole is more than the sum of its parts, the "more" refers to the higher level laws, which make the parts function in a way that does not follow from the lower level laws."[833]

The functioning of the two ways is necessary. The correct systemic viewpoint means neither extreme reductionism nor extreme holism. Heylighen states: "The whole is to some degree constrained by the parts (upward causation), but at the same time the parts are to some degree constrained by the whole (downward causation)."[834]

Applied to musicology: when we teach children elementary details of music theory (e.g. basics of music theory and the laws of the organization of the

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830 Musicological-conceptual.

831 *Basic Concepts of Systemic Approach. Principia Cybernetica Web.* http://pespmc1. vub. ac.be/SYSAPPR.HTML (10.10.2001).

832 See 5.7.2.

833 Heylichen 1995. *Downward Causation. Principia Cybernetica Web.* http://pespmc1 vub.ac. be/DOWNCAUS.html (14.12.2001).

834 Ibid.

details on that scale level), believing that by understanding these details (e.g. tone scales, chords, cadences etc.) they perceive music as a higher structure, we cannot actually help them to understand the higher level structures of music, unless we teach them these levels as well.

Similarly, we can deduct that when the reductionistic-functional (recursive) musicological methods (Krohn, Riemann, Schenker, Křeneck, and others, see above) "were found" and became established in the Western musicology, their higher order laws/higher scale level systemicity also became (albeit involuntarily) an explanation of the lower level order and also a prescription on how to compose (academic) music. Thus, systemic models can be and are used as models of the conceptual practical tools for the design and production of cultural artefacts.

I feel it necessary to be more precise and to moderate Heylighen's categorical statements on the autonomy of the laws of different hierarchical systemic levels. I would rather say: "Each level in the hierarchy of systems and subsystems has its own laws, which cannot be derived directly but indirectly (abductively) from the laws of the lower level." An upper law does not "determine downwardly the arrangement of the subsystems or components on the level below". Their working is mutual and possibly recursive[835]. Moreover, I feel it is impossible to find an upper level without any lower level elements. As Sellars and Brown[836] point out, at least each conceptual scale level needs its own metalinguistic level and new concepts, although these laws can often be similar due to the similarities of the function of the level[837].

5.8.4 Systemic Approach in Cybernetics

The article with illustrations by F. Heylighen in *Principia Cybernetica Web*[838] gives the outlines of the issue. The systemic approach integrates the analytic and the synthetic method, encompassing both holism and reductionism. Von Bertalanffy, a biologist, first proposed it under the name of the "General System Theory". The key concepts are closed systems, open systems, supersystems, subsystems, input, throughput, output, environment, boundary, and component interaction: complexity. The whole is more than its parts.

Von Bertalanffy noted that all systems studied by physicists are closed systems that do not interact with the outside world. This makes it possible to calculate the future states of these systems with perfect accuracy, since all the necessary information is known. The mechanistic worldview seeks universality by reducing everything to its material constituents. The systemic worldview, on

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835 See Banathy 1996. *A Taste of Systemics*. http://www.newciv.org/ISSS_ Primer/asem 04bb.html (28.11.2001).

836 Brown 1998. *Conceptual Comparison and Conceptual Innovation*. http://www.ditext. com/brown/ccci.html (08.10.2001).

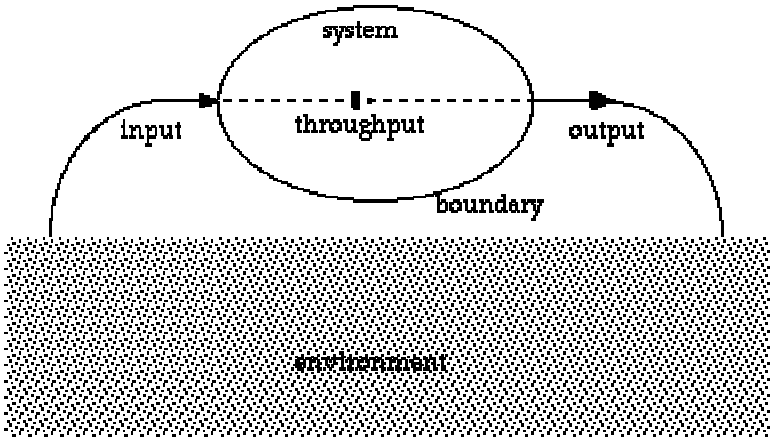
837 See Heylighen 1998. *Basic Concepts of Systemic Approach. Principia Cybernetica Web*. http:// pespmc1.vub.ac.be /SYSAPPR.HTML (10.10.2001).

838 Ibid.

the contrary, seeks universality by ignoring the concrete material out of which systems are made, so that their abstract organization comes into focus.

The basic features of a system, according to the General Systems Theory (GST), are as follows: Open systems interact with other systems outside of themselves. This interaction has two components: input and output. In order to speak about the inside and the outside of a system, we need to be able to distinguish between the system itself and its environment. System and environment are in general separated by a boundary. The output of a system is, in general, a direct or indirect result of the input. System is not just a passive tube; it is an active processor. The transformation of input into output by the system is usually called throughput. See the attached *Chart (17)*.

Chart 17



The environment of a system, too, consists of systems interacting with their environments[839]. The component systems interact with each other forming a whole and because of this interaction something more is added. Heylighen[840] states: "With respect to the whole the parts are seen as subsystems. With respect to the parts, the whole is seen as a supersystem."

According to Bela Banathy[841], the unidirectional cause and effect-approach of traditional sciences is inadequate to deal with the many interactive variables of complex, dynamic systems. It is in such systems that the dynamics of multiple, mutual, and recursive causation operate.

From the viewpoint of an observer, systems are abstract organizations, models, conceptual configurations, and the like. Concepts modeling music are such. (Conceptual-textual and terminological) concepts in human thinking and

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839 My remark: for example, abductive reasoning is a system interacting with other research methods.

840 *Basic Concepts of Systemic Approach. Principia Cybernetica Web.* http://pespmc1.vub.ac.be /SYSAPPR.HTML (10.10.2001).

841 Banathy, B. 1996. *A Taste of Systemics.* http://www.newciv.org/ISSS_Primer/ asem 04bb.html (30.08.2001).

reasoning are always linked with other existing concepts of the past and the future. This is why older musicological concepts and terms live aside of later ones. In practise, this happens at their representative levels: in language (formal, or descriptive texts, signs, graphics, sound, etc.), and in information channels. This is well explained in semiotics as intertextualism[842]. Conceptuality, therefore, is always an open complex, and dynamic system. At the supralevel of conceptuality we can distinguish the complex open system of the cognisphere level, analogous with the complex system of the biosphere where "everything is connected with everything"[843]. In my opinion, the metaconceptualism of this level is the basis for all fields of science, an metamusicology, or theoretical musicology is a branch of it[844].

These are my thoughts on the issue: Any system is a system due to its different parts, elements, and levels. It holds itself together because of the properties of complexity: distinction-differentiation and connection-integration[845]. The quality and amount of differentiation and integration has a direct effect on the quality of the system. A highly differentiated system with minimal integration is close to chaos because of high entropy. A monotonous structure system with maximum connections/integration is highly structured, even symmetrical, and represents negentropy. It is not dynamic, but static. Real organic complexity is a combination of high differentiation and high integration. In the "manmade", designed "conceptual world", we can likewise find negentropic (a closed concept system), complex (concept system – concept field), and entropic concept systems[846]. Lakoff calls this kind of systems feature-bundle structures[847] of which classical categories are good examples. We cannot isolate a living organism from its surroundings, neither can we can isolate any concept from its conceptual surroundings. An isolated concept cannot be understood or used in an informative communication. A good example is the concept of form in music; to some it may mean contents, to some narration, to some a stereotypical structure of music. Similarly as biological organisms, concepts, too, are "conceptually organic". They live, develop, change, or are neglected and become obsolete in communication and information storing in all cultural fields. The term music itself is a good example. To some music is ”organized sound”, to some ”any sounds”, ”behavior”, aesthetic code” (semiotics), etc. Concepts of a certain scale level[848] also interact with other systems outside themselves, with other parallel systems, subsystems and supersystems. In musicology, for example, the system of the natural tonal modes is considered to be, in a sense, a parallel system with the major-minor system (in harmonization) and, in a sense, it is a supersystem to the major-minor system, at least from one-part textural (melodic) viewpoint (e.g, in Gregorian chant).

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842 See also my neoterm [*intergraphics*], 3.3.1; 4.4.12; 5.4.3; 5.10.3.
843 See 1.7.1; 4.4.17; 4.7.1; 4.7.2 for cognisphere-analogy.
844 See 1.1.6.
845 See 5.6.
846 See Systems types 5.4.9.
847 Lakoff 1987: 286.
848 See scale level factor 5.6.3; 5.7.2.

Further, in musicology certain theoretical concepts are linked to other certain theoretical concepts structurally, hierarchically, and functionally. New theoretical explanations with new terminology rise and vanish. For example, the conceptual stock of theoretical explanations of modern music during the 20th century became very rich and colorful in terminology and theory. At the same time, the boundaries of the traditional musicological parameters (even paradigms) became blurred: timbre, texture, rhythm, and form became intertwined with each other in the styles of cluster-, field technique-, and minimalistic music. Paradigmatic boundaries became likewise blurred: music became intertwined with kinaesthetics (performance, happening), linguistics (speech choir), virtual sound world (electronic music, noise music), etc. And as expected, the theoretical complexity affected the making of music itself in normative-academic compositional studies.

5.8.5 System as Black Box and White Box

A system can be seen as a "black box", or a "white box". Heylighen[849] explains that if we focus on the total input and total output of a system (as supersystem), without knowing – or if we prefer to ignore – what happens in between, it is like a "black box". In many cases this is the only result we get out of the observation. For me, conceptuality expressed in linguistic form (or in any form of information) is of this nature. We communicate to each other and gain input from each other, as well as from our "mental environment". We produce conceptual output, but we cannot know, what exactly happens in the brain-throughput. In traditional musicological education the learning material and the teacher's activity is the input into the mind of a student who produces conceptual output as learning that is controlled by exams. The teacher, however, does not focus on the issue of what kind of conceptuality happens in the minds of the students.

Contrastively, if we can reach into the system's internal process by focusing on the throughput structure, we may call it a "white box". If we can "manipulate" favorably the conceptual throughput of a student, the conceptual product of his mind may favorably be different from what was put in. But this requires the study of that conceptual throughput. This is one of the targets of this research: how does the conceptual systemic approach work? The following *chart (18)* by Heylighen shows the both "boxes" (although the white box is actually an oval):

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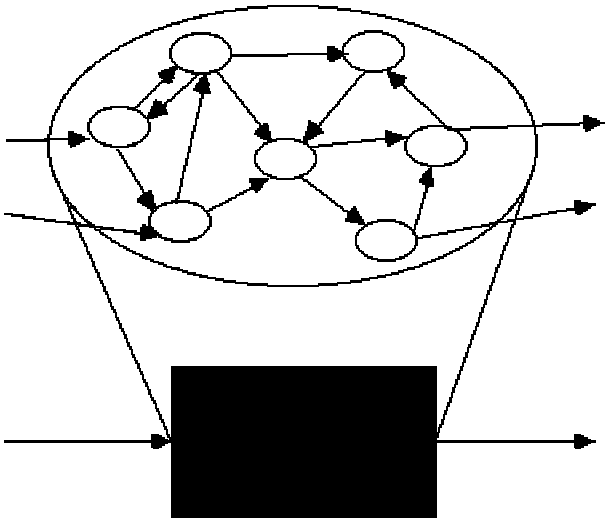
849 Heylighen 1998. *Basic Concepts of Systemic Approach. Principia Cybernetica Web*. http://pespmc1.vub.ac.be/ SYSAPPR.HTML (10.10.2001).

Chart 18



In the typical reductionistic-deductive theorization the existence of cognitive throughput either is ignored or is not the focus of interest. The reductionistic approach focuses only on finding more evidence and cases (= *what*, *which?*) in order to prove the validity of an already obvious outcome through more parallel cases through parallel conceptual systems. In systemic approach, the role of and the focus on throughput are important. By examining *how*, *in what way* the output has come into existence, or what the rules of the dynamics in the conceptual throughput are, the essential features of the hidden holistic systemicity will emerge and lead to new levels of understanding new systemic connections.

5.9 Analogy, Metaphor and Metonymy as Systemicity – Some Musicological Applications

One aspect of systemicity is the use of analogy. Here, I present some deeper aspects of analogy from systemic viewpoints.

Analogy is used in numerous ways in conceptualization. Where there is language, there is analogy. It is used in science, for example, in mathematics and logic, it is used in language (grammar, word-formation, and linguistic style), in rhetoric, etc. From the linguistic and semiotic viewpoints, analogy is connected to metaphor, simile, and metonymy. In everyday use and even in science, the exact understanding of the nature of analogy is not quite clear.

According to *The Oxford Companion to the English Language*[850], the term analogy in Greek means double relation. Thus, analogy means the comparison or correspondence between two things because of a third element that they are considered to share. The same source states: "When such usages are established, their users may forget the analogy and come to think of them as statements of fact." To me, this is a feature of semiotic reification. And further, "because analogies depend on the concept *as if*, they often take the form of metaphors and similes." All and all the concept of analogy forms a large semantic field at least with the concepts of allusion, derivational paradigm, fantasy, figurative language, logic, metaphor, model, parable, paradigm, simile, usage and word-formation.

Analogy is a form of generalization; so also is induction. Inferring what Niiniluoto[851] states about the nature of analogy, induction means hypothetical generalization of a feature of many instances as a feature in multitude: "one in many – thus, in all"; and analogy means deduction: "many features in singular which also in others – thus, the remaining also in singular". Another source states: "Analogy is a form of inference: that if two things agree in at least one respect, they may agree in other respects."[852]

Analogy is widely used in musicology. For example, sonata form is compared with an architectural arch structure; string instruments and wind instruments are considered as singing instruments, etc. The normative and prescriptive musicology, in general, abounds with analogy.

From this, I infer that the instances comparing analogically are probably parallel conceptual subsystems of the same conceptual supersystem because they share the same conceptual elements, or components, at the same scale level. Similarly – as analogy, according to Niiniluoto[853], has great heuristic value – intuition and fantasy, likewise, as methods, are a form of heuristic analogy.[854] From this I conclude that holism can be proved by the properties of analogy. Analogy is a very necessary tool in systemic thinking and in abductive reasoning[855].

In estimating the credibility of analogical reasoning, it is possible to use the following criteria[856]:

> Analogy takes note of the fact that two or more things are similar in some respects and concludes that they are probably also similar in some further respect. In evaluating analogies there are several considerations that matter in determining the relative strength or weakness of inductive analogical inference:

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850 *The Oxford Companion to the English Language* 1992. http://www.xrefer.com/ entry.jsp?xrefid=440939&secid=.- (10.10.2001).

851 Niiniluoto 1983: 137.

852 Lofting (date open). *Analogy vs. Metaphor*:. http://members.ozemail.com.au/~ddiamond/analog.html (10.10.2001).

853 Niiniluoto 1983:153.

854 Niiniluoto 1983: 176.

855 For more detail, see 5.4.7.

856 Partly paraphrased text. *Analogy* in *A Dictionary of Philosophical Terms and Names*. Kemerling, G. (ed.) 1997-2001. http://www.philosophypages.com/lg/e13.htm#anal (10.10.2001).

> 1. Number of instances. In general, more instances strengthen an analogy; fewer weaken it.
>
> 2. Instance variety. In general, the more variety there is among the instances, the stronger the analogical argument becomes.
>
> 3. Number of similarities. In general, the more similarities there are between the instances and a subjective conclusion, the better for the analogical argument.
>
> 4. Relevance. The criteria we're considering apply only if the matters with which they are concerned are relevant to the argument. We just have to use our best judgement in deciding whether or not some respect deserves to be considered.
>
> 5. Number of dissimilarities. In general, the less dissimilarity between instances and conclusion, the better an analogical argument is.
>
> 6. Modesty of conclusion. In general, arguments by analogy are improved when their conclusions are modest with respect to their premises.

In order not to use analogy blindly, it is useful to compare it with *metaphor* and *metonymy*, which, according to Lakoff (see below), represent experientalist, not objectivist, reality. They belong to encyclopedic knowledge and figurative language[857]. It is also useful to take up the concepts of simile and personification. First, metonymy:

> "Metonymy is a…figure of speech in which a thing, concept, person, or group is represented by something closely associated with it . . Metonymy is often contrasted with metaphor. Metonymy is characterized by association, whereas metaphor establishes a relationship of similarity. Thus, refering to a king as the throne is an instance of metonymy. Referring to the king as a lion is an instance of metaphor (Kohl 1992)."[858]

The following is a description of metonymy in semiotic terms by using the functions of signifiers and signifieds.

> "Metonymy: A metonym is a figure of speech involving using one signified to stand for another signified which is directly related to it or closely associated with it in some way, notably the substitution of effect for cause. It is sometimes considered to include the functions ascribed by some to synecdoche. Metonymy simulates an indexical mode. Metonymic signifiers foreground their signifieds and background themselves. See also: Contiguity, Irony, Synecdoche, Metaphor, Metonymic fallacy, Trope."[859]

In the following semiotic definition, 'represented part' could mean a concept that belongs to a conceptual category: king and throne belong to the same category, and throne, in some cases, may substitute the institution of kingship.

> "Metonymy, Poetic function, Synecdoche, Trope. Metonymic (synecdochic) fallacy: This term refers to a tendency for the represented part to be taken as an accurate reflection of the whole of that which it is taken as standing for. It might more

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857 See 2.3.

858 Lofting (date open). http://members.ozemail.com.au/~ddiamond/analog.html (10. 10.2001).

859 Chandler, *Semiotics for beginners*. http://www.aber.ac.uk/media/Documents/ S4B/ sem-gloss.html#M (22.10.2002).

> accurately be referred to as the synecdochic fallacy. See also: Metonymy, Synecdoche."[860]

And metaphor:

> "With metaphor, we can build layers and layers of data such that the metaphor is refined, and thus a long way from the 'thing' itself, but also encapsulates as many aspects of 'the thing' as possible. A 'rich' metaphor (words of a poem for example) can often lead to an intuitive grasping of what is being discussed without once mentioning the 'name' of the thing – i.e. 'the apple'. 'Raw' metaphor is when we get as close as possible to 'the thing'; maths and science try to do this, but they are still metaphors. What is implied in this is that all metaphors have a potentially hierarchic structure…
>
> From this it becomes obvious that there is a definite distinction between analogy and metaphor – analogy is aspectual whereas metaphor is wholistic. However, since any 'whole' can at times be an aspect of a greater whole then it can be used in an analogous form and this can cause confusion in one is not aware of the levels of analysis."[861]

Chandler, a semiotician, gives the following definition of metaphor:

> "Metaphor: Metaphor expresses the unfamiliar (known in literary jargon as the 'tenor') in terms of the familiar (the 'vehicle'). The tenor and the vehicle are normally unrelated: we must make an imaginative leap to recognize the resemblance to which a fresh metaphor alludes. In semiotic terms, a metaphor involves one signified acting as a signifier referring to a rather different signified. Metaphors initially seem unconventional because they apparently disregard 'literal' or denotative resemblance. Metaphor can thus be seen as involving a symbolic as well as an iconic quality. Metaphoric signifiers tend to foreground the signifier rather than the signified. Deconstructionists have sought to demonstrate how dominant metaphors function to privilege unmarked signifieds. See also: Irony, Metonymy, Poetic function, Synecdoche, Trope."[862]

Lakoff endorses the generally accepted definitions of metaphor and metonymy and elaborates numerous cases of various caterorization types. He stresses their foundation on his ideological viewpoint of experientalism[863]. In objectivism, a thought is considered abstract; in experientalism "thought is imaginative, in that those concepts which are not directly grounded in experience employ metaphor, metonymy and mental imagery – all of which go beyond the literal mirroring, or representation, of external reality."[864]

In practice, in literary studies, simile and metaphor can be defined in a simple way. *Simile*[865] is comparison of an object or quality with another object or quality with a specific connotation. Both sides of the comparison keep their identity: "he eats like a pig" (= he, while eating is a complex combination of himself and pig). *Metaphor* means direct connotative comparison and

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860 Ibid.

861 Lofting (date open). http://members.ozemail.com.au/~ddiamond/analog.html (10. 10.2001).

862 Chandler, *Semiotics for beginners*. http://www.aber.ac.uk/media/Documents/S4B/sem-gloss.html#M (22.10.2002).

863 See 4.6.

864 Lakoff 1987: xiv.

865 Under *Figurative language*. http://www.learn.co.uk/default.asp? WCI=Unit&WCU=6173 (24.10.2002).

transferring the identity of one instance to another: "he is a pig"(= he – in all aspects – is a combination of himself and a pig) . Literary studies also use the concept of *personification*, which means giving lifelike qualities to inanimate things, or abstract ideas: "the moon stared down". If we let our imagination run we can also speculate that in the metaphoric case 'he is a pig' the personification happens in a reverse way: pig enters the person of he. It is self-evident that musicological texts abound with similes, metaphors, metonymy, and even personificatio. Thus, it is a challenge to a reader of musicological texts to understand what is meant by a certain expression and literary style.

The definitions of metaphor, metonymy, and their related concepts clearly refer to the scale level feature of complex systemicity[866]. They also refer to the difference between the ontic and ontological reality[867]. It helps us become aware of the relativity of language, terminology, and concepts, and to select suitable conceptual levels in presenting systemicity.

5.9.1 Simile, Metaphor, Metonymy, Personification and Analogy in Musicology

It is interesting to speculate on the famous saying of Hanslick – "Musik ist tönend bewegte Formen" – from the four viewpoints of simile, metaphor, metonymy, and personification. If we take the sentence meaning literally (objectivist view), we mean: this is what music is, and music is not significally anything else. If we understand the sentence experientally (Lakoff) as a simile – "Musik ist *wie* tönend bewegte Formen", we leave possibilities to other statements on music. If we understand that saying experientally as a metaphor "Musik ist tönend bewegte Formen", we take music metaphorically as spatial moving forms but it also leaves possibilities to other statements on music. If we turn the sentence upside down or if we focus on the latter part of the sentence (tönend bewegte Formen), we have a metonymy: "tönend bewegte Formen" represent all music[868]. Experiencing movement (flow/stream of forms – of music) is an animate or organic experience. Thus, Hanslick's statement can also be taken as a personification.

Applying the systemic approach explanations: when we say along the objectivist line that music is "tönend bewegte Formen" (Hanslick) or something similar (e.g. exposition, development and recapitulation as phases of sonata form), we use a *raw* (scientific) *metaphor* (X is Y). It means that the observer zooms out from the scale level of structures (forms – subsystem level) to a generalising supersystem level (music) deducting that music is, or all what can be observed and stated of it is, forms.

If we say that music is "a ladders to heaven for a soul", or that a piano piece of Debussy "sparkles like a fountain of water", these are *rich* (poetic)

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866 See 5.6.3.
867 See 2.1.
868 See also 'Si et fa, la tota musica.' – in Chapter 6.2.9.

metaphors. Kohl[869] writes: "As a form of thinking as well as speaking, metaphor opens up the possibility of combining almost any two words and imagining a context in which they enhance meaning."

The possibilities of using objectivist and structuralist classical categorization and concepts along with experientalist categorization (simile, metaphor, metonymy, and personification) explains why we have a very complex conceptual field of raw (established, conventional) and rich metaphors, as well as, classical categories in musicology[870].

When we say that music is – as Elliot states – *a compound of more or less mutually complementary practises, socio-cultural and human action-meaning systems regulating music production, produced and experienced music-sound happenings, artistic constructions of musical patterns which are regulated by certain socio-cultural principles, ways of action and rules affecting them*[871], it is actually analogy (X *resembles* Y) because we suppose that music really resembles those practises, actions, systems, happenings, etc. While reading such authoritative-sounding definitions, we may fall into the conceptual "trap" of the reification warned about earlier: "When such usages are established, their users may forget the analogy and come to think of them as statements of fact..."[872]

The established conventional terminology of musicology uses many analogies[873]. For example, the concept of *texture* of music is an analogy because texture means "warp and woof" (of cloth or tissue) having horizontal and vertical elements intertwined with each other. The texture of music has vertical features (e.g. harmony, or cluster), and horizontal features (e.g. melody, or polyphony).

5.9.2 Metonymy in Normative Musicology

Metonymy is the cardinal factor in normative musicology. "Rock is all that music is. Bach is the essence of music." These sentences represent metonymy, but in essence most of the musicological dictionarial and largely also encyclopedic vocabulary (at least that of music asnalysis and theory) abounds with metonyms, where one signified stands for another signified. Such terms are, for example, terms of musical styles. Depending of their users, they signify different semantic nuances. Here are some metonyms and their meanings in certain textual contents: romantic (meaning emotional), expressionistic (means hypersensitive, Dionysian), Dionysian (meaning hedonistic, sensual), chromatic madrigal (meaning emotionally expressive madrigal), impressionistic style (meaning elegant surrealism), surrealism (meaning dreamlike, beyond space or time), baroque (meaning pompous), classical (meaning rational, balanced,

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869 In Lofting (date open). http://members.ozemail.com.au/~ddiamond/analog.html (10.10.2001).
870 See Language of design in 2.7.
871 Elliott in Väkevä, see 2.7.
872 See 5.9.
873 See also 2.7 Music as Form. Music as Design. Language of Design.

Apollonian), blues (meaning sad, melancholic), heavy rock (meaning aggressive rock), etc. As musicology develops including more and more paramusicological concepts into its sphere that gain normative scientifif and pedagogical status, the more musicology will have metonymic concepts.

Metonymy of concepts is, of course, language- and culture-bound, although in many cases international metonymic concept-use exists. The Finnish word for chord (in music) is *sointu*, which is associated with something that sounds pleasant. *Sointuva nimi* means a ringing name. *Sointu* is also a name for a female person. It would be absurd to call somebody Chord Maxwell or Harmony Jones in English, or maybe it is possible – who knows. In English, chord may also mean a feeling, or an emotion, because it is a shortening of the word 'accord' that means "to the heart".[874] So, in English chord is associated more to feelings in the heart, and the Finnish word is associated with something else.

5.9.3 Analogy as Tool of Enriching Systemicity Levels

The idea of analogy is meant to explain how we observe *new conceptual levels* (new understanding, a new scale level, or a new hierarchical superstructure) as well as new conceptual entities (e.g. a new concept and a new term for it). According to Sellars[875], they are introduced by analogy with familiar entities[876], with ready available concepts of the conceptual level. The new entity has additional or lacks properties of the familiar entities. The new entity always needs a "metalinguistic commentary" through which the identities and differences between the new entity and the basis of the analogy is explained. An example in musicology could be a "Debussian" term of ['*chord melody*' – my neoterm] explaining the composer's idea of using multipart parallel (chordal) texture as a one-part linear melodic idea (e.g. in *La Cathédrale engloutie*).

Sellars seems to keep closer to the older classical deductive-hypothetical school, whereas Brown enriches the Sellarsian idea towards an abductive and heuristic reasoning: the achieved new concept is an indirect output of the observer's heuristic-cognitive conceptual system. Brown[877] writes:

> "We may also compare concepts from competing scientific theories by exploring such analogies. Such discussions are always metalinguistic, and I will take Sellar's notion of a metalinguistic commentary as a prototype for all discussions of concepts. When we are carrying out such discussions we have available all of the language and concepts that are required to achieve this level of cognitive sophistication .Each of our scientific concepts have been introduced to do a specific cognitive job…Indeed, one reason for introducing a new concept is that we come to recognize the need for a cognitive job that was previously not recognized."

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874 *Webster's Encyclopedic Unabridged Dictionary of the English Language* 1989.

875 Sellars in Brown 1998. *Conceptual Comparison and Conceptual Innovation*. http://www.ditext.com/ brown/ccci.html (08.10.2001).

876 That which is already known and accepted; a conceptual paradigm, or hypothetical "truth".

877 Brown 1998. http://www.ditext.com/brown/ccci.html (08.10.2001).

It is most obvious that by this statement Brown is referring to the hierarchy of super- and subsystems with their relevant systemic scale levels of concepts, which need to do "their specific cognitive jobs". Applied to musicology: by examining certain lower level details of tonality, and trying to understand the workings of the systemic throughput that produces these cases, we can understand better the higher level tonality, but only by letting the better understood general law of tonality also to explain conversely the details better. This is abduction, not deduction.

Because the abductive reasoning process is an open conceptual reasoning system with input, throughput and output, the conceptual "reasoning energy" can move in it freely while, according to the complex theory, its elements tend to form complex conceptual configurations. During abduction, we learn to see more hierarchical scale levels.

In the light of the complexity view by Heylighen & Havel, I think that abductive reasoning equals systemic approach. It can be taken as a process of enrichment of complex conceptual configurations (inside complexity), where more *differentiation* (more different tonality cases) and more *connectedness* add to the understanding of an emerging complex system of, for example, tonality.

Chris Lucas (2000/2001), in his Internet articles (e.g. *Perturbation and Transients – The Edge of Chaos*[878]; *Attractors Everywhere – Order from Chaos*[879]; and *Quantifying Complexity Theory*[880], explains similar possibilities for new concept-forming relating to complexity, chaos theory, and systems thinking – including the role of conceptual "mind attractors."[881]

5.10 The Systemicity Umbrella. Relations of Semiotics and Systems Science/Cybernetics. Relation to Musicology

5.10.1 Introductory Comments

Up to this point in Chapter 5, I have dealt mainly theoretically with the idea of systemicity. Now I link it with the aspect of concept through the aspect of language and that of semiotics[882]. In Chapter 1.2, I introduced my qualitative research goals as the goal of *increasing understanding of conceptuality with the goal of exploring the possibilities of a scientific approach of systemicity*, which I however

878 http://www.calresco.org/perturb.htm (30.08.2001).
879 http://www.calresco.org/attract.htm (30.08.2001).
880 http://www.calresco.org/lucas/quantify.htm (30.08.2001).
881 See also 3.2.2.
882 I wish to point out that I do not deal with the relationship of semiotics and systems sciences or cybernetics in the way Doede Nauta does in his research *The Meaning of Information* (1972. Mouton. The Hague. Paris) since it approaches the question in the light of cybernetics alone, as it was understood at that time. Today cybernetics and systems sciences have considerably merged into one another.

prefer not to call a theory. I associated this also with my abductive research method. In this chapter I present a new conceptual-theoretical model that I call the *systemicity umbrella*. It is a tentative presentation of matching the main semiotic aspects and cardinal principles with systems sciences and cybernetics. In order to understand the idea of the systemicity umbrella fully, it is necessary to read first Chapter 3.2 on Theoretical Starting Points, especially the end of the chapter, as well as Chapter 5.4.9 on Systems Types in Systems Science, and Cybernetics as well as Chapter 5.8.2 Systems Analysis in Cybernetics.

The reason for presenting a theoretical model also meets with the criteria of the interests of qualitative research[883], which I presented in Chapter 1.2. The systemicity umbrella deals with features of language, finding regularities, understanding the meaning of text or action, as well as the aspect of reflection.

In many passages of the text of this research I have referred to the systemic similarities between semiotics and systems science/cybernetics. The reasons are as follows: concepts in musicology are conveyed and communicated through terms, words, texts, and signs. Concepts of systemicity are, likewise, communicated through terms, words, texts, and signs. The same is the case with semiotics itself. Semiotics is a field that has developed means of describing communicative-conceptual phenomena, mainly from two viewpoints: older structural semiotics and later social semiotics[884].

I have designed the systemicity umbrella based on the abductive reading of a careful selection of texts, especially on semiotics and systems sciences as well as cybernetics. Texts on terminology science and categorization reveal the same features in a lesser degree. The systemicity umbrella is meant to help to introduce the existing conceptual scale levels: from the abstract metaphysical ontic level to the practical details of the (ontological) concepts that we experience to represent instances of the reality. The systemic umbrella shows that music[885], musicology, and music(ological) education and pedagogy are located in the systemic complexity of semiotics and systems sciences/cybernetics. In the diagram below[886] one can see that from the semiotic viewpoint they (as concepts) belong to the *ideological level* and from the viewpoint of systems sciences and cybernetics they belong to the *paradigm level* as designed conceptual systems, as theories, philosophies, logic, arts, etc. They are also activity at the community level as part of *human activity systems*, where the best results could be reached especially through heuristic and purpose seeking (open and complex) education, instead of deterministic educational activity[887]. Semiotic readings similarly level strong criticism and warnings against the manipulative tendencies of language usage[888].

It is necessary to bear in mind that this presentation, at the same time, is a designed model. All designed models are ultimately, closed conceptual systems

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883 Tesch: 1992: 59, in Hirsjärvi, Remes & Sajavaara 1998: 166.
884 See 4.5.; 4.5.1.
885 Actually in the form we communicate about it.
886 See 5.10.3.
887 See Banathy in Chapter 5.4.9.
888 See Chandler, *Semiotics for Beginners*. Codes. http://www.aber.ac.uk/media/Documents/S4B/sem08.html (10.10.2001).

because they tend to define matters, although we know that no definition is absolute or final. Therefore, it is not of course practical to try to fit in all the possible concepts of systems sciences and cybernetics, and especially not of semiotics. This outline suffices to show the similarities of the systemic nature of the semiotic field as a designed conceptual open system and its parallels with the concepts of systems sciences. It is worth noting that the more modern (soft) systems science sources use a richer and freer selection of words and texts (concepts) than the earlier, more rigid (technological, first- order cybernetics) systems science sources. It is also interesting to meditate on whether we actually can consider the semiotic relation to the reality of concepts as hypothetical theories on par with "the more traditional", and more recent scientific ones, such as systems sciences. For me, at least they are parallel conceptuality.

5.10.2 The Systemicity Umbrella in Detail

The systemicity umbrella is based on the systemic cardinal principle presented in Chapter 5.8.4 and 5.8.5, mainly in the flowchart model. According to the model, if something comes (output) from something (throughput) then something exists before throughput (=input), which here in this presentation means "world", or "truth(s)", or "ultimate knowledge", or "mystery", if you like. I explain here the different parts of the model.

From the viewpoint of complexity[889], the "world", "truths", etc., belong to the *transcendental "scale" level*[890]. The concept of scale on this level is maybe unnecessary because of the metaphysical, transcendental, unreachable, unknowable ontic nature of that level. Here semiotics (world as social text) and systems sciences/cybernetics (either natural, or designed systems) are part of that ontic level. This level we cannot examine directly, and we should remember that when we think or talk of semiotics or systems, we are thinking of and discussing on **concepts about** them, not **about them**! What we can examine, and what reveals something about them indirectly, is the ontological output. Here the output is semiotic concepts, systemic concepts, or other paradigmatic concepts. On the side of semiotics, it means the human designed, and unended semiotic "productivity" as intertextualism. It entails a huge material of texts in different forms and contents in time as codes. On the side of systems, we have the vast and baffling complexity of systems working in space ("mental space", in semiotic texts), in time, and in scales (in semiotics different codes, in my opinion, are "scales"). For man, all this the *abstraction scale level*[891].

This all needs to be manifested and represented through human conceived concepts; hence, the *representational level*. Presumably, the input in both cases is the same ("world"), but the throughput (cognitive-mental human system) is

889 See Chapter 5.6, especially 5.6.3.
890 Omitted in the diagram below.
891 Paradigm here means a school of thought linked to an ideology or a stance to the reality.

used differently because the concepts produce different outputs: differentiated *forms* (=information) of conceptualization (= conscious knowledge) in the forms of semiotics and systemicity.

As stated above[892], the *ideological level* – which is connected on the one hand to the transcendental truth-value level, and on the other to the *relation to reality* (through metasystem and other theories) – is a level on which music, musicology, music education and pedagogy appear either as textual, interpretative or social codes (in semiotic terms) that can be divided in more detail. Musicology, which is the main interest of this research, is a scientific code, but it is also connected to other codes (of perception, aesthetics and ideology) through intertextualism. In systems sciences it is a form of science, philosophy, or a theoretical approach on the paradigmatic level. Musicology, of course, is connected to music as art.

On the *relation to reality (level)*, or how it all appears in the infinite conceptual cognitive praxis of man (in texts/signs, language, terminology, etc.), on the side of semiotics, we have a plethora of "semiotic-theoretical" conceptual details and examples – desired or not desired (polysemy, narrowcast codes, dominant codes, reification, redundancy, etc.). On the side of systems sciences/cybernetics, we have everything that causes either closed or complex systemicity (negentropy-reductionism, entropy). On a higher level in semiotics, we have codes and modality judgements explaining human semiotic thinking and "behavior"; on the systems side, we have various systems theories; and above all, a metasystems theory, or theories metamusocology included. The dotted elliptic circles are meant to present areas that conceptually relate to each other in semiotic and systemic side.

The traditional musicological education belongs mainly to the level of concept representation without any logical and systematic (!) reference to other necessary levels that could give a more holistic picture of musicology (e.g. music theory, music analysis, music aesthetics, and music history) as a conceptual tool.

To sum up: in the light of systemicity both semiotic and systemic outputs (semiotic concepts and systemic-scientific concepts) are parallel systems. Semiotics has a rich terminology and conceptual categorization due to the high "tolerance" of assimilation of many linguistic and scientific-philosophical influences for semiotic-conceptual probing. The systems boundary of semiotics is very flexible[893]. The information material and data of semiotics, therefore, is very complex: much differentiation and high integration. It is not easy to describe it coherently because it is an abductively organic and dynamically developing scientific paradigm.

Because semiotics uses rich terminology and concepts (= rich and differentiated data), it is also a very suitable field for abductive-systemic research purposes. For this reason the direction of semiotics also seems to give

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892 See 5.10.1.

893 Systems Definition in *Top Reading on System Definition and Classification* by Anthony A. Verstraete. http://www.smeal.psu.edu/misweb/systems/sycodef.html#SYSTEM_BOUNDARY (10.10.2001).

more light to the question of concept and conceptualization. "More beams of light give more color and shades to an object than a raw one-beam spotlight."

Presently much of the richness of semiotic concepts and terminology seem to focus on the "attacking" older, and purely deductive world-views. Albeit, semiotics has produced a plethora of concepts and terminology on different conceptual-systemic scale levels, such as *open semiosis* (Eco)/semiosis, *intertextualism* (Kristeva)/texts, *dominant coding*, *aesthetic coding*, etc./codes, *preferred reading* (Hall)/ideology, *reification*/representation, *naturalization*, *transparency*/codes, *univocality/narration*/textual codes – just to name a few of them[894].

5.10.3 The Systemicity Umbrella as Intergraphics

It is not easy to grasp the conceptual layers and levels of a linear text, especially of a text that is full of criss-crossing definitions and connections, such as the texts of semiotics are. I have transposed the essential concepts of the text above on the systemicity umbrella into an intergraphic systemic structure[895] *(Chart 19)*, which makes it easier to conceive the complexity of the issue. In order to understand the entire conceptual content of the systemic umbrella, the graphics below and the text presented above are needed.

In this graphic presentation, the semiotic and systemic "locations" of musicology and music can be seen clearly. They function on the ideological scale level of semiotics as scientific and aesthetic codes; and on the paradigmatic scale level of systems sciences, they function as theories, philosophies, mathematics, logic (music theory, music aesthetics, music analysis, etc.), and as art. Naturally, both semiotics and systems sciences are designed conceptual systems.

From the semiotic viewpoint, musicology and music are represented as texts and signs; from the systems scientific viewpoint, they are designed textual systems (complex conceptual configurations) expressed as concepts and language.

(Social) semiotics is interested in great detail in explaining the reality through nuances of human communication of concepts as texts (codes, modality judgements), and through understanding meanings of concepts. The aspects of language and its use in conveying different meanings are its main focus. Systems sciences and cybernetics are satisfied with the logical and philosophical theoretical nature of systemicity and its "nuances" as explanations of the reality through natural and designed systems.

The contrast with (social) semiotics is great. Systems scientists, such as Rocha, treat concepts and cognitive categories as "biological organisms" that

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894 Chandler, *Semiotics for Beginners*. http://www.aber.ac.uk/media/ Documents/S4B/sem-gloss.html (29.08.2001).

895 About intergraphics see Chapter 4.7.2; adapted sources: Chandler/semiotics; Heylighen, Banathy et alii/cybernetics – systems sciences.

need to "survive", etc.[896]. It is an attempt to alienate the human cognitive conceptuality into an alleged objective distance. The same goes with the idea of memetics in systems sciences. Language is not the main focus. Common to both semiotics and systems sciences and cybernetics, however, is that they are manmade conceptuality and manifested through language (language understood in a broad sense). This viewpoint is missed in both, so far.

In the aspect of concrete communication, on the semiotic side, musicology and music are connected to the representational scale level (as texts and signs) through scientific and aesthetic codes. In systems sciences, they belong to the designed (textual) systems of concepts and language (e.g. musicological terminology) through systems theoretical explanations of musicological conceptuality[897]. The border of both paradigms (semiotics and systems sciences/cybernetics) is fuzzy; in fact, they blend together, as evident in at least some systems science research[898]. All this forms in the semiotic side an infinite intertextual concept field. On the systems side there is a complexity of various conceptual systems. All this conceptual activity is based on ideologies, and on more or less systemic theories, and it is communicated and stored culturally through science and education as human activity.

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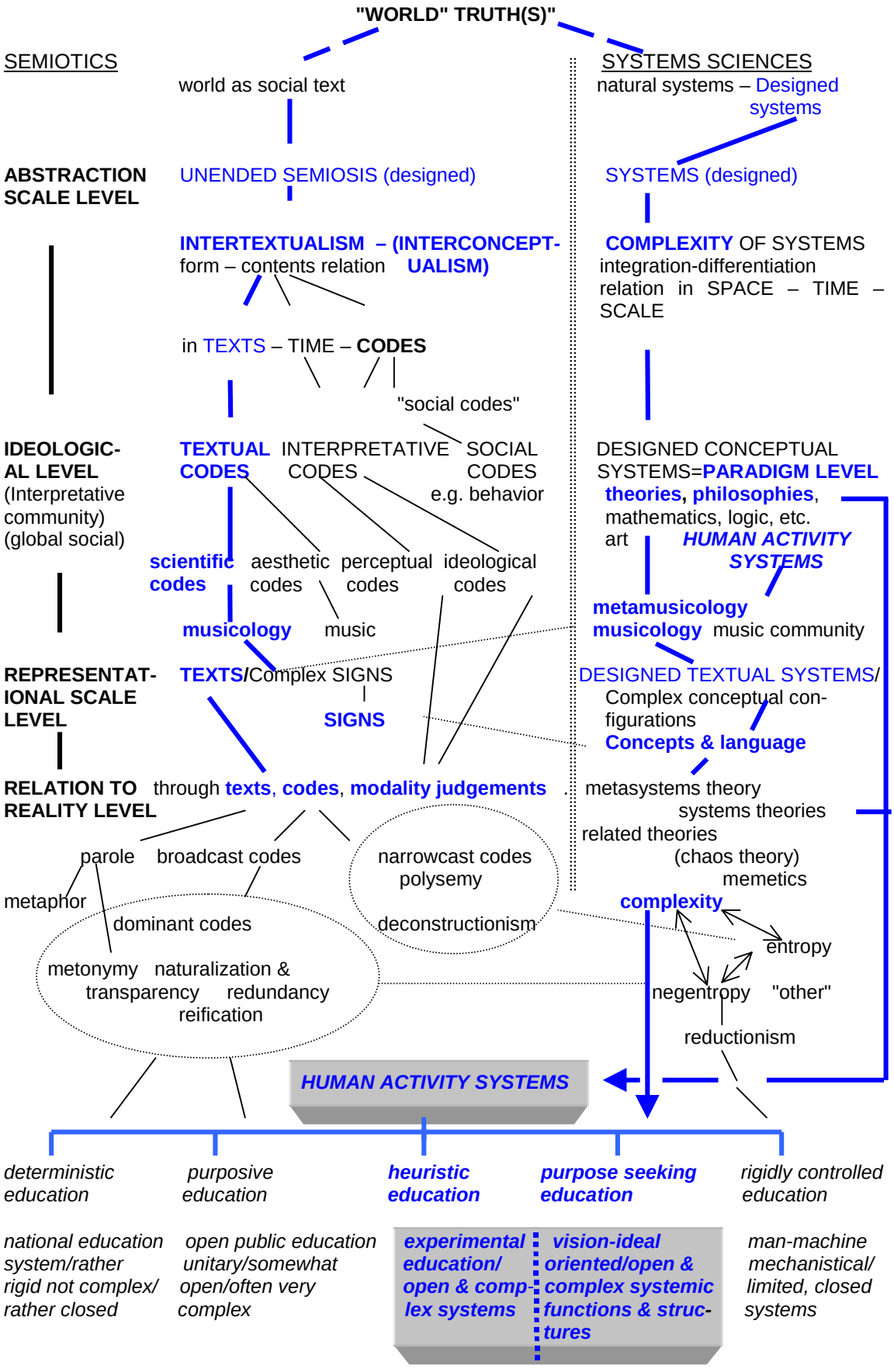
896 Rocha 1997. http://www.c3.lanl.gov/~rocha/es_contx.html (04.09.2000).

897 To my surprise I have not come across systemic explanations of musicology, except that of Georgescu, see 1.6.3. Otherwise, systems science has taken a standpoint to "nearly everything".

898 Rocha 1997. http://www.c3.lanl.gov/~rocha/es_contx.html (04.09.2000).

Chart 19 **SYSTEMICITY UMBRELLA** (Designed)



5.10.4 The Advantages of the Systemicity Umbrella Concept

The advantages of the systemic umbrella are several. It gives a holistic systemic ontological picture of musicology related to the tools it needs: concepts, language, terminology, signs, and texts – whatever conceptual tool we deem to choose for scientific, or educational and pedagogical purposes. It can be used in subjective or normative ways. However, it requires enough detailed knowledge of the issues concerned and related. It helps its user to become more aware of language and concept use. We can define ideas more precisely and in more detail, more individually, or find and formulate new concepts.

In musicology, we can find better definitions to replace old reified and redundant definitions. I have used the technique in defining certain phenomena in music, for example syncope or chord, in a new way, and have discovered new parametric phenomena to be defined, e.g. surface rhythm glide (appearing in, for example, "Putting on the Ritz" due to the asynchrony of the metre of the main melody and the pulse metre behind it), just to name a few. A word of warning is, however, necessary. In all systemic models, we come into the problem of the paradox of accuracy and perspicuity: the more details we add into a systemic model the less perspicuous it becomes to its reader[899].

5.10.5 Semiotics and Systemicity. Basic Semiotic Principles with Systemic Commentary

In order to elaborate the concepts inside the systemicity umbrella, my target is to prove and show how interesting it is to compare in practise the closeness of basic semiotic tenants and those of systems science/cybernetics. Several cardinal principles and details are analogous. For that purpose, I have selected certain semiotic readings[900] commenting on them from the viewpoints of systems sciences and cybernetics[901]. On occasion, I have also commented on some musicological aspects of the issue. It may be necessary to the reader to go back to the chapter 4.5.1 in which the semiotic basic principles were elaborated in more detail.

It is sufficient to examine the three basic concepts of semiotics, viz. the features of the paradigm itself, *semiotics*, its basic conceptual unit, *sign*[902], and *modality*[903], which refers to the reality status accorded to, or claimed by a sign, text, or genre. Everything else ultimately leads to them. Semiotics, thus, is comparable with systems sciences and cybernetics on the paradigmatic, theoretical, and metasystems levels. Sign itself is an actual system, a system, or

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899 Mela 1999: 11 in 5.4.3.
900 Chandler, *Semiotics for Beginners*. Introduction. Glossary. http://www.aber.ac.uk/media /Documents/S4B/semiotic.html (29.08.2001).
901 See Chapter 5.
902 On sign, see also 4.5.1.
903 See below.

a model[904]. In this sense, for example, the musicological terms 'exposition', or 'tonic', or 'fugue' are existing actual systems; they also are concept systems with inherent elements, and at the same time they are models. Sign is naturally a concept as well, and thus represents the representational scale level. Modality, by definition, has to do with the reality as perceived by an observer. In cybernetics this means constructivism. Of this all, more details below.

5.10.6 On Semiotics

It is not yet possible to consider semiotics a coherent institutionalized academic discipline because its adherents profess several different, even competing theoretical stances, and use diverse research methods. "Even with the most basic semiotic terms there are multiple definitions" [905], and the term 'science' applied to semiotics is misleading. Umberto Eco's[906] definition on semiotics is one of the broadest: "semiotics is concerned with everything that can be taken as sign…as significantly substituting for something else". Chandler writes: [semiotics] "is not only concerned with (intentional) communication but also with our ascription of significance to anything in the world." At least since the time of Eco's first revolutionary tentative views, the scope of semiotic research interest has become bewildering: art, literature, anthropology, and the mass media. Today semiotic research is carried out by linguists, philosophers, psychologists, sociologists, anthropologists, literary, aesthetic, and media theorists, psychoanalysts, and educationists. "Beyond the most basic definition, there is considerable variation amongst leading semioticians as to what semiotics involves."[907]

Two divergent traditions of semiotics stem from Saussure (semiology) and Peirce (semiotics). Both camps have their leading figures and representatives.[908] Perhaps the most influential leading bridging person between these two schools of thought is Umberto Eco. Broadly speaking, the Saussurean tradition is closer to the older structural linguistics, which I associate with the cybernetic camp of systemic thinking, and the Peircean tradition is closer to social semiotics, which I associate with the soft systems sciences.

Even more similarities between systemicity and semiotics can be found. Cybernetics, by definition, is related to the idea of control and governance. Structuralistic semioticians have used language as a model to study social phenomena: "Lévi-Strauss for myth, kinship rules and totemism; Lacan for the unconscious; Barthes and Greimas for the 'gammar' of narrative. Julia Kristeva declared that 'what semiotics has discovered is that the law governing or, if one

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904 See 5.11.1; 5.11.2; 5.11.3.

905 Chandler, *Semiotics for Beginners*. Introduction. http://www.aber.ac.uk/media/Documents/S4B / sem01.html (10.02.2002).

906 Eco 1979: 7; see my points on the issue in more detail in 4.5.1.

907 Chandler, ibid.

908 Saussureans: Louis Hjelmslev, Roland Barthes, Claude Lévi-Strauss, Julia Kristeva, Christian Metz and Jean Baudrillard. Peirceans: Charles W. Morris, Ivor A. Richards, Charles K. Ogden and Thomas Sebeok; source ibid.

prefers, the major constraint affecting any social practice lies in the fact that it signifies; i.e. that it is articulated like a language'.[909] I cannot but quote the following passage by Chandler:

> "Language is almost invariably regarded as the most powerful communication **system** by far. For instance, Marvin Harris observes that 'human languages are unique among **communication systems** in possessing semantic universality... A communication system that has **semantic universality** can convey information about all aspects, domains, properties, places, or events in the past, present or future, **whether actual or possible, real or imaginary'** (cited in Wilden 1987, 138). Perhaps language is indeed fundamental: Emile Benveniste observed that '**language is the interpreting system of all other systems,** linguistic and non-linguistic' (in Innis 1986, 239), whilst Claude Lévi-Strauss noted that 'language is the semiotic **system** par excellence; it cannot but signify, and exists only through signification' (Lévi-Strauss 1972, 48)." [910]

I have used here bold font for my purposes. One cannot miss the striking parallels with and connections to systemic sciences. Benveniste's opinion refers to the fact that language, in the form of musicological terminology and descriptions, interprets the conceptual world of music. Thus, "the musicological" of music (texture, tonal system, form etc.) are **interpretations of** music, but **not music** itself. We should never assume that music is what it is because of musicological concepts. Musicological concepts do not describe music but what is conceptualized by concepts and related to language.

Semiotics and cybernetics/systems sciences share the common medium of modelling systems and letting them to shape us (and through us) our world. For example, traditional Saussurean semioticians are mainly interested in the underlying semiotic structures and rules but not so much in specific linguistic and communicative practises. Saussure's approach was to understand semiotic systems "synchronically" or "frozen in time". Later, structuralistic cultural theorists adopted this usage. They studied social and cultural phenomena reflected in a given semiotic system of a time period. Another matter was to try to define whether the semiotic system was the cause of these phenomena, or vice versa.

The same questions of understanding systems and letting them shape our world is a big issue among systemic sciences, where the need of systemic world vision sometimes rises to a level of a manifesto[911]. It goes without saying that at least all professional education is fundamentally affected by the dominant scientific-philosophical codes. Language as a means of communication and transmittance of information of musicology is the "ideological" use of concepts and terms in the form of texts (complex signs) and signs.

Certain linguists (Jakobson and Tynyanov) challenged the synchronic viewpoint as illusory and pointed out that synchronic systems have the past and the future. Voloshinov went into details: "A synchronic system may be said

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909 Cited in Hawkes 1977, 125, in Chandler, *Semiotics for Beginners*. Introduction. http://www.aber.ac.uk/media/Documents/S4B/sem01.html (10.02.2002).

910 Ibid.

911 Banathy 1996/1997. http://www.newciv.org/ISSS_Primer/asem04bb.html (30.08. 2001).

to exist only from the point of view of the subjective consciousness of an individual speaker belonging to some particular language group at some particular moment of historical time".[912] Chandler points out: "Language is seldom treated as a static, closed and stable system which is inherited from preceding generations but as constantly changing." In my opinion, these features clearly reveal the systemic dimensions of space, time, and scale of language, or intertextualism as Kristeva, a semiotician names this phenomenon. At the same time, the cybernetic, observer-oriented (constructivistic) view sounds clearly in the words of Voloshinov.

The current, poststructuralistic semiotic theory involves these two main emphases: 1. *subjective aspects of signification* = what meaning effect the signifier has on an individual mind (this view is strongly influenced by the Lacanian psychoanalysis), and 2. *social aspect of signification* (practical, aesthetic or ideological use of signifier in social communication) – the meaning is related to culturally shared codes.[913] Compared with systems sciences and cybernetics: both the subjective and social factor is taken into consideration in modern systemic sciences, which is visible in the great variety of scientists as members of the ISSS.[914] What are the merits of semiotic research? Chandler writes:

> "This is a pressing question in part because the writings of semioticians have a reputation for being dense with jargon: Justin Lewis notes that 'its advocates have written in a style that ranges from the obscure to the incomprehensible' (Lewis 1991, 25); another critic wittily remarked that 'semiotics tells us things we already know in a language we will never understand' (Paddy Whannel, cited in Seiter 1992, 1). The semiotic establishment is a very exclusive club but, as David Sless remarks, 'semiotics is far too important an enterprise to be left to semioticians' (Sless 1986, 1)."[915]

I endorse this statement and wish to point to the direction of systemicity research.

5.10.7 On Sign

The concept of sign is very crucial to semiotics and has been the focal interest of numerous researchers. The following one is a compact description:

> "A sign is a meaningful unit which is interpreted as 'standing for' something other than itself. Signs are found in the physical form of words, images, sounds, acts or objects (this physical form is sometimes known as the sign vehicle). Signs have no intrinsic meaning and become signs only when sign-users invest them with meaning with reference to a recognized code. Semiotics is the study of signs. See also:

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912 Voloshinov 1973: 66, in Chandler. *Semiotics for Beginners*. Introduction. http:// www.aber.ac.uk/ media/Documents/S4B/sem01.html (10.02.2002).

913 De Lauretis 1984: 167, in Chandler, ibid.

914 See 5.1.

915 Chandler, *Semiotics for Beginners*. Introduction. http://www.aber.ac.uk/ media/Documents/S4B/sem01.html (10.02.2002).

> Analogical signs, Complex sign, Digital signs, Functions of signs, Modes of relationship, Models of the sign, Photographic signs, Signification, Simple sign." [916]

Signs are the means of the communication of meanings. Meanings are the means of conveying information. The function of information[917] (which is structure) is to convey controlled meanings (knowledge[918]). The usage of signs by human beings is controlling meaningful communication by the proper use of signs. Cybernetics by (commonly accepted) definition, is the study of human control and communicative functions. Signs are, thus, semiotic-cybernetic tools for communication. Furthermore, signs are represented through models (Peircean, Saussurean, or other) that in fact are always conceptual reductions of the systems (concepts of sign) they represent[919]. This all matches perfectly the function of musicological terminology and music notation, which tends to control how institutionalized music is described and prescribed.

5.10.8 On Modality

Chandler's text (with my bold font for emphasis) is compact and clear on this difficult subject:

> "Modality refers to the **reality status** accorded to or claimed by a **sign, text or genre**. Peirce's classification of signs in terms of the **mode of relationship** of the sign vehicle to its referent reflects their modality – their apparent transparency in relation to 'reality' (the symbolic mode, for instance, having low modality). In making sense of a text, its interpreters make '**modality judgements**' about it. They assess what are variously described as the **plausibility, reliability, credibility, truth, accuracy or facticity of texts within a given genre as representations of some recognizable reality**. For instance, they assign it to fact or fiction, actuality or acting, live or recorded, and they assess the possibility or plausibility of the events depicted or the claims made in it. In doing so, they draw upon their knowledge of the world (and **social codes**) and of the medium (and **textual codes**). Such judgements are made in part with reference to cues within texts which semioticians (following linguists) call 'modality markers', which include features of form and content. See also: **Ontology, Reality"**[920]

Modality judgements are thus, the observer's perceptions of what is the reality and what represents it: his/her choice of modality level is scaling and zooming out or in from one level to another in the conceptual systemic context of the texts. What seems a super-concept on one level changes into a detail-concept on another level. This is one, and important, aspect of complexity[921]. I present no further examples in this limited context.

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916 Chandler, *Semiotics for Beginners*. http://www.aber.ac.uk/media/Documents/S4B/sem-gloss.html#S (29.08.2001). See also the definition of Greenlee in 4.5.1.
917 See 5.4.10.
918 Ibid.
919 See system 5.4.2, model 5.4.3.
920 http://www.aber.ac.uk/media/Documents/S4B/sem-gloss.html#S (29.08.2001).
921 See 5.6.3 Scale Level Factor in Complexity.

6 PRACTICAL APPLICATIONS OF SYSTEMIC DESCRIPTIONS TO MUSICOLOGICAL CONCEPTS

The following diagram *(20)* includes the examples of selected musicological concepts or concept fields in this chapter. I have planned them with their possible pedagogical use in mind. Pedagogical applications of systemicity have been utilized consciously to some degree either in the better-known form of constructivism[922], or as systems thinking. An example of the latter is the writings of Martti Mela. He has published, among other things, with the aid of his colleagues and students, a handout[923], in which he presents the method along with its pedagogical reasons. The literature referred to in the handout includes several important international and Finnish researchers of systems sciences and cybernetics. The Department of Biophysics of the University of Oulu has been active in spreading the method among the pedagogues of selected gymnasia, as well as has given special courses for pedagogues during several years. Still, according to Mela, the method is not widely known, or even understood properly. Mela[924] writes:

> "*Systems thinking* has to be regarded as one of the modern disciplines. Mastering the basics of systems thinking is useful in any field. The advantages of systems thinking for readers (students in school and university) are clear. They learn to link various phenomena within a discipline, and even between different branches of science. This means holistic perception of single pieces of information. Learning becomes meaningful, extensive, creative, and one can minimize the amount of information that has to be memorized. Learning becomes livelier and the student gets more information with less effort. The significance of systems thinking is best manifested in the fact that it connects phenomena within the various subjects and disciplines bringing them closer to each other. Nowadays, interdisciplinary know-how is both rare and worth aspiring to, since in today's civilized information society we need specialists who have received an extensive and versatile education; who have the ability to integrate knowledge from different branches of science."

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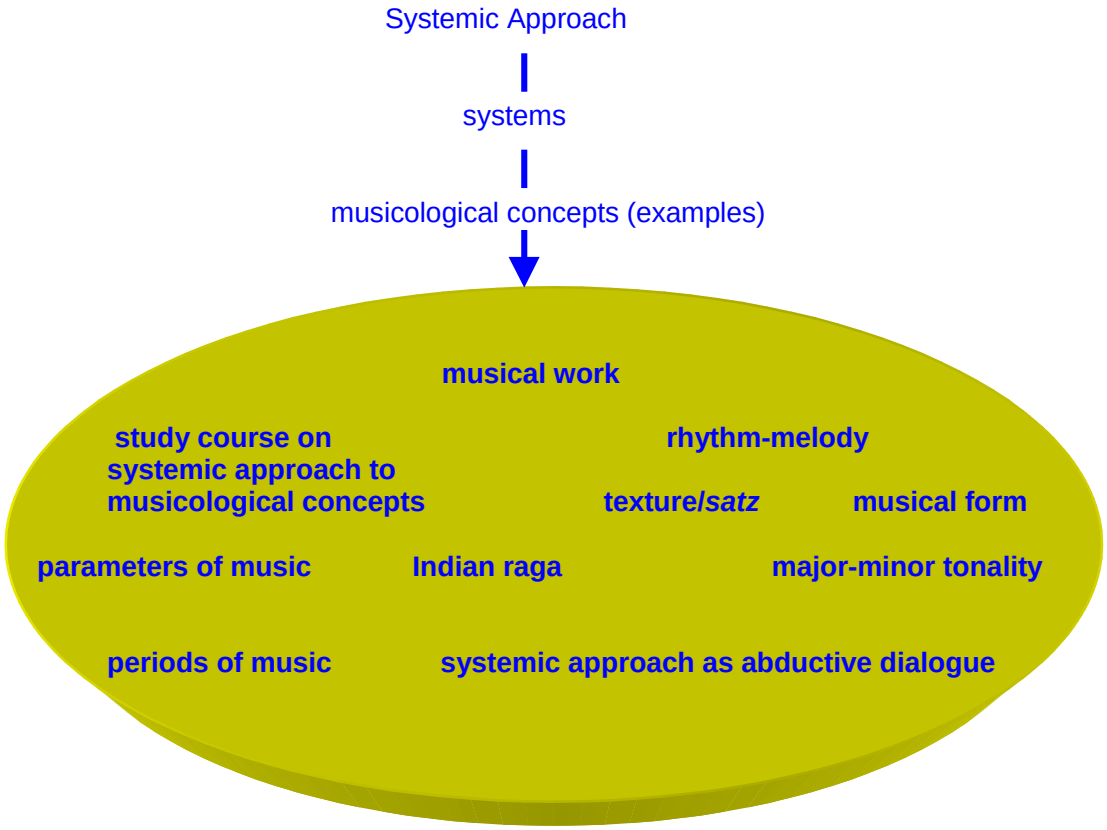
922 See 1.4.3; 1.4.4; 1.5.1: 1.6; 1.7.2; 1.7.3 etc.

923 Mela, M. 1999. Systems Thinking As Application. Electrical, Fluid, Mechanical, Thermal, Diffusional Systems. University of Oulu, Department of Bio-chemistry.

924 Mela 1999: 3.

It is interesting to compare these "promises" with how well they meet the list of the educational problems of musicology[925] I have presented in Chapters 1.4.1 and 1.4.3. Mela's statement points out why it is also important, in musicology to try to integrate concepts into systems, to show their connections, universalities and analogies, to explain the differences between actual system (music as an ontic phenomenon), system (music as musicological-ontological conceptuality), and models and analogies (musicological concepts as terminology, metaphors, and signs). Mela's statement provides the reasons why I have developed – originally intuitively, presently consciously – my study course of Systemic Approach presented hereafter.

Chart 20



6.1 A Study Course on Systemic Approach to Musicological Concepts

I began to grope towards systemicity in pedagogy back in the 1980s when trying to find various conceptual systems of certain musicological parameters. With a specialized focus I taught it on the secondary level at the Conservatoire of Oulu under the name of yleinen *musiikkitieto I* (Introduction to General Music Knowledge I), and later on the professional secondary level under the name of

925 Study course musicology.

musiikkianalyysi (Analysis of Music). It also proved very helpful in other general subjects such as music history, music aesthetics, and music analysis. Since autumn 2000, I have given courses on musicological systemicity (*musiikin systeemiset käsitejärjestelmät – Systemic Approach to Musicological Concepts)* as a pilot project in the Oulu Polytechnics Cultural Unit, Degree Course of Music. I do not know whether similar courses have been given elsewhere in Finland.

6.1.1 Objectives and Philosophy of the Course

The important principle was to help the students to understand the conceptual ambiguity of seemingly familiar musical phenomena: what had been learned earlier as normative concept formulas was not the final truth but much more complex and more interesting. My task was to give new light to old knowledge. My strategy was to structure explanations with several factors and not with only one or two. It even became necessary to challenge some of the older terms and to find new ones to describe a musical/musicological phenomenon better. Thus, for example, the Finnish term of recapitulation (*kertausjakso* = repetition section) in the sonata form was replaced with a more exact term [*paluujakso* = return section – my neoterm] – to illustrate fact that the recurring thematic material is not usually identical with the exposition but a variant, and often even developed. The theoretical term of "natural minor scale" was changed into "unnatural"/theoretical minor scale because the natural scale as such is not very natural in the real use of music.

The most essential matter was to stress that a given conceptual musicological structure, or system model, was not meant to be the only and the final explanation of the phenomenon. Moreover, a conceptual explanation, or a system model should never be taken as the phenomenon itself; so I stressed the relativity of knowledge and its conceptual description. Music theory and organic music go tangent with each other in the mind of a music listener, but a conceptual description is always only description; never the phenomenon itself.

One of the leading thoughts in this kind of method is to question so-called "facts", to check their conceptual basis and to learn to understand and perceive matters in new ways, which means to help a student to organize and develop systemically the conceptual world he/she already carries in his/her mind[926].

While a familiar phenomenon became understood in a new and more coherent way, it likewise became possible to introduce initially unfamiliar (or poorly assimilated or remembered) concepts by the aid of analogies. Examples of these were the connections between the concepts of *nava rasa* (Indian music)

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926 An interestingly similar attempt to conceptualize the possibilities of human body movement are the ideas of Rudolph Laban, who investigated theoretically the fundamental principles of human body movements in order to develop a means of organising and analysing it. Choreutics and Eukinetics were the theories dealing with the immediate space around the performer (kinesphere), as well as the dancer's dynamics and rhythm.; see *The Laban Archive at the National Resource Centre for Dance*, University of Surrey, Guildford, Surrey GU2 5XH, UK. See http://www. archives. org. uk/coverstories/aug99.html (21.10.2001).

and *Affektlehre* (Western music), or the relation of Indian *raga* and *that* by comparing them with the relationships between Western theoretical *scale* and *tone set* (*sävelikkö* in Finnish) of a melody.

An essential aspect has been to try to see connections and dependencies (i.e. complex connections) between various musicological parameters (e.g. tone system – texture – form) and to examine which parameters seem to be dominant in a certain musical work and a certain musical style or genre. For example, in Western music, texture can be "rich" because of several melodic layers and their part-leading features (vertical harmonic richness), yet a one-part melody of an Indian raga can also be texturally rich but in a totally different (linear) way. This all has tried to represent a more holistic (wide spectral) than narrow conceptual music analysis.

During the course we have examined cases where a certain parameter "melts" into another. Rhythm overlaps with texture and timbre in the cluster-technique, which functions with long and "static" timbre layers. There are cases where a parameter is non-existent. In speech choir, music tone system is replaced by sound system of sound effects such as speech intonation (linguistic prosody = phrase melody) and vowel-consonant timbres. These examinations raise up the interesting question of the boundaries of the traditional music(ologic)al parameters: e.g. where are the borders of tone/sound system and texture, or rather what happens at the border of these conceptual systems?

6.1.2 Course Feedback

The feedback by the students on these courses has been generally positive. This kind of pedagogy is creative, pleasant, and full of positive surprises. They have felt that the course opens new possibilities to understand musical phenomena. Many previously unclear and unstructured concepts have found their places in their cognition; theoretical phenomena that were previously taken as obvious facts have gained new and wide perspectives (such as the musicological parameters of music, nature of music texture, connections between church modes and ragas, concept of tonality, layers of rhythm, etc.).

6.1.3 Course Load

In practise, the parameters examined during the course have been those whose material is seemingly well known and familiar to students; material which belongs to the established national musical theoretical curricula and course loads. The elementary theoretical curriculum starts with the characteristics of tones (pitch and duration), their notation, tone combinations (intervals and chords), basics of tonal/major-minor polyphony and harmonization, scale system (scale types, chromaticism, and enharmony), and usually a brief introduction to modality (Western church modes). However, the proper concept of tone system is not dealt with. The same happens with the rhythm

parameter; the assumed "basics" are taught (everybody knows them, I need not to go into details) but not the most obvious basic components of rhythm which I prefer to call [*surface rhythm* and *core rhythm*[927] – my neoterms].

My course has covered mainly the *tone system*, *rhythm system*, and *form system*. I have introduced many examples of the *texture/satz*[928] system along with the tone and form systems but I did not have time to concentrate on texture separately. I have also pointed out that additional musicological concept systems are the systems of *sound*, *tuning*, *dynamics*, *narration*, and *affect modality/emotions*[929]. Inside the last system mentioned, the system of relation *of verbal text and music* can be found as well as the system interaction of *kinaesthetic movement and music*, such as in dance and ballet.

6.1.4 Example of the Contents of Course Load. Texture of Music as Conceptual System

The following list of keywords gives the reader an idea of the possibilities of approaching just one parameter of music in a systemic way. The concepts are handled, of course, with relevant musical examples from various styles, cultures, and cultural eras.

Texture

A. *General use of the concept of texture from any known concept field*: warp and woof of cloth; texture of any material; texture of any abstract composition; etc.; B. *In music*: 1. Melodic textures/horizontal-linear: one-part texture, two-part texture, multi-part texture; 2. Voice leading possibilities: parallel, counter-movement, one stable one moving, skip -linear combinations; 3. Drone texture; 4. Heterophony texture types; 5. Unisono texture; 6. Polyphonal texture types (free style – learned style/rules of imitative writing), the Flemish school, dodecaphony, etc.; 7. Vertical textures: vertical interval structures from cluster to chords, chord types, chordal melody, tendency tones, dissonance-sonance phenomenon; 8. Speech choir texture; 9. Noise texture; 10. Electronic music texture/generated sound texture; etc.

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927 See corresponding components of music defined broadly as *rhythm* (including rhythmic accents, rhythmic groups etc, due to difference of loudness, duration, contour, etc.) and as *metre*, http://www.grovemusic.com/shared/ views/article. html?section=music. 45963.1.1 (21.10.2001).

928 Note that I use the terms texture and *satz* in a somewhat different way than the usual tradition of these terms – see 6.1.4. *The New Grove Dictionary of Music and Musicians* defines texture: "A term used when referring to the sound aspects of a musical structure. This may apply either to the vertical aspects of a work or passage, for example the way in which individual parts or voices are put together, or to attributes such as tone colour or rhythm, or to characteristics of performance such as articulation and dynamic level". http://www.grovemusic. com/shared/views/ article. html? from =search&session_ search_id=1003671756&session_name= de57c8d2a6be40dd&hitnum=1&section=music.27758&start=1&query= texture& search_subview=search_subject (21.10.2001).

929 See Systemic Approach to Parameters of Music 6.2.5.

Other: 1. Relation of texture with tone system: e.g. modal music, major-minor music, chromaticism and texture, etc.; 2. Relation of texture with form: imitative melodic texture – polyphonic forms, one part + continuo, etc.; 3. Texture and narration: in vocal music, e.g. madrigalism; 4. Relation of texture with rhythm; 5. Relation of texture with timbre and orchestration; 6. Relation of texture with dynamics: as in concertante, or register dialogue; 7. Relation of texture with aesthetic interpretation and performance: emotions, character modality; 8. Relation of texture with acoustics of the performance space: resonance, echo effect; etc.

6.1.5 Course Material

The musical data of the course has included examples from the Gregorian chant to minimalism; from jazz and pop to raga and electronic music, and speech choir; examples of non-European music cultures have also been included. These examples of music are heard in our culture through the radio and the television, and students of classical music certainly have heard "nearly anything" at least a few times in their lifetime. Strikingly enough, they do recognize spontaneously music genres and examples without understanding conceptually how and what they are. The pedagogical strategy of systemicity during the course has been the process from the familiar to the unfamiliar, opening up the systemic idea behind the familiar and then showing similarities and differences in the unfamiliar.

6.1.6 Course Assessment and its Problematics

The assessment situation after a course is always a surprise to a teacher. Some students are good, some really brilliant; but some, despite of their active discussive participation during the course (they may present good and awkward questions), fail in the exam which by tradition is literal-verbal and graphical.

After my long experience, I have come to the conclusion that the problem could be mainly semiotic. Conceptual complexity (differentiation and integration of concepts) cannot be understood and described with a limited and homogenous stock of concepts. A student who has received a broad musical theoretical education (and has assimilated it conceptually) is able to understand and produce systemic musicological answers. But a student whose conceptual “history” is short and shallow cannot, even though his intelligence is quite sufficient to inspire interesting discussions on focused issues during the lessons. For example, mathematical equations and rules are limited to expressing quantities not qualities (an absurd question would be: "Tell me how beautiful this tune is?") Thus, an enterprise to express qualitative complexity through them is clumsy. The identification of some formal structures of intervals, chords, and cadenzas does not help much; and knowing them incorrectly is a catastrophe. The language of traditional music theory is narrow and normative;

it cannot produce the fertile soil for creative systemic conceptuality. Semiotics instead has taken for itself a huge stock of concepts, words, and terminology that is both differentiated and integrated. A person who uses rich conceptual language is able "by nature" to understand semiotic conceptual nuances as a complex system, and by the aid of this ability he or she is able to examine the behavior of, e.g. normative concepts and its related terminology. This is why we easily think that a person is intelligent and another not. Therefore, if we introduce complex systemic approach to musicological concepts we must be ready to widen our conceptual expressive capacity towards the semiotic paradigm.

6.1.7 An Example of the Assessment of Systemic Concepts of Music Course. An Exam.

Here is an example of the assessment of the course of Systemic Concepts of Music. This exam was given to students at the Oulu Polytechnic's Cultural Unit on 17 January 2001. The course load covered the tone systems and rhythm parameters of music. The exam duration was 2 1/2 hours.

Unit A. Choose 10 musicological terms out of options a – l; and answer the questions. Explain the terms with relevant examples of music.

a) synthetic scale; b) cluster; c) rhythm mode; d) *aksak*-rhythm; e) surface rhythm; f) tone set; g) hemiola; h) ostinato; i) texture (of music); j) field technique;
k) minimalism; l) mode; m) swing; n) tendency tone

Unit B. Choose 14 questions and answer them.
1. What are the *structural elements* of (traditional) music that can be analyzed and described?
2. Explain *tone system* of music.
3. How can we define *chord* with tones? What is a chord, what is not?
4. What is meant by the sentence alleged to J.S. Bach: "*Si et fa, la tota musica*?"
5. What are *tonal centres*? What does it mean?
6. What *types of tonality* does the musicological literature describe?
7. What means *chromaticism* in tonal music?
8. On which basis do we name the *harmonic minor*? What about the *melodic minor*?
9. Explain the difference between *scale* and *tone set* (of tone system)?
10. Write the *accidentals* needed in the following scales a) G-Dorian; b) C-Mixolydian; c) B-Phrygian; d) D-Ionian.
11. In what way are the *tonal modal* and *major-minor systems* related?
12. Give examples (5 to 6 pieces) of *free rhythm* in music.
13. What does the *natural tuning* mean in practise? What is its "opposite"?

14. What kinds of changes of *tempo* appear in music? How are they marked in notation? (Give 5 examples).
15. Explain the main differences between *thorough bass* and *modal harmonization*
16. Describe some main features of the *modal tone system*.

Unit C. Please, answer all questions.
1. Imagine a *hemitonic scale continuum*. It contains various *established scales*. Write the continuum on the following stave and delineate the established scales you know. Give the *accepted names* of the scales. (Empty stave without accidentals was given on the paper).

2. Which *tone systems* appear in the following notational excerpts? Name the tonal system terms (Four one-part notated melodies on paper: a pentatonic melody; a whole-tone melody; a G-minor melody and a dodecaphonic row-melody. The teacher played the melodies on the piano during the exam).

3. Which *rhythmic phenomena* appear in the following notational excerpt? Mark the appropriate terms referring to the indicative arrows (six arrows).
(The students were supposed to detect the basic rhythm of the 6/8 marked as a notated beat in parentheses under the actual notation; rhythmic accents marked as > >; iskuala (a term by Krohn – see 6.2.4); hemiola and surface rhythm indicated by a line over the notation).

6.1.8 Selected Answers

Many students understood the main contents of the course very well; some of them gave really creative and excellent answers, even in ways that did not come up during the lessons. I could see that they thought independently and logically. I have to admit that a couple of the questions were obviously either misunderstood by some students or were ambiguous to them; a feature that we can hardly ever avoid in pedagogy. Yet, their answers are equally valuable to the teacher.

According to my experience, the best way to read the students' answers is to strictly ignore the keyword (key-concept) of the question because it allures us to preferred reading, and we may accept answers that are too superficial. In some cases an unusual and unorthodox linguistic expression of a student may "hit the point" better than a teacher's normative linguistic formulation during the lessons. It is better to read the answer by omitting the keyword to see if the conceptual contents of the answer really define the keyword/concepts looked for.

Poor and Good Answers (examples):

Unit A

Question. Explain surface rhythm.

> *Answer A:* "Surface rhythm is the rhythm by which we identify the musical piece, for example the rhythm of a melody."

My comment: Ignore the question. Read the answer first in this way: “Beep” is the rhythm by which we identify the musical piece, the rhythm of a melody, for example. Now, "beep" could also refer to the basic rhythm (of valse or mazurka) by which we identify **the type of a musical piece** (e.g. a given dance), but the answer continues: "for example the rhythm of a melody." Conclusion: the student had some point in this but he did not **explain** anything. The answer is poor.

> *Answer B:* "By surface rhythm we mean the rhythmical elements brought forth; heard changing units, or sound events, which bring possible change in the rhythm heard (In the background there is the basic rhythm which we do not necessarily hear, for example, the bolero notated)."

This answer separates surface and basic rhythm, which is good. The answer tries to stress that surface rhythm is acoustic and heard and that it contains changing rhythmical units. This answer is more concrete. Conclusion: a rather good answer.

Unit B

Question 1. What are the *structural elements* of (the traditional) music that can be analyzed and described?

> *Answer A:* "Form element: form structure, species of musical work, such as fairly well defined sonata form, rondos, fugues, etc., symphony... Rhythm: the species of basic and surface rhythm, note durations, binary, or tertiary rhythm; perhaps polyrhythm, pauses, accentuation’s, etc. Texture: the cross-section at any passage of a musical work. Analysis reveals which kinds of layers exist at the passage: which melodies, and chords – such as thorough bass texture, drone texture, etc. Tone systems: which tone regulations and methods are used in a given musical work. In addition to these we can also analyze orchestration; or in a Lied the connections of the text and song; or we can analyze changes in the dynamics [of a musical work], as well as their purpose."

> *Answer B:* "Structural elements of traditional music that can be examined are musical form, the tone systems it uses, texture, rhythm, the relationship of song and melody, and orchestration. When examining the form of music we pay attention to its structure (e.g. the sonata form and its parts: exposition, development, recapitulation (return section!), or the symphonic form...) In tone systems we examine the behavior of the tones of a musical piece, and their rules (e.g. major-minor system, pentatonic system; in examining a tone system we pay attention, e.g. to its voice-leading). In texture we examine the vertical cross-section of a musical piece (the structure of the chords, voice leading, or anything which happens at a given passage). In rhythm we examine the types of fixed or free rhythm; as well as other rhythmic phenomena such as hemiola and syncopation."

These are good, even excellent answers. The first one is really compact and good.

Question 2: Explain *tone system* of music.

> *Answer A:* "Tone system of music means musical system where the relationships of tones have their own (established) meaning."

This seemingly logical and clever answer sounds acceptable, but it is nearly a tautological circular argument. Its problem is the wording 'musical system'. The correct term is **concept system**, because musical system may also refer to any other parameter of music. The student does not comment at all on what "own, established meaning" means (the definition is vague – it could refer to entropy or to anything), and what kind of relationships the tones have (e.g. entropy contains chaotic relationships), because the tones also have the properties of duration and timbre.

> *Answer B:* "By tone system of music we mean the system of the tones of a given musical work. In this system certain tones, their relationships and functions are defined; except when we talk about, e.g. the phenomena of atonality. There exist several tone systems like major-minor, dodecaphony, pentatony, modes →church modes, tonality, atonality, scales, etc., etc."

The answer is good because several conceptual elements, their relationships and the correct terminology is involved in the answer with relevant examples.

Question 3: How can we define *chord* with tones? What is a chord and what is not?

> *Answer:* "The relationships of tones, and, thus, forming equations [formulas?] can construe several various chords. The most common ones must be the major-minor chords – which are built up of relations of minor and major thirds – as well as diminished, seventh, augmented, etc., chords are. Light music, classical music, jazz, folk music – nearly all music – contains most peculiar chords, and we cannot draw clear boundaries just like that. What if I press all the white keys of the piano, and say that I play a polychord → many on top of each other? Can we define chord in an easy way?"

This was a good answer with good discussion and relevant examples. The student understands the open systemic nature of the concept of chord.

Question 7: What means *chromaticism* in tonal music?

> *Answer A:* "(khroma, Greek = color). Chromatic tones [accidentals] are those not belonging to a (tonal) key. (In C major they are the black keys of the piano). For example, tone F is a chromatic tone in D major."

The preceding answer is very categorical and uninformative. Read the answer first this way: "Beep tones are those not belonging to a tonal key..." The answer could also mean that "beep" tones may belong to another key, but are not

necessarily chromatic tones in a certain tonal key. The following one is a better answer:

> *Answer B:* "Chromaticism means variant tones that bring "color " to music. A chromatic tone [an accidental] is chromatic from a certain viewpoint. For example, F sharp is sharp F in C major tonality, but in G major it is a leading tone of the scale and here it does not have a chromatic function. I think music becomes more lively by creating (spontaneously and surprisingly) chromaticism in arrangements. Chromaticism lies between tonality and atonality. To put it simply: the more chromaticism, the closer we come to atonality."

This answer was a good one.

6.2 Practical Demonstrations of Systemic Approach in Musicology. Analogies and Models

In order to follow my goal, which is the abductive logic[930] that proceeds from the practical-empirical to the theoretical and then back to practical applications, I present some demonstrations of systemic approach in musicology[931].

As stated before[932] concept systems, owing to their ontological nature, can be used to *represent structured knowledge* in many ways "for example through predicative logic, semantic field, semantic network, concept relations, concept net, scripts and frames."[933] Pedagogy and education is basically introduction and communication of structured knowledge. As also stated before[934], a system can be described and communicated by various methods: as *diagrams*[935], *flow charts*, *graphics*, *matrixes*, or *mathematical methods*. But the essential thing is to find an analogy and demonstrate it through a model[936].

Here are some practical examples of systemic approach that can be applied in concepts of musicology, especially for pedagogical purposes. Some of them I have designed myself, some are applications from other systemic models (from terminology science), and some are examples I have found in musicological literature. I use various graphical possibilities in the form of texts and concept diagrams (which show generic relations by tree diagrams, partitive relations by rake diagrams, associative relations by arrow diagrams, and other concept relations not explicitly defined, by broken lines[937]), satellite node systems, and some other models.

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930 See 1.2 Criteria of Qualitative Research and General Outline of This Research.
931 Study course musicology.
932 See 4.4.15 for the other use of concept systems in terminology science referring to Nuopponen 1994: 48.
933 See also Papeegaj et al. 1986: 40, in Nuopponen 1994: 47.
934 Nuopponen 1994: 30.
935 Which to me represent real complex systems of intergraphics see 4.6.2 and interconceptualism-intertextualism.
936 See 5.4.7.
937 See 4.4.7.

6.2.1 Musical Work as a Satellite Concept System

This systemic diagram shows a suggestion to the connections of, if not all, albeit the most necessary concepts relating to the concept of musical work. According to Nuopponen[938], a satellite concept system is made up of functional[939] concept relationships, and it is worked out and structured as a mind map[940]. Thus, the mind map is the analogy and the satellite system is the model. In this diagram, the generic concept relationships appear as connections between the concepts of *musical work – content*, or *musical work – musicological parameters*, or *form – free forms – asymmetry*. Instrumental concepts, relationships for example, appear between *musicological analysis – tuning/sound/form/texture/ rhythm* (as parameters serving the analysis). This satellite concept system can be used for pedagogical purposes so that the teacher asks the students to list those theoretical parameters of music they associate with the concept of musical work and think are necessary in describing and analysing music ontologically. Rhythm, tones, or forms of music naturally come to mind. The teacher can expand the concept system by introducing the students to less familiar aspects (such as the ontic and ontological nature of music, semiotic analysis, narratology, etc.), as well as to more detailed conceptual aspects and components of a parameter (like form covers dynamic forms – variation – symphonic development – metamorphosis, etc.).

Mind mapping this kind of satellite system *(Chart 21)* requires paying attention to the different types of concept relations: hierarchical (generic, or partitive), associative (pragmatic), etc.[941] The brown-yellow ovals indicate the supersystems of music and musicology, other ovals subsystems in various degrees. The thick blue lines indicate the immediate hierarchical systemic connections and the narrow lines the less immediate ones. This chart is purposefully a draft, with open satellite nodes and lines.

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938 1994: 226.

939 1994: 103. Nuopponen counts generic and instrumental concept relationships (1994: 106 – 107) as functional relationships, see also the division of the *ISO/FDIS 1087-1:2000*: 3.2.20-3.2.26.

940 See Nuopponen 1994: 226 – 230.

941 See 4.4.8.

Chart 21


semiotic analysis
narration analysis
ontic and individual musical work
extramusical content
musical content
ontological system
musical work
content
musicological analysis of parametres
sound source
timbre
binary
tertiary
symmetry
asymmetry
tuning system
tone material
musical form
static forms
free forms
static-dynamic forms
tone systems
form as texture vertical
form as texture horizontal
dynamic forms
free forms
atonal
tonal
mono-part
multi-part
rhythm
symphonic development
variation
measure
surface rhythm
metamorphosis
regular
irregular

6.2.2 Systemic-Semantic Field in Thesaurus: Rhythm – Melody

Thesauri present structured knowledge as semantic fields[942]. Thus, any concept or any piece of knowledge analogically belongs to a concept field through associative relation[943]. A word list of associative concepts is the model to list the associations. *Roget's Thesaurus* in the Internet (www.thesaurus.com) offers an example of the semantic field of the concept of *rhythm*. The word searched first was rhythm[944], and it gave the following results:

> Rhythm found in 4 items.
>
> Melody
> Excerpt: "... Melody. Concord. melody, rhythm, measure; rhyme(poetry) . pitch..."
> [View Entry]
>
> Repetition
> Excerpt: "...; monotony, tautophony; rhythm ; diffuseness, pleonasm, redundancy..."
> [View Entry]
>
> Regularity of recurrence. Periodicity
> Excerpt: "... ; pulse, pulsation; rhythm; alternation, alternateness, alternativeness..."
> [View Entry]
>
> Poetry
> Excerpt: "..., foot, numbers, strain, rhythm; accentuation (voice) ; dactyl..."
> [View Entry]

After this I clicked on melody[945]. The result was:

> III. WORDS RELATING TO MATTER
> III. ORGANIC MATTER
>
> 2. Sensation; Special Sensation; Sound; Musical Sounds
>
> Melody. Concord.
>
> [Antonyms: discord.]
>
> [Nouns] melody, rhythm, measure; rhyme(poetry) [more].
>
> pitch, timbre, intonation, tone.
>
> scale, gamut; diapason; diatonic chromatic scale, enharmonic scale; key, clef, chords.

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942 See 4.4.16: "language divides the reality into constraints and for every constraints there exists a certain amount of words, which receive their meaning in relation to other words of the same constraint".

943 See 4.4.7; 4.4.8.

944 http://www.thesaurus.com/cgi-bin/search?config=roget&words=rhythm (28.10.2001).

945 http://www.thesaurus.com/roget/III/413.html (28.10.2001).

modulation, temperament, syncope, syncopation, preparation, suspension, resolution.

staff, stave, line, space, brace; bar, rest; appoggiato, appoggiatura; acciaccatura.

note, musical note, notes of a scale; sharp, flat, natural; high note(shrillness) [more]; low note [more]; interval; semitone; second, third, fourth; diatessaron.

breve, semibreve, minim, crotchet, quaver; semiquaver, demisemiquaver; sustained note, drone, burden.

tonic; key note, leading note, fundamental note; supertonic, mediant, dominant; submediant, subdominant; octave, tetrachord; major key, minor key, major scale, minor scale, major mode, minor mode; passage, phrase.

concord, harmony; emmeleia; unison, unisonance; chime, homophony; euphony, euphonism; tonality; consonance; consent; part.

[Science of harmony] harmony, harmonics; thorough-bass, fundamental- bass; counterpoint; faburden.

piece of music [more]; composer, harmonist, contrapuntist.

[Verbs] be harmonious; harmonize, chime, symphonize, transpose; put in tune, tune, accord, string.

[Adjectives] harmonious, harmonical; in concord, in tune, in concert; unisonant, concentual, symphonizing, isotonic, homophonous, assonant; ariose, consonant.

measured, rhythmical, diatonic, chromatic, enharmonic.

melodious, musical; melic; tuneful, tunable; sweet, dulcet, canorous; mellow, mellifluous; soft, clear, clear as a bell; silvery; euphonious, euphonic, euphonical; symphonious; enchanting (pleasure-giving) [more]; fine-toned, full-toned, silver-toned.

[Adverbs] harmoniously

[Phrases] " the hidden soul of harmony " [Milton].

This kind of a structured concept presentation of knowledge is very helpful in trying to understand the real complexity of rhythm, at least theoretically. It provides a large amount of differentiation with the necessary connectedness[946] of a semantic field/concept system. At the same time, it shows some points of overlapping concepts (in this case the concepts overlapping both rhythm and melody) and concept boundaries. The semantic field of rhythm merges into the semantic field of melody. From this “repertoire of concepts”, it is also possible to find a large variety of conceptual expressions (terms, words) to match specific ontological concepts.

946 See 5.7.

6.2.3 Systemic Approach to Texture/*Satz* – a Concept Relations Diagram

In Chapter 4.4.7, I presented a structural systemic diagram (= model) of concept relations used in terminology science where one can see how an ontic reality (*object*, or referent) relates to the concepts describing it. Applied analogously to the concept of texture/*satz*[947], we can see how texture is one of the structural parameters of music (the other ones being tone system, rhythm, form, etc.). The texts commenting on the nature of texture use auxiliary terminology (factura, technics, style, etc.). They form the bulk of the *characteristics* of the concept and all those features that characterize texture conceptually form its *intension*. Thus, the more we expand conceptually the concept of texture the more characteristics we shall have. This means that there must be more and more various sorts of ontic musical excerpts (*extension*) allowed into the conceptual sphere of texture. In the end, any musical writing (= *definition*) can be broadly *defined* as texture or can be *named* (*appellation*) as texture. Musical terminology has accepted so far the variants of the *term* (texture and *satz* – at least I use them). The musical works and excerpts of them dealt with in musicology (through music theory, analysis, history, and aesthetics) use a plethora of special terminology of texture. They can be listed as the subordinate concepts of the same dimension (=*extensional definition*): These are polyphony, homophony, texture, style, instrumental-, vocal-, pianistic-, and orchestral textures, learned & free style, thorough bass, cluster texture, etc., as defined by musicology in various sources.

Compared with the original diagram by *Tekniikan sanastokeskus ry*[948] I have added two additional components to my diagram. Texture can also be understood as *musical form*. For example, polyphonic motet writing represents dynamic form: it is a process and unfoldment of musical configurations[949]. Texture analysis serves the reverse side of the coin, and when applied, it links up with normative musicological activity (*texture studies/composition*) with its positive and negative impact[950].

For this *systemic diagram (Chart 22),* I have used the concepts given by *OIMTS*[951]. Interestingly and understandably enough, the final (objective) *intensional definition* of texture is open because the matter is open conceptually due to the "development" of music, unless we limit it to the few established characteristics mentioned above.

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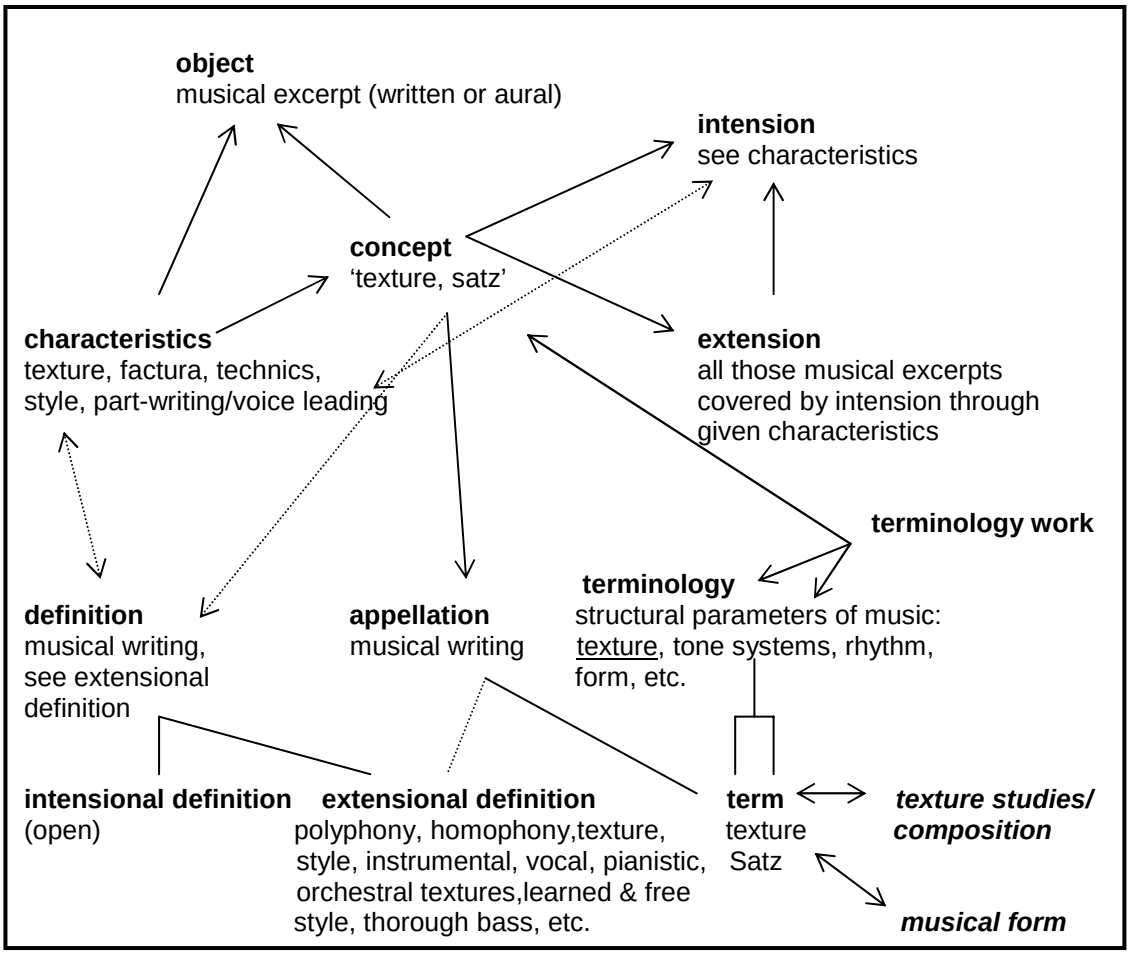
947 Source *OIMTS* Vol. 4: 139. Compare my use of the term for example in 6.1.4.
948 See 4.4.7.
949 See *OIMTS* Vol. 4: 328 – 329: *dynaamiset muodot* (dynamic forms).
950 See, e.g. 1.4.3.
951 *Otavan iso musiikkitietosanakirja*. *Volumes 1– 5*.

Chart 22

Texture-concept and its associative relations as in *OIMTS* Vol. 5: 139. *Satsi*/Satz. Adaptation of a concept system model.



In addition, for the sake of the truth, we must state that the definition of texture as musical writing by *OIMTS* is not sufficient because there is also unwritten music. Moreover, the *New Grove Dictionary of Music and Musicians, 2nd* ed. treats the term more liberally[952].

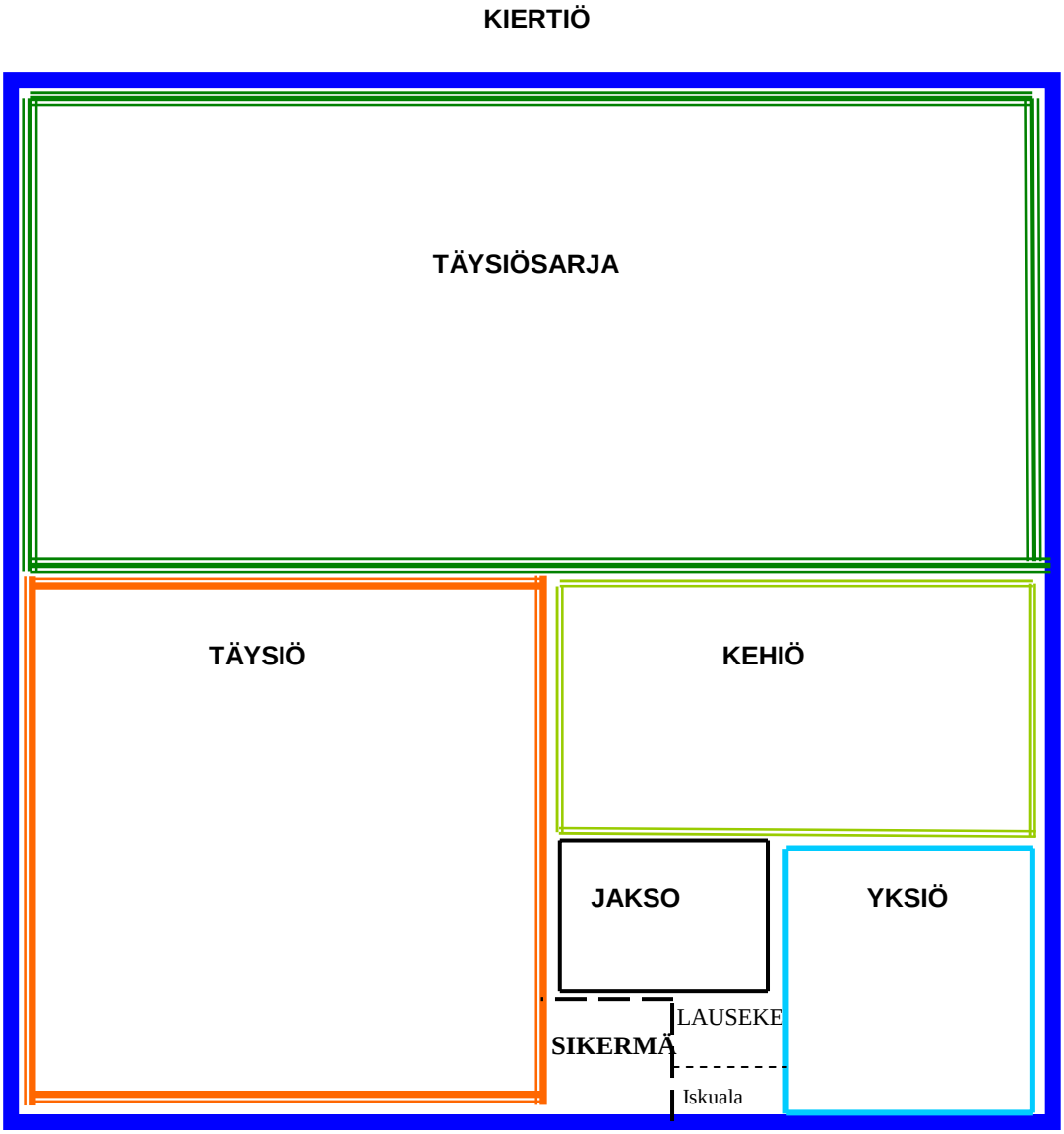
6.2.4 Systemic Approach to Musical Form: Krohn's Formenlehre

Otavan iso musiikkitietosanakirja (*OIMTS*)[953] presents a condensed term list of Ilmari Krohn's conceptual definition of musical form. His idea is to systemize the older ideas of A.B. Marx and other later theoreticians in more detail. According to Krohn, the form of music is actually rhythm at all levels and all musical forms are successive, binary, or ternary. The idea is analogous with species of organisms (animals and plants) in the nature. Especially interesting is

952 http://www.grovemusic.com/shared/views/article.html?from=az&section=music.27758 (10.10.2001).
953 Vol. 4: 332, Chapter "*muoto*" (form).

his idea of a clearly defined conceptual system with specialized conceptual terminology. Thus, the terms and concepts of certain compositional types, such as cyclic forms, sonata, symphony, concerto, or an act of an opera, represent one common idea of the concept of "*kehiö*"[954]. Understandably, Krohn's approach could not and cannot include several of the compositions of the post-romantic and the modern era.

Chart 23



I do not quote here the text of *OIMTS* where the material is already in a form of a table[955] (= model) listing and sorting various possibilities of musical form. I have reshaped the contents into another visual form (= model analogous

954 Which is really difficult to translate into English and difficult to understand as a separate concept.

955 Designed by Risto Väisänen who gives only part of the concepts and terminology of Krohn.

with graphics of, e.g. technical engineering, or architecture), which reveals better Krohn's systemic approach behind. This diagram *(Chart 23)* shows clearly the ideas of the scale level factor[956] and the classical view of categorization[957] in Krohn's presentation. The metasystem level is represented by the idea of music being of successive, binary, or ternary form-type. The supersystem level is "*kiertiö*" (represented, for example, by the music of a liturgical year). Under this comes the subsystem level of "*täysiösarja*" (represented, for example, by Wagner's Niebelungen tetralogy) and under it, the subsystem of "*täysiö*" (such as an opera, or a work of three sonatas), etc. The smallest form unit "*iskuala*" means a "basic beat pattern" (binary or ternary) which functions as such or as compounds.

The idea is "old-fashioned", describing form from the deductive viewpoint as a crystallized stable and closed structure. Everything is mainly closed and stable in Krohn's presentation.

6.2.5 Systemic Approach to Parameters of Music

The following diagram (= model, *Chart 24*) features most of the well-known musicological parameters described and used in the traditional music theory and analysis[958]. As stated in Chapter 2.7, Elliott divides the parameters into syntactic and nonsyntactic ones. I treat them here as one semantic field[959]. The conceptual material and terminology of the diagram can be found for example in *OIMTS* and *The New Grove Dictionary of Music and Musicians*, *2nd ed*. Various parameters overlap each other: the tone system has to do with the tuning system which has to do with sound. Timbre, an aspect of sound, has to do with affect modality, which has to do with narration. Musical form and texture are related and overlap with rhythm and dynamics. Depending on the type of music, certain parameters are more on the aural focus, others less. For example, in the cluster music the element of rhythm merges into timbre. The result is a complex concept system with parametric differentiation and connectedness, and includes various scale levels[960]. In the next chapter (6.2.6), I show analogously how the diagram can be used in describing the Indian raga system.

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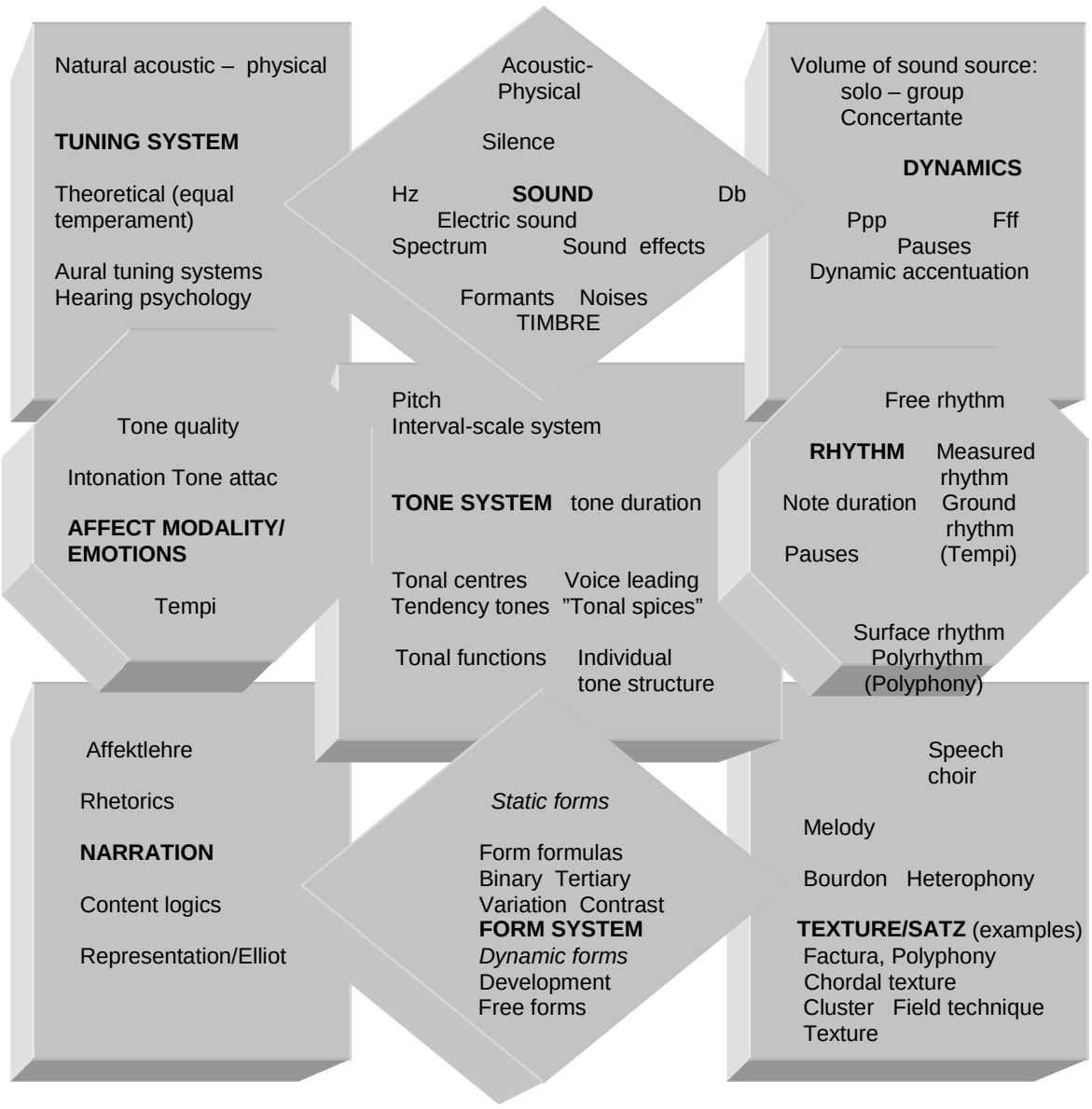
956 See 5.6.3.
957 See 4.6.1.
958 The analogy comes from the world of materials, which have properties like weight, density, melting temperature, forms, workability, behavior with other materials, mental associations, its value, etc.
959 See 6.2.2, as well as the definition of semantic field in 4.4.16.
960 See 5.7 (5.7.2).

Chart 24



6.2.6 Systemic Approach to Indian Raga

The following is a textual summary of the salient features of the tone system of raga, which I have written using various sources (analogy = encyclopaedia)[961]. It is vital to note that it is impossible to describe the tone system of raga without referring to other related musicological parameters. The tones of raga have to do with such things as: 1. The theoretical (*srutis*), acoustical (physical: Hz) and aural (tonal accents) **tuning system**; 2. **Affect/modality/emotions** (through the tonal centres and the tone functions: *vadi*, *samvadi*, *anuvadi*, *vivadi*); 3. **Texture** (through *sakal*); 4. **Form** (through *sakal* and improvization, as well as the points

961 Sources: B.C. Deva, *Indian music*. 1980; Ravi Shankar, *My Music, My Life*. 1969, and William P. Malm, *Music Cultures of the Pacific, the Near East, and Asia*. 1996.

of stasis: *nyasa*, *apanyasa*); 5. **Narration** (through affect and form); 6. **Dynamics** (tonal accents), etc.

Raga

For the purpose of this research, I am interested in the systemic description of the tone system of raga. Due to the long and colorful history of Indian music and its theory, and due the objective of this research, it is not possible to introduce all the theoretical variants of historical raga. The development of music shows that praxis and theory do not necessarily often meet each other. Therefore, I shall leave out the examination of the tetrachord system (*angas*) related to the 72 *melas*, as well as *jati* (or, "proto-raga", in Shankar's terminology[962]), as well as the basic scales of *shadja grama* and *madhyama grama* along with the related *moorcchana*-scales described in Natya Sastra by Bharata c. 200 B.C.[963]. *Jati* had practically all the most important characteristics of raga: amount of tones, tone functions, tonal centres, etc.[964]. The starting point in this research is limited to the raga-concept by Ramamatya in the 15th century[965], which serves as a basis for the present raga. In the1620s, in his book *Chaturdandi Prakashika*, Pandit Venkatamakhi developed a classification of the scales of raga[966], which, according to Deva[967], functions nearly as such as the descriptional basis of Karnatic music. In the 1930s, V.N. Bhatkande[968] described the Hindustani raga system basing it on 10 *that-scales*. The North Indian and South Indian raga somewhat differ, according to Deva[969], in the way that a Hindustani musician follows more closely the theoretical starting points of raga, and accentuates the tonal centres of raga (*vadi*, *samvadi*). A South Indian musician takes liberties in relation to theory, and is thus freer in improvization[970].

Raga, the soul of Indian melody, represents the grammatically precise tendency of systematization, typical to Indian aesthetics of music, as well as to other Indian arts in the course of their history. This also applies to the concept of rhythm, *tala*[971]. The practise of raga, according to Deva[972], dates back to the era of 400 B.C. In his book *Briddahesi*, Matanga (c. 400-800 B.C.) writes that raga, the classical melody type, has at least five tones. According to Deva, music that functions with fewer tones is folk music[973].

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962 Shankar 1969: 20.
963 Deva 1980: 24 – 25.
964 Shankar 1969: 20.
965 Deva 1980: 26.
966 *Melakarta*, Malm 1996: 119.
967 1980: 26.
968 Malm 1996: 120.
969 1980: 15 – 16; 18.
970 Deva 1980: 16.
971 Deva 1980: 6.
972 Deva: 1980: 7.
973 Ibid.

Amount of Practical Functional Tones of Raga

In today's practise[974] raga is confined to certain rules crystallized in the course of its development. In practise, a musician follows these rules more or less strictly. Raga needs at least five tones (*svaras*). Thus, a raga can be pentatonic, hexatonic, or heptatonic. The maximum of tones is usually seven but in Hindustani music, according to Deva[975], a raga may have nine, or even twelve tones. In Karnatic, music ragas with more than seven tones are rare when we do not count the "spice tones"[976]. Shankar[977] also mentions ragas with three tones (Raga *Malashree*) and four tones (Raga *Bhawani*).

Functions and Variants of Raga Tones. Relation to Tuning: *Svara (Suddha, Tivra, Komal)*, and *Sruti*

A scalar tone (*svara*) belonging to a raga must be natural (*suddha*), sharp (*tivra*, *teevra*), or flat (*komal*). For notational purposes, Indian music uses seven *suddha* tones and five variants (*tivras* and/or *komals*). How much a tone is sharp or flat depends on the natural tuning of the particular raga. This again is related to the theoretical *sruti*-microinterval tuning system. The same applies to Turkish classical music where a whole step is divided theoretically into nine microintervals[978].

The smallest melodic unit/interval (compared with the Western second), called *svara*, is, in practise, 2 -4 *srutis*. *Srutis*, or units of the Indian tuning system, are considered as the smallest audible pitch differences; they are of three kinds[979]. An octave is divided into 22 *srutis*[980], not equidistantly, but so that the three kinds of *srutis* appear in different places of various scales. According to Shankar[981], an octave can be divided theoretically into 66 small microintervals. In this way, fine tonal shades and tensions of scalar tones, which otherwise have the same basic tonal function, can be utilized in different ragas[982]. For example, the *suddha* tones of *Ri* or *Dha* have at least four different variants in different scales (*mela*, *that*); *tivras* and *komals* have even more variants, depending on the raga.

The Amount of Ragas

The possibility of accentuation and interpretation of tone functions with the possibilities of various combinations of the tuning elements of ragas yield a

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974 Deva 1980: 11-12, Shankar 1969: 20-23, Malm 118-120.
975 1980: 11.
976 *Vivadi*, "enemies", or dissonant tones, Shankar 1969: 23.
977 Ibid.
978 Ismail Hakki Özkan, *Türk Mûsikîsi Nazariyati ve Usûlleri*, *Kudüm Velveleleri*. Publisher Ötüken Nesriyati 3rd print 1990: 36-39.
979 22, 70 and 90 Hz. Strangways 1914: 115-117, in Malm 1996: 117.
980 Deva 1980: 29; Shankar 1969: 18, Malm 1996: 117.
981 1969: 18.
982 Deva talks about *tonal regions* of svaras 1980: 29.

great amount of ragas of different tonal shades. Malm[983] mentions that Indian literature names and describes about 1000 theoretical ragas; Shankar talks about thousands, and Deva about an unlimited number of ragas. Alone, through the permutations of 72 *melas*, according to certain rules pertaining the amount of tones and their combinations, we get 34 848 theoretical scales, out of which we could produce an unlimited number of ragas[984]. According to Malm[985], about 50 ragas are in general use in either Hindustan or Karnatak; 250 ragas, according to Deva[986], and a few hundred, according to Shankar[987]. The amount of the actual use of ragas by individual musicians varies. As to the tuning of correct intervals in a performance, a musician does not "count *srutis*" when fixing the frets of his instrument to the requirements of a given raga, or when singing a raga. A good sense of the exact pitch and the mastership of the required tonal regions of *svaras*, are all that is needed.

Theoretical Classification of Ragas. *Melakartas*, *That-Scales*, and Tetrachords of Scales

Today it is customary to count a raga to the related scale (to 72 *melas/melakartas* of the Karnatic music, or to 10 *thats* in Hindustan). The theoretical scale (*mela* or *that*), to which a raga is related, is a mother scale (*janaka mela*), and the actual practical scale, *janya raga*, (or the tone set of a raga, I would say), is its derivation. However, Deva[988] criticizes in detail the *melakarta* system, and makes a categorical difference between the theoretical tone system attached to ragas and its concepts, such as *moorcchana*, *mela* and *that*, considering the latter as abstractions of living music. The merit of his criticism is to point out the fact that when musicology (music theory) started to control music making (e.g. during the creation of the *melakarta* system, and afterwards), music theory also started to control practise. In the Western sense, we may state that present Indian musicological thinking is affected by the hypothetico-deductive approach.

Character Tone Set of Raga: *Arohana* and *Avarohana*

The ascending tone limb of raga (*arohana*), as well as its descending tone limb (*avarohana*), has a feature akin in a way to the Western melodic minor scale. The sharp sixth and seventh tones of the melodic minor scale are very usual in many melodies of the minor tonality as they lead directly, or indirectly, to the second octave of tonic (such as in the song Moscowite Nights, in D minor, the end of measure 4, and beginning of measure 5 → B, C sharp, E, D, A, etc.). When coming down the melody line, these tones are changed half a step flat, as

983 Malm 1996: 119.
984 Deva 1980: 33.
985 Malm 1996: 119.
986 Deva 1980: 33.
987 Shankar 1969: 20.
988 1980: 30.

we all know. Other melodic minor scales in the Western tradition are the Gypsy minor scale, and the blues scale.

The ascending and descending tone limbs of ragas are not scales in the usual sense, but include certain tone figures or formulas (*vikrit* – the same phenomenon called *guseh* appears in the Persian *dastgah* modal system). These formulas give a certain individual character to each tone limb; therefore, I prefer to call these *character tone sets*. An example of the *arohana* and *avarohana* of raga *Kalyan*[989] is B, D, E, Fsharp, G, Fsharp, A, B, C (= *arohana*) – C, B, A, G, Fsharp, G, D, E, D, C (= *avarohana*).

Character Formulas of Raga. *Sakal*: *Prayoga*, *Pakad*, and *Chalan (Chandra)*

The personality and identity of a raga is enhanced by melodic formulas, melodic core motifs, which associate with human character types, according Deva. In the music of Hindustan, they are called *sakal*, and they are of many kinds[990]. A similar phenomenon exists in the Arabic and Persian music (*gusheh*). In the Western music, we could compare them with the identified melodic, or motif-type idioms of certain composers, such as the Sibelius-motif[991] and the Grieg-leitmotif[992].

Tonal Function of Tones of Raga. *Sa*, *Vadi*, *Samvadi*, *Anuvadi*, and *Vivadi*. Points of Stasis

Sa is the tonic of a raga and serves as the "home base"[993]. The second important melodic gravitation centre is *vadi*[994], which is also known as the "king " of raga. *Vadi* gives the ethos (*rasa*) of a raga and it is emphasized most strongly. According to Deva[995], if a consonant tone *Pa* (G) is used as *vadi* it will make the raga calm and quiet, if a dissonant note is *ri* (D flat) then the mood of the raga is of yearning, fatiguqe, and separation. The second important tone is *samvadi*[996]. According to Shankar[997], *samvadi* is always a forth or fifth apart from *vadi*. Then there are *anuvadi*[998] and *vivadi*[999], which are used rarely but give a raga a special color of dissonance when required.

According to Deva[1000], the unfoldment of raga has to be punctuated like a sentence of language. In ragas, melodic phrases and sections must come to certain rests on certain notes; thus, there are particular necessary ending notes

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989 Shankar: 1969: 98.
990 Deva 1980: 12.
991 E. Tawastsjerna in *OIMTS* Vol. 5: 220.
992 Nils Grinde in *OIMTS* Vol. 2: 442.
993 Shankar 1969: 23.
994 "That which sounds", Deva 1980: 15; "sonant", Shankar 1969: 23.
995 1980: 15.
996 "Minister", Deva ibid.
997 1969: 23.
998 "Courtiers", Deva ibid.
999 "Enemies", Deva ibid.
1000 1980: 12.

and commencing notes (*graha svara: nyasa*, *apanyasa*). These have a relationship to the mood (*rasa*) of raga, as well as a technical importance for the form of raga.

Articulation of Tones of Raga (Tonal Accent): the Relationship of Tone to Tuning. *Gamakas*: Ornamental Tones and Embellishments. Improvization

According to Deva[1001], it is not enough to define a raga only by its notes, their dominance and arrangement. The practise of a certain note, such as *dha* (A flat), should have minutely different pitches in different ragas (*Bhairavi*, *Todi*, *Bhairav*, and *Asavari*) although theoretically they have the same name and symbol. These minute differences can be regulated by tuning and intonation and are connected with the concept of *sruti* (see above).

Another factor that characterizes the tonal accent is the way a tone is produced. It can be straight but more often it is highly embellished[1002]. These are called *gamakas*. The amount and kinds of gamakas is, according to Deva, infinite; Shankar lists graces such as *kampita* (shake), *ahata* (sounding more than one note with a stroke), *tiripa* (stressing one note of a phrase), *andola* ("swing" effect), *meend* (short slide from *svara* to *svara*), etc. Many of these are meant to express human emotions such as sobbing and laughter.

Without going into further details, we can state that the performance of raga involves improvization in a systemic conceptual frame, the elements of which are in the mind of the performer. Every performer is an individual and can bring along his or her personal ways of utterance but evidently, the performer is also guided by the aesthetic norms of the surrounding society.

Summary of Raga

There are various concise definitions of ragas. Summing up the salient features of raga, we have the definitions of Shankar and Deva:

> "...raga is a definite, scientific, subtle, aesthetic melodic form, made up of a series of notes within the octave, each one different from every other and distinguished by its own particular sequence of notes, number of tones, ascending and descending orders, most prominent notes, notes of different lengths, characteristic phrases, and principal mood. It is the melodic base of Indian classical music on which the musician improvizes in any style, for any duration, and in any tempo, either as a solo or accompanied by drums, and it may have a composed base (song or instrumental *gat*)." [1003]

> "A raga, then, is a melodic concept. It is a seed idea which has to be grown and blossomed out by the creativity of artiste. The seed has the qualities just described: the notes have to be of definite nature (scale), they are to be in a certain order of tonal syntax, with emphasis on determined ones. Besides, there have to be characteristic phrases. A little thought shows how similar raga is to language with its alphabet, syntax, phrases, punctuation and accent. The artiste accepts these restraints and

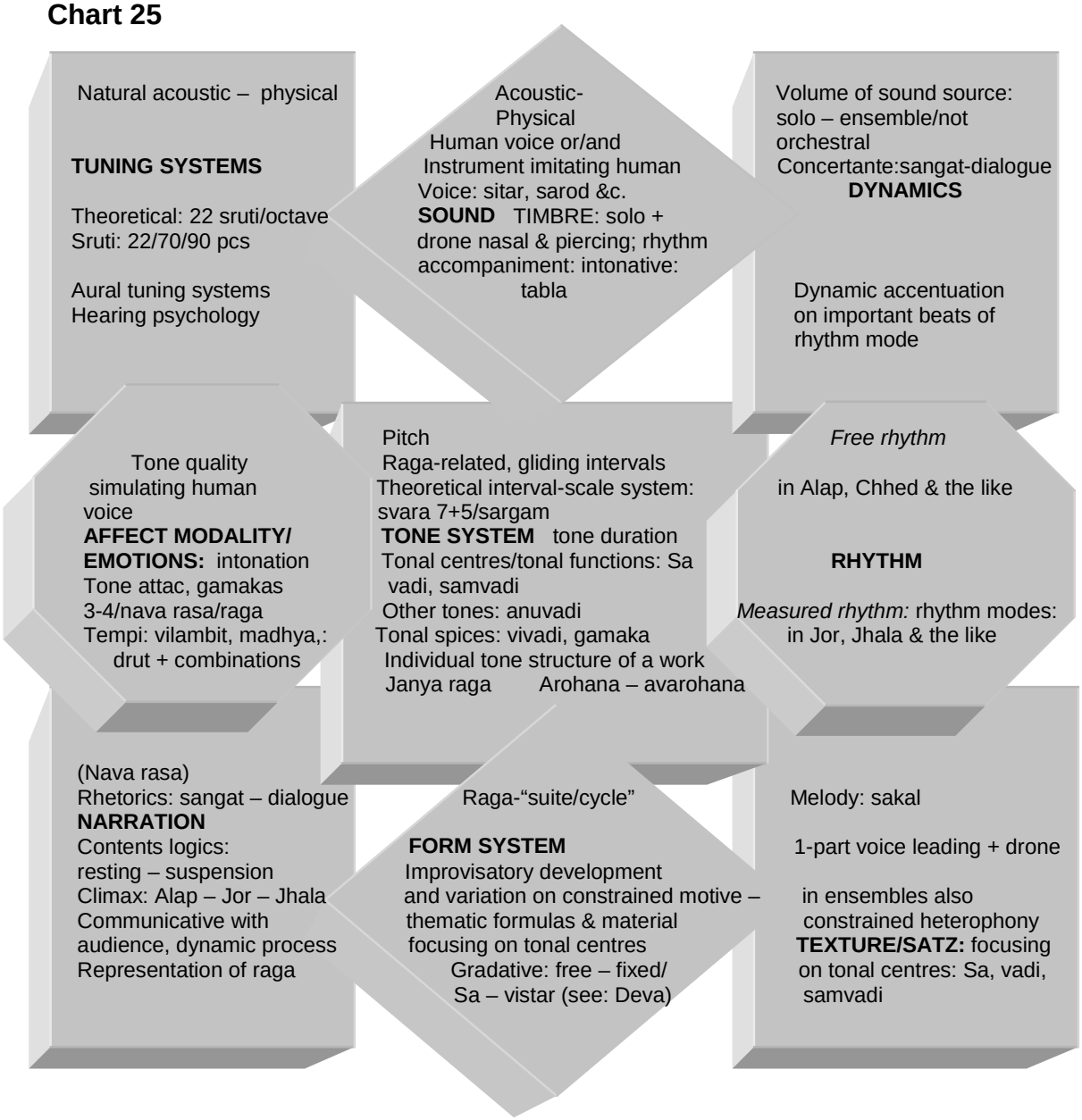
1001 1980: 16.
1002 1980: 16; Shankar 1969: 23 – 24
1003 Shankar 1969: 29.

searches for deviations, introducing surprises, all the while adhering and executing the traditional form to the best of his genius." [1004]

Systemic Chart of Selected Musicological Parameters of Traditional Raga

The above-described complex verbal informational data of the major part of the structural elements of raga can be reduced into a usable and helpful systemic model (satellite system; *Chart 25*) in the following way, as adapted from the diagram (*Chart 24*) in Chapter 6.2.5.

Chart 25



This systemic diagram model of raga comprises of nine selected musicological parameters: *tuning system*, *sound system*, *dynamics system*,

[1004] Deva 1980: 16 – 17.

affect/modality/emotions system, *tone system*, *rhythm system*, *narration system*, *form system*, and *texture system*. As stated at the beginning of this chapter, all these parameters link to each other in some way. From this viewpoint, the tone system in Indian raga seems to be on the focus. Most aspects of raga are interpreted from the tone system viewpoint. For example, the tonal centres are mentioned specifically in the "boxes" of tone system, form system, affect/modality/emotions system, and texture. I consider this model a helpful tool in introducing the essential elements of raga along with the relevant text.

6.2.7 Systemic -Approach to Major-Minor Tonality

The New Grove Dictionary of Music and Musicians, *2nd ed.* (=encyclopaedia) gives eight (a – h) different definitions of tonality[1005] and, rightly enough, discusses the reasons of its controversiality. One reason for the difficulty in defining tonality is the variety of terms and concepts linked with the issue due to the various theoretical needs of researchers. For my purposes, I take the most common use of the term because it relates directly to the question of the major-minor-tonality (bold font emphases are mine).

> "(h) Perhaps the most common use of the term, then, in either its noun or adjective forms, is to designate the arrangement of musical phenomena around a **referential tonic** in European music from about 1600 to about 1910. However, this arrangement is **conceptualised**. Musicians agree that there are **two basic modal genera**, major and minor, with different but analogous musical and **expressive properties**. It gives rise, moreover, to abstract relations that control **melodic motion** and **harmonic succession** over long expanses of musical time. In its power to form **musical goals** and regulate the progress of the music towards these moments of arrival, tonality has become, in Western culture, the principal musical means with which to manage expectation and **structure desire**. It is thus understood to be essential to modern Western music: it determines the coordination of harmony with melody, metre with phrasing, and **texture with register**, thus encompassing – within its historical domain – the whole of music."

My comments on the text: the conceptualization of the major-minor system focuses on the following points in the practical music theory of music education[1006]. *Referential tonic* means, of course, tonic (T) to which subdominant (S) and dominant (D) are linked for the sake of wanted/expected harmonic progression. The *two basic modal* [sic!] *genera*, major and minor, are distinguished usually by the major/minor third in hearing (sometimes by major/minor sixths – although both criteria are questionable in many practical instances of music hearing). Their *expressive properties* are usually linked with moods and sentiments of music: happiness = major; sadness and melancholy = minor, although sublimated sadness (in music of Gluck, or Haendel), as it is explained, can be expressed with major as well. *Melodic motion* in the major key can be "anything", provided the tonic is arrived at often enough (especially in cadenzas), and the tendency tones (half step to tonic) are observed. The tonality

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1005 http://grovemusic.com/grovemusic//article/section/2/28102.1html (10.09.2001).
1006 Music theory, music analysis and harmonization courses.

in the minor key, according to the theory, must follow certain melodic contours (tendency tones upward and downward in the melodic minor scale).

Harmonic succession of both major and minor are considered analogical, although minor "needs to borrow" the major-character of its dominant chord from major, as is explained. Both are considered analogical in respect with *musical goal expectation* and *structure desire*, as well as with the type of *texture with register* (concept of chords and their types and registers in harmonization).

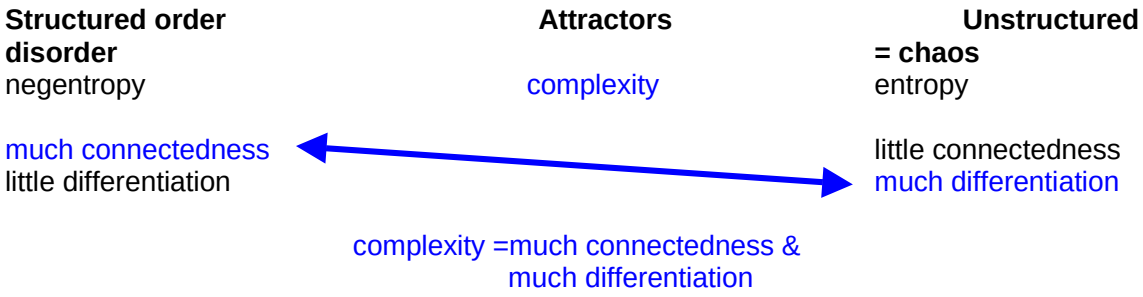
Major, as it is usually explained, is "single". The minor-tonality, however, accepts several other variants: Oriental, or Gypsy-minor, blues-minor, Dorian, Phrygian, Aeolian- minor, even pentatonic minor (such as C, D-flat, F, G, A-flat in Japanese music). These cases of minor are usually taught by music theory teachers as separate cases, ignoring the fact that they refer directly to the modal nature of the major-minor tone system indicated in one of the definitions (= definition a) in *The New Grove Dictionary of Music and Musicians*, *2nd ed*.[1007]. Some theory teachers introduce the major nature of the Lydian and Mixolydian modes. It would be equally logical to introduce similar cases from other modal tone systems (such as the major nature of *Bhairavi that*/raga in the Indian music). Using the analogy of systemicity: from the systemic viewpoint, the traditional elementary presentation of the major-minor tone system is a rather closed structure; and in a sense represents nearly negentropy[1008]. It is made up of prominent T/S/D functions, tendency resolve tones, cadenza formulas, major-minor thirds, and diatonic scale configurations. In other words, the system has much connectedness but little differentiation. Any change would "ruin" the closed system: for example, the acceptance of fourth-interval structure chords into the system, or a new interpretation of the tonal functions.

In order to prove how the major-minor system and other related tone systems could be seen in a new way, I present an application of the scale level factor of complexity[1009]. The model *(Chart 26)* is the negentropy – entropy opposition (=thesis – antithesis model), where complexity represents synthesis seen from either side of the polarity[1010].

1007 http://www.grovemusic.com/grovemusic//article/section/2/28102.1html (10.01.2001).
1008 See 5.7.1.
1009 See 5.7.3.
1010 See also Chart 16.

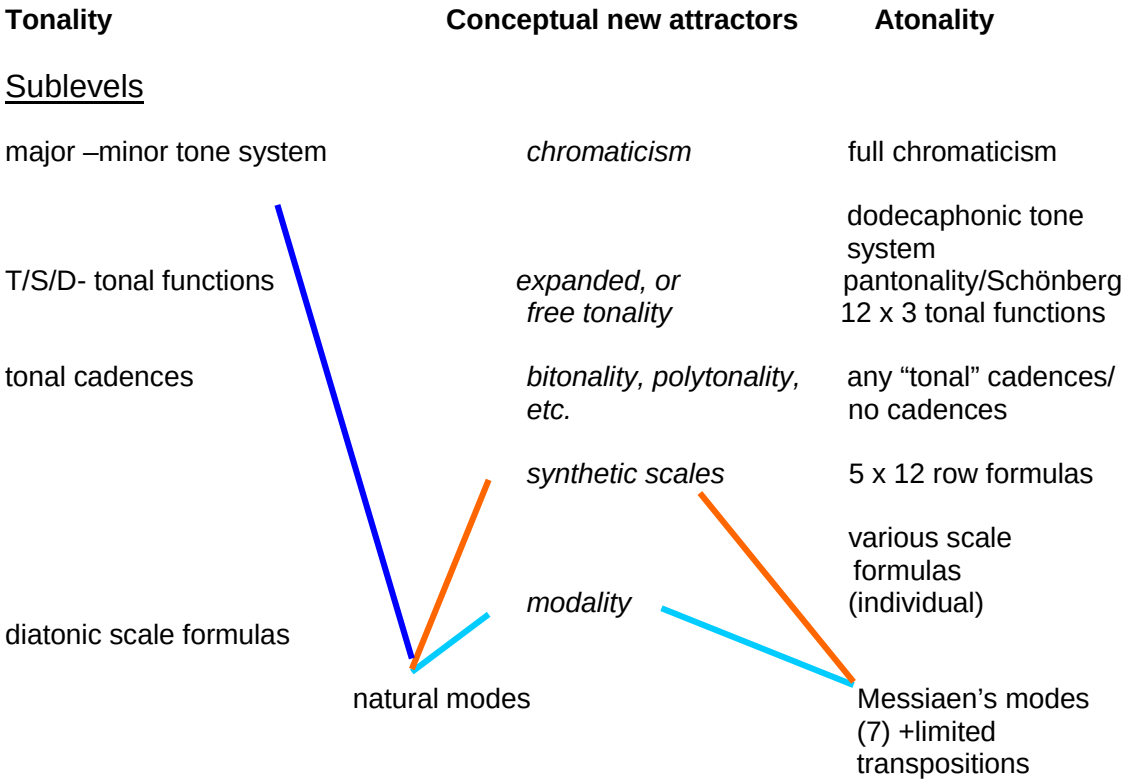
Chart 26

Complexity theory



Applied to musicology:

Superlevel

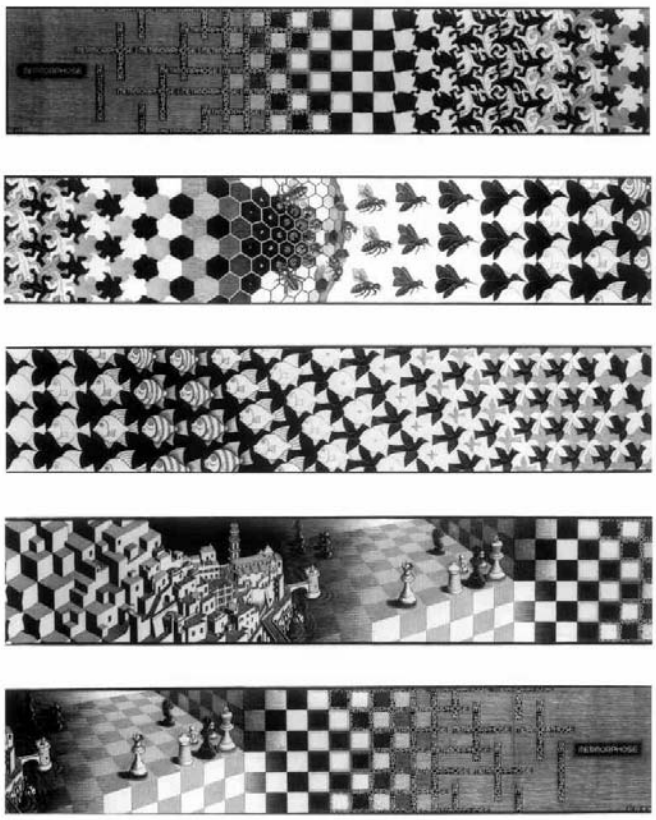


Some comments on the chart: first *on the role of attractors*. Among the conceptual attractors[1011] are those conceptual reasonings which aim at new theoretical explanations by finding new concepts and their terminology; reasonings that work at the edge of two or more concept fields: at the edge of concept attractors[1012]. The traditional and established conceptual definitions have once

1011 See especially 3.2.2.
1012 Lucas1996/2000/2001. *Attractors Everywhere – Order from Chaos*. http://calresco.org/attract.htm (30.08.2001); also 3.2.2.

been new conceptual attractors during their inception (such as the major-minor tonality). In the course of time, they have become norms, and have even "locked" a concept system. However, because concepts by nature are dynamic, any change in the concept system may cause a new concept attractor to appear, and the old system may start to change to that attractor direction. Changes in tonality were first explained by chromaticism, later by other conceptual variant attractors, depending on the initial conditions. From the tonal attractor starting point, the result was the conceptual attractors of pantonality, expanded tonality, free tonality, and so on. From the atonal attractor starting point, the result was dodecaphony, or row formulas. Modality, which usually was associated with tonal systems, also became an attractor in the atonal side. Examples of this are the modes of Messiaen, or synthetic scales. The new concepts that start working as new attractors usually have components and features from older concept systems. This is another explanation for the rise of sustainable neoterms.

Secondly on *complexity*. Tonality as a system can be interpreted as 1. A closed and negentropic system with a few very important tonal components with strict structural rules of the T/S/D-tonal functions, and tonal cadences; 2. A less negentropic system with more different components of chromatic tones, less strict structural rules, and open cadences; 3. A complex system with expanded tonality, bitonality, etc.; 4. An entropic system: pantonality.



Depending on the *attractor viewpoint*, we can say that the 12-tone formulas are either serial rows, synthetic scales, or atonal modes – whatever we choose to say, provided we know the original and previous use of the concepts and terms (attractors) involved. Similarly, the major-minor-tone system can be seen as a form of modality, provided tonality is seen in a wider attractor sense[1013]. The boundaries of each term and concept are liable to merge into other terms and concepts because their conceptual borders are fuzzy. Thus, because of this complex intercontextualism, we can never be sure in our definition exactly and absolutely what the major-minor system, or modality, or atonality is. The situation is analogous with M.C. Escher's fascinating

1013 See above the definition a) in *Grove*.

pictures[1014], which can be interpreted as graphical models of conceptual complexity, and in which the borders of visually identifiable forms merge into another (see above).

If we allow more tone/tonal differentiation (e.g. in the form of chromaticism) into the negentropic system of major-minor, it will become more complex; it will expand. Similarly, if we reduce the tonal differentiation possibilities of an atonal 12-tone system (such as in the case of Webern's violin Concerto: G, B-flat, D, F-sharp, A, C, E, G-sharp, B, C-sharp, D-sharp, E-sharp), it will become atonally less complex.

6.2.8 Systemic Approach to Periods of Music. Borroff's Taxonomical Chart

Systemic approaches, of course, have appeared in earlier musicological literature. All graphic presentations featuring several conceptual elements related to each other are in fact some kind of systemic approach, even without the conscious systemic intention of their author.

The textual summary[1015] analogous with an encyclopedic text and the charts[1016] by Borroff (*27; 28*) are a splendid example of a systemic approach of its kind. In order to utilize it fully the reader must be rather well versed with Western music history, and its phenomena and terminology. I greatly appreciate Borroff's creative and connotative way of using terms and concepts in this chart. Here are some major comments.

Borroff's musicological (descriptive–analytical) parameters are *pitch materials, rhythmic organization, linear unit, vertical unit, construction principles, ideal of sound, ideal of combined sounds* and *relation to text*. In the light of the parameter division that I have used in this research[1017], Borroff's pitch material equals with (my) **tone system** and rhythmic organization with **rhythm system**. Under the parameter of **form** come the concept of linear unit and construction principles and the concept of ideal of combined sounds (split choirs of the Renaissance, consorts of the Baroque, and orchestral blend of the Classical period). However, the last concept (ideal of combined sounds) merges into the parameter of **timbre** that in Borroff is equal with the concept of ideal of sound. The last concept, on the other hand, features the concept of size and space[1018] dealt with by Borroff as a separate musical parameter.

The concept of vertical unit by Borroff clearly represents the parameter of **texture**, but some of the concepts under construction principles (= form) clearly belong to texture, too. Borroff's parameter of relation to text refers to the parameters of **affect/modality/emotions**, or **narration** of music.

1014 See Escher, M.C. 1938-40..*Metamorphose II (a fraction)*. http://www.worldofescher.com/gallery/MetamorphoseII.html (30.10.2001). All M.C. Escher works and texts copyright (c) Cordon Art B.V., P.O. Box 101, 3740 AC The Netherlands. Used by permission.

1015 General Ideas of Western Music, Borroff 1971: 713.

1016 Borroff 1971: 709 (= model featuring the concepts of time, development of compositional technique and materials).

1017 6.2.5, Chart 24.

1018 Borroff 1971: 699–701.

Chart 27

	Hexachordal Period		Twelve-tone Period			
	MEDIEVAL	RENAISSANCE	BAROQUE	CLASSICAL	ROMANTIC	THE NEW MUSIC
Pitch Materials			***Tone Key***			
	Simple hexachord with chromatic semitone		Major-minor system		Expanding Chromaticism	Multiple concepts of materials—historical, exotic, electronic, popular
		Overlapping hexachords	Equal temperament			
		Modality				Antitonality
		Expanded system of hexachords				
Rhythmic Organization	***Proportions***		***Meter***			
	Basic triple		Exploited beat			Clock or theatrical time
	Mannerism			Assumed continuing meter		
		Basic duple and hemiola			Fragmentation	Steady beat in popular style
		Simplification			Disintegration	
Linear Unit	Punctus		Subject		Theme	Gesture
Vertical Unit	***Accumulation of Intervals***		***Chord***			Sonority
	Through linear interaction	Often independently conceived	Motivated in bass	Invertibility	Motivated variously	Event
					Nonmotivated	
Construction Principles	Accumulation of linear elements		Polar texture of treble-bass	Contrasting subjects, keys, textures	Architectural form thematically based	Accumulation of vertical units (gestures, events)
						Superimposition
Ideal of Sound	Vocal—emulation of the reeds		Instrumental—emulation of the voice			Multifaceted, often disembodied; when visually related, often kinesthetic
Ideal of Combined Sounds	Simultaneous and successive contrasts		Split choirs	Contrast within a blend—the orchestra	Big, full, connected sound	Complex of sounds
	Independent lines		Combined consorts			Independence by overlapping elements
	Spatial deployments		Spatial deployments			Spatial deployments
	Blend—the consort			Unity of source		
Relation to Text	Illumination		Interpretation			Transcendence

Chart 28

General Ideals of Western Music

The assumptions of the *Medieval Era* were that music is melodic and created as separate lines written successively; that music is primarily vocal; that both harmony and rhythm are proportional; that the beat in polyphonic music serves to coordinate performance; that form derives essentially from patterns of text; that the separate lines should be presented in individual tone colors; that the resulting consonances are interesting in themselves and should be further explored; and that the job of the performer is to present his part as a vital element in a proportioned structure.

The assumptions of the *Renaissance* were that music is conceived as an accumulation of separate lines into patterns both horizontal and vertical; that music can enhance the meaning of words; that the steady beat serves as a cohesive force; that sounds should be gentle and well blended; that harmony has implications in defining form and that these functions should be further explored; that instruments can present musical statements even though they cannot produce words; and that the job of the performer is to present melodic lines with a lively sense of shape and with independence, dexterity, and taste.

The assumptions of the *Baroque Era* were that pulse is essential; that music "rides" the beat; that melodic interest is based on the figure and is secondary to the rhythmic impulse; that music—even vocal music—is instrumentally conceived; that form is architectural, built on both spatial and musical contrasts; that key tonality is an exciting new concept with formal implications that should be further explored; and that the job of the performer is to present with clarity what the composer has written.

The assumptions of *Classicism* were that music is capable of many shapes and textures; that these shapes and textures (both surface and structural) can, through contrast within a continuity of pulse and meter, create musical designs that are exciting and moving in themselves; that harmony and key are vital; that confrontation of different musical ideas can be dramatic and that such confrontation should be further explored; and that the job of the performer is to communicate contrasting textures and shapes, thus re-creating the musical reality.

The assumptions of *Romanticism* were that melody is primary to both language and form in music; that pulse is fluid and varies for the sake of expression; that a rich, full tone quality is desirable to interpretation; that harmony is functional and based on a triadic system from which it is expanding through chromaticism; that other cultures utilize sounds and effects that are sometimes interesting in themselves and that should be further explored; and that the job of the performer is not merely to present the music but to evoke the emotional meaning behind the music.

The assumptions of the *new music* are that sounds are endlessly various and exciting and that any of them may be used in musical compositions that accept a share of the composer's joys, risks, and victories.

From these remarks one can understand that Borroff treats music as a complex musicological concept system with due connectedness and differentiation. She has some very interesting and matching concepts and terms, especially concerning the new music:

> sonority; event – as vertical unit
> clock, or theatrical time – as rhythmic organization
>
> accumulation of vertical units /gestures, events – as construction principles
> multifaceted, often disembodied; when visually related, often kinaesthetic – as ideal of sound
> transcendence –as relation to text

6.2.9 Systemic Approach Utilized in a Classroom Situation. Scripts

Finally, I present some examples of how systemic thinking and approach could be utilized in dialogues and discussions between a teacher and students in a practical classroom situation. While trying to guide the thoughts of students to understand an issue, it is vital that the teacher starts with the concepts familiar to students. He utilizes concepts which students already know (or remember) but do not necessarily understand, or at least do not understand that concepts in reality are always relative.

For this purpose, an abductive[1019] trail of thinking is very useful. We may also call it constructivism[1020], if we like. For me, this is systemicity. During the discussion, a concept field on the issue at hand is conceptualized and structured in the brains of the conversers. Here we have a dynamic conceptualization process, not a readily structured concept system to be proven. The process varies due to different conversational situations, topics and conversers; and although the result of the discussion (=conceptualization of the concept field on the issue) may be roughly the same, the process varies. In the world of concepts, a linguistic dialogue represents *scripts* and *texts*, which may appear as different variants of concept fields[1021].

Situation (fictive) 1: Discussion of teacher (T) and student (S) on musical texture during a music history lesson:

A student has passed the 3/3-music theory course. He has learned, among other things, what the major-, minor-, augmented, and diminished chords, as well as the dominant 7th chords, are. The pedagogical method of his/her theory teacher has been a typical traditional behavioristic-atomistic-structural method. The classroom situation takes place during a music history course. The teacher this time is not a music theory teacher but a lecturer on music history. The teacher (**T**) discusses with the student (**S**).

1019 See 1.4.3; 1.4.4; 1.5.1: 1.6; 1.7.2; 1.7.3 etc.
1020 See 1.4.3; 1.4.4; 1.5.1; 1.6; 1.7; 3.1; 4.3.3 etc.
1021 See 4.7.1 Script (Text) as Concept Field.

T. OK. Let's take the concept of chord – what really is a chord? **S.** Hey!??? This is not a music theory class! **T.** True, but you should know it anyhow. So, please, tell me, what is a chord? **S.** Well, it's a group of three tones. **T.** Which three tones? **S.** They sound together. **T.** Yes, they may sound simultaneously together, or one by one. But how do they relate to each other; what do they form? **S.** Thirds on top of each other. **T.** What is a third? **S.** It's an interval. **T.** Take three seconds on top of each other. Do they form a chord? **S.** Of course not! **T.** Why not? – Take three fourths on top of each other; do they form a chord? **S.** No. Yes. Maybe? – I don't know! **T.** How come yes-no-maybe-don't know? **S.** What???

T. Take two minor thirds on top of each other – is it a chord? **S.** Yes, it's a diminished chord. **T.** Quite so. What about two major thirds on top of each other? **S.** It's an augmented chord. **T.** What about a major chord? What is it like? **S.** Major third below, minor third on top. **T.** And a minor chord? **S.** Minor third below, major third on top. **T.** What about this one: three thirds on top of each other – major, minor, minor? **S.** Well, that's a dominant seventh. **T.** But three major seconds on top of each other is not a chord, or is it? **S.** Noup, it aint! **T.** Why not? **S.** They – er – they're too close to each other?

T. Let's take this one. (Teacher plays on the piano). Here we have three fourths on top of each other. **S.** Sounds a bit weird. – Well, it might be some kind of a jazz-chord…I mean I've heard it before. **T.** That was the Prometheus-chord invented by Scryabin – I'll take it up again it later on… What about this one? (Teacher plays C-A-F tones) **S.** It sounds like major. **T.** What about these sixths (C-A-F sharp)? Is it a chord? **S.** It might be…Sounds a bit odd. **T.** And now: here we have a seventh and a sixth on top of each other (C-B flat-G). **S.** That's swell! It's a major chord! **T.** How about these two sevenths on top of each other (C-B flat-G sharp)? Now, B flat and G sharp move like this, and we'll have this one (C-A-A)? **S.** The latter one's a chord… so the first one must be a chord as well. What else could it be, 'cause it had three tones as well…and the topmost tones a bit moved to the other one. And that was a chord! **T.** Precisely! I take again these sevenths on top of each other. So that was a chord (C-B flat-G sharp/A flat). Now I play the same tones inverted, so that they are next to each other – like this (G sharp/A flat-B flat-C). Now then – is this a chord? **S.** No, they 're too close to each other.

T. Let's go back to our first question: what is a chord? **S.** Well, it seems you must have thirds, or larger intervals on top of each other. **T.** Yes! Because seconds on top of each other is by far much too compact sound material – which, by the way, is called a cluster. Cluster means something, which is packed up; a pile or a bunch…You know, of course that the word cloister (or monastery) and cluster are related concepts and words. In cloisters they lived in a compact, closed-up society – I mean the monks and nuns in the olden times. **S.** Oh, I didn't know the connection of these words. **T.** Well, to tell you the truth, we could – if we'd like to – treat clusters as a kind of chords – provided we expand the concept of chord. But, we won't do that right now… (Discussion continues)

(Note: the teacher above does not on purpose comment on the case C-B flat-G sharp moving to the "C-A-A-chord" which sounds like a F-major chord despite the tone F is non-existent!). The teacher tried to make the student first see the analogy between his earlier concept of chord and the new idea where the concept of cluster is not acceptable but groupings of thirds and larger intervals are. The inversion of third is sixth; and should be familiar to the student at least in hearing.

Situation (fictive) 2: Discussion of teacher and student during a music history lesson:

T. In order to understand what the upsurge of atonality challenging tonality meant at the turn of the 20th century, we should make sure how we altogether understand tonality as a system. Therefore I present you with the question: what is tonality in music; how does it manifest itself, and in which structural layer of music? So far, we'll keep the discussion in the safe frame of our familiar Western music, right! **S.** Eh???

T. I wonder, whether you've heard a famous saying attributed to the person of Johann Sebastian Bach. It goes like this: *Si et fa, la tota musica.* **S.** We haven't studied Latin; it's Latin – isn't it? **T.** No, it's Italian and means: si and fa is all about music. **S.** ??? **T.** No kidding; si and fa are all about music – or nearly all about it. It means si and fa – when together – meant something very basic. We'll come to that soon, no doubt. – Now, what are si and fa? **S.** I've been taught it's ti, not si! Is it the same thing? **T.** Yes, it is. **S.** But can si and fa be all about music? We do have also do, re, mi, and all the rest of them? **T.** Well, we'll see into that. If si and fa sound at the same time, or we place them together here on the blackboard, like this – What sort of an interval do we have here? **S.** Diminished fifth. – Hey, c'mon, this is a music history class, not a theory class! **T.** Well, let's see the end of the story! If I turn them upside down, like this? **S.** Augmented fifth. **T.** Right! In the time of Bach, it was known as the devil's interval: *diabolus in musica* – though Bach himself exploited it in his music.

S. But this is tritonus! **T.** I hear you! – But you did take course 1 in harmonization, right? Then tell me: how do you resolve this kind of an interval. **S.** – We had a course on four-part harmonization, not on two parts. Besides, that interval is not a chord! **T.** Just a minute! You also did learn the rules of resolving dissonants, right? **S.** Can't remember. **T.** Let's see this anyway. Listen to this- I'll play you first si-fa, and write the notes B-F on the blackboard. How do these tones proceed from here? **S.** Pardon? **T.** See, like this: B to C and F to E. – and listen, how it sounds! **S.** All right. **T.** Yes, and if I place them like this: fa-si, and I'll write them like this: F-B. How do the tones proceed now? **S.** F to E and B to C **T.** There you are! So, to sum up: tritonus diminishes when being a diminished fifth, and augments, or expands when being an augmented fourth. **S.** It's more than clear, but I don't get what this all has to do with tonality.

T. We'll be there in a minute. I play you again the si-fa interval, but do not yet write it on the blackboard. How does it proceed? **S.** I told you already. It diminishes into C-E. **T.** Are you quite sure? Is it the only resolution? **S.** ??? (Do you think I'm stupid - eh?). **T.** What if I play it like this: B to A sharp and F to F sharp? **S.** Hey ! That's great! – But how did you do that? **T.** Well, if we interpret the tones si and fa as being B and E sharp, then we'll have an augmented fifth, which expands outwards. Or, the same interval can be interpreted as a diminished fifth: F-C flat diminishing into G flat and B. Let's see this all on the blackboard. You must have heard the concept of enharmony? **S.** Well – yes. **T.** Right. So we can proceed from tritonus in four ways, depending on in what kind of tonal environment it appears. This is what Bach already knew in practise. Tritonus, as an interval, contains the so-called tendency tones having a tendency to move on in a certain way in half steps. Did anyone introduce you the properties of tendency tones before? **S.** No.

T. Tendency, as we all know, means to strive after: to lead to, to incline to, etc. In a musical performance, these tones were meant to be played out; especially in melodies, or in chords. There are other kinds of tendency tones, as well; in fact, we call them leading tones that lead from tension to rest. This is the traditional explanation of them. Musicians created affects, emotions, and sensations with dissonant tensions, which also were resolved into consonant rests or tonuses. This is one of the essential meanings of the concept of tonality. – Let's still do a trick. We shall write this B-F tritonus adding with one more tone, namely G – there, right beside F. Now I'll play all the same resolutions with G included. **S.** Hey, it is a dominant seventh! **T.** That's quite correct. Tritonus has already alone a dominant

> function of resolution; but more often in connection with three- and four-part chords. **S.** But how does this all connect with tonality? **T.** I'll show you. B leads to C, which is the tonic of C major or C minor-tonality. If we interpret tone B enharmonically as C flat, it leads to the third of G flat major; while tone F leads to the tonic of G flat major. And so on. In tonality, the listener feels the need to conceptualize where the tonic is.
>
> **S.** That's cool, man! – So you don't need to memorize separately every single combination of those eight chords, you just remember what is tritonus, the principle of resolving and enharmony. **T.** Exactly! The whole point is that we have a system of these elements and their properties interpreted in relevant ways; and maybe also the fact that tritonus always appears in the dominant seventh chord, out of which we have four variants. These, on their part and enharmony included, can be resolved into eight chords of both major and minor tonalities. The major and minor chords are, so to speak, a "state of normality", or the tonic function at which we occasionally arrive. Si and fa create a dissonance that is bound to resolve into a consonance. Conceptualising tonality in the major or minor modes presupposes the element of si-fa which "shakes" the tonality; and the element of resolving this dissonance to tonality: to the mode of the "normal state". Tonality thus involves metaphorically the presence of the mode of normality, and the stimulus shaking it. We may also use a term from physiology: muscle tonus means the resting tension of a muscle. The example described above is just an example of the phenomenon of tonality…
>
> **T.** But now we should concentrate on discussing in what way chromaticism, or chromatic tones, influence tonality. Do you know from which language the word *chroma* comes from, and what does it mean? … (Discussion continues)

Here the teacher combines music theory with aesthetics starting first with a metaphorical conceptual model of si et fa, which at first is strange to the student. Then he explains which concept the model represents (tritonus), shows that tritonus represents the dominant function (which is familiar to the student from the elements of harmonization), and then he explains the principle of resolution. Including the principle of enharmony, the eight possibilities of resolution of tritonus are also presented. After this, the teacher comes to the aesthetical side of the question of tonality by explaining "the commonly accepted metaphorical behavior " of tonality.

The previous examples indicate the typical feelings of students of having completely "lost the plot of the story". They certainly have the willingness to find the track, and we certainly are able to help them by inducing them to sort out their earlier stock of information and knowledge by aid of systemic approach. At the same time, we can integrate new and unfamiliar information that will take its logical place in the cognitive network of the learner.

7 CONCLUSION

The aim of this research has been to develop theoretical openings of the conceptualization of ontic music, which appears to intertwine with musicology that represents it ontologically. This study has involved the main questions of music and musicology, concepts and language, concept and signs, concepts and information, systems and complexity. It even became necessary to offer new definitions of the levels of musicology (see below). My writing has attempted to be an "abductive excursion" in the world of systemicity, where the beforementioned factors integrate; the side plot has been communication and especially musicological education (mainly music theory and analysis in the traditional sense). All these factors appear to intertwine at the conceptual level, although musicological conceptuality has been the focus to which my theoretical findings repeatedly return. This interdisciplinary research has two sections; in the first part (Chapters 1 – 5) I have tried to build the theoretical foundation of the systemic approarch, and the second part (Chapter 6) has showed practical applications of my theoretical findings[1022].

I feel that the literary data has given strong evidence to my cue: systemic approach is applicable to the examination of musicological concepts and it also explains much of the systemic nature of conceptualization in general. The systemic approach also seems to explain well why and how the normative musicological conceptualization (especially the concepts and terms of traditional music theory and analysis) has the features it has: it is objectivistic oriented, it is structuralistic, its is often negentropic, it maintains the classical view of categorization, and it is based on deductivism.

Before focusing to the more detailed issues of musicological conceptuality and concepts it first became necessary first to deal with the nature of musicology, how is it understood today and what is related to it in respect of my research interests. For my purposes in Chapter 1, I defined *musicology as science*, its present situation ("musicology of the provisional") and the questions it involves in the conctext of this research. It became necessary to comment the relationships of *musicology and music*, *musicology and music theory*, *musicology and music analysis*, and finally the relation of *musicology and music pedagogy*. In the

[1022] Something similar appears to be Lakoff's *Women, Fire, and Dangerous Things* (1987).

chapter of *musicological conceptualization* I have given a suggestion of introducing a new level of musicology, and two viewpoints to *musicological concepts,* namely the *liberal view* and the *normative view,* as I call them.

My research is not a musicological or a semiotic one, it is interdisciplinary and philosophical-theoretical mainly at the level of *theoretical musicology*. Therefore, it should not be assessed from the common musicological premises, neither should it be assessed purely from any of the theoretical premises (systems sciences/cybernetics/complexity science, semiotics, categorization theories, or terminology science) comprising the main data of my research.

In order to avoid any misunderstanding of the terminology on musicology, I have created some new definitions on the concept. Using analogy, which is one of the essential tools in systemic approach[1023], I decide to make the difference between the conceptual levels and aspects relating to musicology. From the systemic point of view in which the variables of the scale level factor[1024] and complexity[1025] are taken into account, as well as from the scientific-methodological viewpoints of deductivity and abductivity[1026], musicology can be understood as three levels (explained in more detail in the respective chapter): 1. *The study course level/musicology* (third sublevel). These are courses of literary music studies in the basic levels of music education such as music theory and analysis, history of music, courses of harmonization, orchestration, thorough bass, etc. This is systematized musicology – or music theory as these subjects are called in musicology. 2. *The scientific level* (second sublevel). This is musicology in the sense as understood today covering a huge range of musicological research from historical and systematic musicology to music semiotics, gender studies, critical theory, ekphrasis, and so on. This could also be called *applied musicology*. 3. *The theoretical-philosophical level* (superlevel) which is the "pure" musicological-conceptual level and uses the abductive method in purpose of generating purely new musicological *conceptuality*. This could be called *theoretical musicology* [my neoterm]. The scientific level of musicology naturally generates new musicological concepts and partly new musicological conceptuality, but these studies should be counted into theoretical musicology. In order to generate new theoretical conceptuality (new ways of using concepts), the theoretical–musicological level naturally needs concepts used at the lower level of the musicology level as well as the study course level because these levels create the concepts needed in studying and describing ontic (material) music, its features, and use. Thus, musicological concepts are the concepts used for definitions and categorizations at the level of the study course musicology and (applied) musicology.

Theoretical musicology uses another level of conceptuality. This is the level of my research. In order to study systemicity as a form of musicological conceptualization, I need musicological concepts from the lower levels of musicology, and its sublevels. In the practical part of my abductive research

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1023 See 5.4.7.
1024 See 5.7.2.
1025 See 5.6.
1026 See 3.3.

(Chapter 6), I give examples of synthesising my theoretical-musicological findings with concepts of (mainly) music theory and analysis.

To make it clear what I mean with musicology in respective textual contexts, see the footnotes. As stated above, musicology in this text means mostly systemized conceptualization about music for scientific and educational purposes.

Rethinking Music, a book on critical readings on musicology, its research objects and methods, features the state of the present musicology[1027]: "The history of musicology and music theory in our generation is one of loss of confidence: we no longer know what we know." *Rethinking Music* coins the musicology of our time as "musicology of the provisional".

Musicology[1028] since it was defined in the West in the 1860s has been in a state of constant change. Adler gave the division of 'historical' and 'systematic' musicology, later the discipline of musicology developed an array of various methods and terminology to examine and define various sets "of viewpoints the specifics of a particular type of music which developed during a particular period amongst a particular section of the population of one particular continent."[1029] . In 1980s, Kerman's criticism against 'formal' musicology gave arise to trends, sometimes coined as the New Musicology[1030], which covers a long list of musicological research interests.

From the systemic-complexity viewpoint, the earlier musicology was a closed and negentropic concept system[1031]. Its conceptual elements were those which aimed at defining and describing the technical structure of music as form, tonality, etc., known as music theory and music analysis. This tool was usable for structural analysis, and it also served (and even serves today) as a regulative tool in music making (mainly as music theory exercizes and elementary, or traditional compositional styles). The focus of this concept system was music as musical works (preferably in Western musical notation), and their technical structure. Negentropically structured concept systems exert strong authority in human systems. Traditional musicology or music theory still does, as complained by many musicologists.

In the course of time, this system encountered criticism, especially since the 1980s. What is called now 'new musicology' claimed that music research needed expansion. This was due to different and new interests in music by many musicologists. Music cultures, trends, and genres that were not studied before, became fashionable (e.g. music of ethnic groups, minorities, pop-music, etc.) This has meant utilising scientific methods from other sciences such as

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1027 Cook & Everist 1999: *Preface*: v.

1028 This chapter deals with applied musicology as science.

1029 *Some '-ics' and '-ologies' of Music*. http://www.theblackbook.net/acad/ tagg/ teaching/ipms/ ologies. html#TheoryMusic (29.08.2002).

1030 Cook & Everist 1999:*Preface:* xi, see also Agawu 1996. http://boethius.music. ucsb.edu /mto /issues/ mto. 96.2.4/mto.96.2.4.agawu.art (27.08.2001).

1031 See Chapters 5.6.1 and 6.2.7.

sociology, cultural studies, media studies, communication studies, anthropology (of music), ethnomusicology, etc.[1032].

Unavoidably, this has created a complex conceptual situation inside the science(s) of musicology. The structural and technical focus of music and musical works have shifted elsewhere, and new conceptual attractors have arisen[1033]. The whole field of musicology has changed from a relatively closed and rigid concept system into a complex concept field in front of which musicologists feel themselves baffled (see Bohlman above). Naturally, they wish to see some order or conceptual attractors in it, and they are searching conceptual focuses.

As art (and music) has become a more complex phenomenon, likewise the science examining it has developed many different methods to examine the complex phenomenon: musicology has become complex. When a phenomenon is *experienced* in a new way the reaction to that experience also changes. But this new way of experiencing new things also start to have an effect on older things, thus, old things are also examined in a new critical way: this is unavoidable. But it is not necessary to be only negatively critical. As many of the writers of *Rethinking music* imply, music analysis and theory are not old-fashioned. The way of looking at it in the old way is old-fashioned. As a practical result of my findings I offer new ways of looking at music analysis and theory (Chapter 6).

I have focused this research on exploring theory-analysis-based musicological concepts in the light of systemic approach. This serves the holistic conceptualization of and about music although I maintain that musicology (which is textual and graphical metaphors, analogies and models in one form or another), in fact is unable to describe music proper. Moreover, linguistic or other conceptual definitions on any matter are never final[1034]. Musicological concepts describe their own conceptual world; music is another level, it is ontic. But, by understanding better or more logically (systemically) the conceptual world of musicology, we can "describe music" better and more logically. At least we can make better conceptual choices and use musicological language more precisely as well as understand what others wish to express through concepts. The outcome of this research shows that musicological concepts can be studied systemically in many interesting ways. Similar basic research in musicology has not been done before; at least I have not found any such results.

This research does not prove the validity of any given system but stresses the importance of systems thinking and abductive systemic approach, introducing various possibilities of systemicity and its creative use. It examines how complex systemicity theoretically appears in cybernetics and systems sciences as projected to fields dealing with concepts, terms, language, and communication. These relate to theories or paradigms of terminology science, feature theories of categorization and semiotics. Constructivism as a pedagogical philosophy represents systemicity. The research culminates in the

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1032 *Some '-ics' and '-ologies' of Music*; http://www.theblackbook.net/acad/tagg/teaching/ipms/ ologies. html#TheoryMusic (29.08.2002).

1033 On attractors, see 3.2.2

1034 See 1.6.5.

concept of the systemicity umbrella, which, along with other findings, is the result of the cardinal abductive research method. Along with new concepts, the research offers several neoterms. The results promise several applications of systemic approach in musicology, which also apply to musicological education.

My research method has been qualitative-abductive. Thus, I have examined a considerable amount of seemingly heterogeneous material on concepts, terminology, language, categories, systems, complexity, information, analogy, etc. with logical rigor pointing to the direction of my cue: systemicity. I also had to decide the saturation level of my material: how much is enough, how much not. This task was not an easy one. The reason for introducing a considerable amount of data is to increase the impartiality of my research. These kinds of texts have not been used in musicology before; they were not familiar to me, and they are not familiar to most musicologists. In order to be able to intertwine systemic thinking with musicological thinking in a complex way, one needs to have enough conceptual material to digest.

The abductive research method presupposes the goal of increasing understanding, and creative understanding. I have introduced several new interpretations of the nature of music, musicology, concept, systems, sign, text, graphics, etc., in the light of systemic thinking. Along with new concepts, my research offers several neoterms[1035]. I feel that this abductive mind journey has greatly increased the understanding of the workings and nature of concepts and systems, and how they relate to each other. The most important finding in my research is the necessity of introducing the conscious use of non-linear dynamic systemic complexity in the description and examination of musicological concepts. In the light of systemicity and complexity, many atomistic pieces of knowledge become clearer and find their proper place in the systemic hierarchy.

The original motivation for my research was the experienced crisis in the professional musicological education based on my personal pedagogical experiences as follows:

Two cardinal principles of the nature of music and related musicology have not yet been widely understood: 1. Music and the conceptuality of it is not the same thing, although in practise these two are considered cognitively equal. The ontic essence of music and its ontological definitions, therefore, are mixed up, resulting in the common mistake of normative simplification of musicological phenomena. 2. Musicological conceptuality presented in traditional music theory and analysis is systemized but not systemic. These fatal mistakes are prevalent in tradition-based professional music pedagogy which using a typically objectivist and deductive approach treats concepts as rigid and closed structural categories and lacks systemic conceptual cohesion. In the scientific musicology, the new school since the1980s depressed the faith in older formal musicology. Promising solutions point to systemic paradigm. Systemic approach and complex systemicity explain musicological concepts in a new way.

[1035] Such as meaning cluster (4.6.1); polytext (4.7.1); interconcept (4.7.2); intergraphics (in several places); chord melody (5.9.4); surface rhythm (2.7; 5.4.5); core rhythm (6.13); communication energy (5.4.9); *paluujakso* (4.4.6; 6.11), cognisphere (1.7.1; 4.4.17; 4.7.2).

Because of systemic approach, I could not avoid levelling certain constructive criticism against the traditional structuralistic and deductive musicological pedagogy prevalent in current music education, which treats concepts as rigid and closed categories[1036]. A new way of looking at musicological conceptuality became necessary. Systemic approach, by nature, is non-closed and dynamic systemicity; therefore, the abductive research method was my natural choice because it also matches perfectly the criteria of qualitative research[1037].

As musicological education is necessarily connected to the concept world of musicology, there had to be something "to be fixed" in musicological conceptuality. The musicological reasons of this research were presented in Chapter 1.6, where I state that in addition to the evident educational application value of systemic approach towards musicological concepts[1038] it also has very important paradigmatic musicological reasons. The trends in new musicology since the 1980s set the question of music into an ambiguous position[1039]. The post-structuralistic hegemony[1040] seems to underestimate the possibilities to study "music directly" as conceptual systems, because systems converge structures, norms and formalism which are rejected. However, it is not thinkable to lay the foundation of understanding about music if we reject formal tools altogether. They are needed, not as rigid structures, but as a dynamic complex conceptual tool to present variable systemic possibilities.

As it is not possible to isolate the musicological concept material into a separate concept system due to interconceptual and intertextual reasons, I divided my empirical testing of solutions into two research fields: A. The theoretical data material on concepts (Concepts, Systems, Language, Graphics, and Music: Chapter 4), and B. Systemic Approach and Systems (Chapter 5), and took along relevant musicological conceptual material.

In Chapter 4, I gathered material on concepts as they appear in the general use: in cybernetics, terminology theory and science, semiotics, category research (especially Rosch's prototype theory and ideas of Lakoff), and finally concepts as texts and graphics.

In Chapter 5, I gathered material and theories behind systemic approach: systems, information, cybernetics and systems science, systemic complexity, impact of complexity on musicology, systemicity in various forms, analogy, figurative language (metaphor, metonymy, simile, personification) as systemicity.

The empirical task of the research was to project musicological concepts and phenomena in connection with the above-mentioned theoretical data. This all culminated in a new conceptual-theoretical model, or rather, in a theoretical approach as the "systemicity umbrella" (in Chapter 5.10), with a tentative

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1036 See 1.4.3.
1037 See 1.2.
1038 See Chapter 6.
1039 See 1.6.2 Schism in Modern Musicology.
1040 E.g. narratology and deconstructionism.

presentation of comparing the main semiotic principles with those of systems sciences and cybernetics.

I have taken plenty of semiotic terminology and conceptuality (Saussure, Peirce, Eco, Greenlee, Bakhtin, and many other authorities) into my research material because semiotics offers a vast and complex field of concepts relating to language use; and language use has to do with musicological terminology and concepts. Moreover, the semiotic idea of intertextualism matches the concept of complexity in cybernetics and systems sciences.

The criteria of qualitative research require application of solution to practise. In Chapter 6, I present first a detailed description my study course on Systemic Approach to Musicological Concepts and then eight theoretical demonstrations of systemic approach in musicology[1041]. In the end I present two fictive situations of systemic approach utilized in a classroom situation. In all these cases I explain the systemic reasons of these approaches.

In this research I have studied selected systems-related theories and their possibilities with an aim to deepen our understanding and knowledge of the nature of musicological concepts, and concepts in general. I feel convinced that this research gives ample of evidence to prove that systemicity can be implemented in many ways in the examination and description of musicological concepts. The present terminology science offers means to structure musicological terminology into semantic fields and relationships, by which we can sort out macro- and microlevel relationships of concepts. A semantic field in the style of thesauri[1042] introduces parallel terms and associative concepts to the use of possible new and more accurate terms in the description of musicological phenomena. Tree diagrams of terminology science help to chart especially partitive relationships[1043].

Related to terminology is semiotics which, when understood systemically, gives excellent tools, like intertextualism, codes, modality, connotation, denotation, etc. for finding styles, forms and ways of presenting musicological concepts through texts. These tools also help us to ”see behind the texts”, to approach the meaning behind, and bring necessary flexibility and alternatives of linguistic description. Semiotics handles a vast amount of different text types with rich terminology. A basic knowledge of semiotics is necessary to the understanding of the rich conceptuality and terminology of musicology in a systemic way.

The theories of cybernetics and systems sciences offer possibilities to understand the relativity and complexity of concepts. Just to give the reader a few examples: they are very necessary tools against static structuralism that involuntarily creeps into every institutionalized and formal education. The sciences which describe systems, entropy, negentropy, complexity, etc., also give a ”skeleton” to semiotics which otherwise easily appears chaotic. A combination of semiotic knowledge with systemicity is necessary. Soft systems

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1041 Study course musicology.
1042 See 6.2.2.
1043 See Nuopponen 1994: 158.

sciences, which study human systems, have similarly a direct link to the evaluation of educational and pedagogical activities as systems.

The findings of this research, I feel, are of use to musicology and musicological pedagogy. The results touch other fields of science, as well, e.g.,terminology science, semiotics, systems sciences, concept research, category research and general research methodology[1044]. I believe that the idea of the systemic umbrella that features the relationship of semiotics and systems sciences/cybernetics, is of interest to the experts of these paradigms. I have wished to demonstrate the applicability of systemic thinking to new, creative and usable ways of modelling musicological knowledge and concepts. Systems thinking greatly enhances the focusing of large quantities of musicological information into organized systemic knowledge; it enhances understanding the conceptual essentials. New knowledge can be generated, and systemic thinking/approach and abductive reasoning can utilize analogous methods that help to create new knowledge.

How to utilize systemic approach in the present situation of music education? In music education, especially the theoretical subjects of music theory and music analysis can be raised onto a new conceptual level by aid of systemic approach because their "accepted" terminology already exists. Teachers and pedagogues of musiological subjects can design course loads and course objectives basing on systemic approach. Students can be taught to create systemic models to boost and organize the conceptual material of their study subjects (for example in writing essays, or creating portfolios). It is possible to create new musicological subjects devoted to holistic descriptions of musicological material, or give new viewpoints to replace the traditional deductive and normative viewpoints in musicological subjects.

This research has given many results, many more that I could expect in the beginning. It has shown moreover that from ontological viewpoint concepts are systems (and signs are systems), concepts are forms and structures of information, concepts are signifieds and senses, concepts are mind-energy attractors, and concepts are categories and prototypes. However, this ontological conceptual definition on concept is not what the ontic concept is; moreover, this definition is not final because no definition on any matter is final.

Through my findings I have wished to activate mainly the field of musicology by giving new theoretical and philosophical impulses; if I have also succeeded in giving some new ideas to the thinking of semioticians, cyberneticians and systems scientists, as well as to terminology scientists, I feel this research has done its duty.

Homage to Socrates: "Though the truth is absolute, its conceptual definitions are never final because there is no ideal standard reader"

"At its best musicology prepares us for the reality of music."

The author of this research

1044 For example, connecting abductive method to systemic thinking/approach.

YHTEENVETO

Tutkimukseni nimi, *On Conceptualization of Music; Applying Systemic Approach to Musicological Concepts with Practical Examples of Music Theory and Analysis*, voidaan suomentaa seuraavasti: Musiikin käsitteellistämisestä. Systeemisen tarkastelutavan soveltaminen musikologisiin käsitteisiin sekä käytännön esimerkkejä musiikin teoriasta ja analyysistä. Tutkimukseni tarkoitus on kehittää teoreettisia johdantoja musiikin käsitteellistämisen jatkotutkimukselle. Musiikki ontisena ilmiönä kietoutuu kompleksisella tavalla musikologiaan joka edustaa sitä ontologisesti. Tutkimukseni, joka on monitieteellinen, tarkastelee musiikkiin ja musikologiaan, käsitteisiin ja kieleen, käsitteisiin ja merkkeihin, käsitteisiin ja informaatioon sekä systeemeihin ja kompleksisuuteen liittyviä pääkysymyksiä. Abduktiivinen metodi ja systeemisyys sekä niiden integroituminen on tutkimukseni pääjuoni; sivujuonena on musikologinen koulutus ja kasvatus ja niihin liittyvä kommunikaatio. Kaikki nämä tekijät kietoutuvat toisiinsa käsitteellisyyden eri tasoilla. Vaikka tutkimukseni on monitieteellinen eikä se ankkuroidu musikologiaan eikä sitä tule tarkastella puhtaasti musikologisena, sen välitön käyttöintressi on musikologia ja erityisesti löytöjeni musiikkipedagogiset sovellutukset. Epäilemättä tutkimukseni on haaste puhtaasti musikologisesti ajattelevalle lukijalle. Musiikin käsitteellistämistä ei mielestäni voi tutkia selvittämättä edes jossain määrin mitä musikologia on tieteenä, mikä on sen nykytilanne ja mitkä nykytutkimusintressit liittyvät omaan tutkimukseeni. Paljastui (mm. Cook & Everist: *Rethinking music*), että musiikin analyysin ja teorian tilanne on otettu uudelleen esille.

Jotta ymmärrettäisiin, missä merkityksessä käytän käsitettä musikologinen käsitteellistäminen (sitä ei tule ymmärtää musiikkitieteellisenä käsitteellistämisenä, joka on vain yksi sen aspekteista) tarkastelen ja erotan musiikkitieteen kolme musikologista tasoa*: teoreettisen musikologian (metamusikologian)*, joka on tutkimustasoni, *soveltavan musikologian* eli musiikkitieteen (*musikologian*) kaikkine erityistieteellisine aloineen sekä *oppiainemusikologian*, joka tarkoittaa käytännössä ammatillisen musiikinopetuksen ns. yleisiä tai teoreettisia oppiaineita. Minulle siis termi musikologia tarkoittaa ylipäätään musikologista käsitteellistämistä, ei ainoastaan musiikkitiedettä.

Jotta teoreettista musikologista tasoa voitaisiin tutkia, on siinä käytettävä alempien tasojen musikologista käsitteistöä tutkimuskohteena mutta ei tutkimusvälineenä, koska musikologiaa ei voi tutkia omilla välineillään. Siihen olen tarvinnut systeemitieteiden, kybernetiikan, systeemitieteen, semiotiikan, käsitetieteiden, terminologiatieteen sekä kategoriatutkimuksen teorioita ja käsitevälineistöä. Totean myös, että toisin kuin monilla muilla aloilla (mm. luonnontieteet) musiikin käsitteellisessä koulutuksessa ei uusin teoreettinen tieto ole kulkeutunut perus ja ammatillisen oppiainetasolle. Tätä puutetta korjaamaan olen kehittänyt musiikin teorian ja analyysin käsitteistön systeemisen tarkastelutavan, jonka sovelluksia esittelen luvussa 6.

Halutessani noudattaa abduktiivisen metodin integriteettiä, jonka mukaan lukijan on pystyttävä seuraamaan tutkimuksen luovaa juonta, en ole muuttanut alkuperäistä tekstiä miltei lainkaan, vaan lisännyt alaviitteisiin mitä musikologista tasoa tai aspektia kulloinkin tarkoitan. Abduktiivseen metodiin kuuluu, että aikaisempiin ajatuksiin saatetaan palata myöhemmin jalostuneessa muodossa. tai että jotakin johtolankaa saatetaan seurata pitempään muiden jäädessä vähemmälle huomiolle. Tämä aiheuttaa sen, että aikaisemmin esillä olleiden asioiden toistumiselta ei voi välttyä.

Kahta seikkaa musiikista ja siihen liittyvästä musikologiasta ei ole vielä yleisesti havaittu: 1. musiikki ja sen käsitteellistäminen eivät ole sama asia, vaikka käytännössä näitä pidetään kognitiivisesti samana. Musiikin ontinen ja sitä määrittelevä ontologinen olemus sekoittuvat, jolloin päädytään tyypilliseen virheeseen eli musikologisten ilmiöiden normatiiviseen yksinkertaistamiseen; 2. perinteisen musiikinteorian kuvaama musikologinen käsitemaailma on kylläkin systemaattinen muttei systeeminen. Nämä virhepäätelmät leimaavat perinteistä musiikin koulutusta, joka vaalii objektivistisia ja deduktiivisia tarkastelutapoja ja jossa käytetään käsitteitä jäykkinä struktuureina ja suljettuina kategorioina. Musiikin koulutuksen käsitteistö ei ole myöskään systeemisesti kiinteä. Tieteellisen musikologian piirissä ilmestyi 1980-luvulla uusi koulukunta, joka romahdutti luottamuksen vanhempaan muodolliseen musikologiaan. Systeeminen paradigma tuntuu lupaavan ratkaisuja näihin ongelmiin. Systeeminen lähestymistapa ja kompleksinen systeemisyys selittävät musikologisia käsitteitä uudella tavalla, jolloin myös näkökulma musikologiaan tieteenä muuttuu. Tämä monitieteellinen tutkimus ei väitä, että jokin tietty systeemi olisi ainoa oikea, vaan painottaa systeemiajattelun ja abduktiivisen systeemisen tarkastelutavan tärkeyttä ja tarjoaa erilaisia mahdollisuuksia systeemisyydestä ja sen luovasta käytöstä. Se tarkastelee, miten kompleksinen systeemisyys ilmenee teoreettisesti kybernetiikassa ja systeemitieteissä ja heijastuu aloihin, jotka tarkastelevat käsitteitä, termejä, kieltä ja kommunikaatiota. Nämä ovat puolestaan suhteessa terminologiatieteen, kategorisoinnin ja semiotiikan teorioihin tai paradigmoihin. Konstruktivismi pedagogisena filosofiana edustaa systeemisyyttä. Tutkimukseni huipentuu systeemisyys-sateenvarjo-käsitteeseen, joka muiden havaintojeni ohella on tulos keskeisestä abduktiivisen metodin käyttämisestä. Uusien käsiteiden ohella tutkimukseni tarjoaa käyttöön useita uustermejä. Tutkimustulokset viittaavat moniin systeemisen lähestymistavan sovelluksiin musikologiassa ja niitä voidaan hyödyntää myös musikologisessa opetustoiminnassa.

Laadullisen tutkimuksen kriteerit

Tutkimukseni edustaa laadullista tutkimusta[1], jossa sovellan miltei sellaisenaan Anttilan[2] suositusta abduktiivisen päättelyn tutkimusotteesta: 1. johdanto ja tutkittavan ilmiön nykytilanteen kuvaus; 2. tutkimusintressit; 3. tutkittavan ilmiön problematisointi; 4. erilaiset hypoteettiset ratkaisumallit (vastaa teorian

1 1.2.
2 Anttila 1998: 441, kohdat I-XIII.

asemaa deduktiivisessa menetelmässä); 5. ratkaisumallien välillä tapahtuva valinta (vastaa tutkimusmenetelmän valintaa); 6. ratkaisujen empiirinen koettelu (idean suunnittelu ja käytännön toteutukseen vieminen, refleksiivinen ja empiirinen tulosten tarkastelu); 7. ratkaisujen vertaaminen asetettuun tehtävään (tulosten kriittinen arviointi eli tutkimuksen luotettavuuden tarkastelu); 8. ratkaisun hyväksyminen (uuden parannetun tuloksen käsitteellistäminen eli uuden teoreettisen mallin kehittäminen), 9. ratkaisun soveltaminen käytäntöön; 10. tutkimuksen luotettavuuden arviointi; 11. pohdinta/diskussio; 12. lähteet; 13. liitteet. Omassa monitieteellisessä tutkimuksessani noudatan Anttilan suunnitelmaa pääkohdin, kuitenkin siten, että johdanto-osaan sisällytän myös tutkimusintressini, mikä Anttilan mukaan on mahdollista, sekä modifioin runkoa tutkimustarpeitani vastaavaksi.

Anttilan mukaan laadullisella tutkimuksella on kolme päätavoitetta yhdistyneenä tutkimusraportointiin: kuvaileva tavoite, ymmärryksen lisääminen ja teoriaa muodostava tavoite yhdistyneenä induktiiviseen ja abduktiiviseen metodiin. Oma tutkimukseni täyttää nämä kriteerit, koska tavoitteeni on käsitteellisyyteen liittyvän ymmärryksen lisääminen sekä systeemisten lähestymistapojen mahdollisuuksien tutkiminen.

Teschiin viitaten – laadullinen tutkimus 1. tarkastelee kielellisen ilmaisun ominaisuuksia; 2. etsii säännönmukaisuuksia; 3. pyrkii ymmärtämään tekstien tai toimintojen tarkoituksia; 4. hyödyntää reflektiota. Oman tutkimukseni aineisto ja metodologia täyttää nämä kriteerit: 1. terminologiatiede ja semiotiikka; 2. systeemit ja systeemisyys eri muodoissaan; 3 käsitteet ja niiden piirteet; 4. abduktio tutkimusmetodina yhdistyen heurismiin, analogiaan ja hermeneutiikkaan.

Musikologian tilanne

Musikologia on nykyisin erittäin laaja tutkimusalue, jossa käytetään tekstejä käytännössä kaikilta tieteen aloilta. Erityisesti 1980-luku toi perinteisen historiallisen ja systemaattisen musikologian rinnalle uusia trendejä kuten musiikki sosiaalisena voimana (Dahlhaus), esteettisenä kokemuksena (Kerman), suhde muihin taiteisiin ja yhteiskuntaan (strukturalistinen antropologia, semiotiikka, narratologia, poststrukturalismi, postmodernismi, psykoanalyyttiset metodit, jne.). – laajasti ottaen ns. kriittinen koulukunta. Tämän hetken musikologiaa leimaa epätietoisuus, kuinka suhtautua toisaalta vanhempaan ankarasti historiseen ja systeemiseen (ns. formalistiseen, mm. perinteinen musiikin analyysi ja teoria) musikologiaan, mikä on klassisen musiikin ja sen tutkimuksen tulevaisuus, mikä musiikkitieteen arvo ja musiikkitieteilijöiden tulevaisuus. Näyttää myös siltä, että analyysin kielto on lievenemässä ja siihen suhtaudutaan suopeammin, mutta sille asetetaan myös edelleen odotuksia välttää formaalisuus ja normatiivisuus[3].

[3] Kts. esim. eri kirjoittajien näkemyksiä Cook & Everist 1999: *Rethinking Music* sekä mm. Välimäki S. 2002. *Musiikkianalyysi musiikkikritisismin*ä.

Systeemiseltä kannalta kaikki tämä on ollut yritystä systematisoida musiikin, tai oikeammin musikologian, käsiteaineistoa. Johtopäätöksinä esitän, että 1. musikologia on kumulatiivista käsitteellisyyttä; 2. käsitteellisyys pyrkii systematisoitumaan; 3. käsitteellisyys muovaa käytäntöä. Näin ollen spekulatiivinen musikologia, kuten musiikin teoria ja musiikin historia, tuotti ajan mittaan myös säätelevää (regulatiivista) musikologiaa, kuten normatiivinen musiikin teoria ja analyysi sekä normatiivinen musiikin säveltäminen ja tulkinta. *Groven* mukaan suurinta osaa musiikin teoriasta voidaan pitää hyvin formaalisena.

Dispositio

Tutkimukseni jakautuu abduktiivisen menetelmän mukaisesti kahteen pääosaan. Luvuissa 1 – 5 rakennan teoreettisen pohjan systeemiselle lähestymistavalle ja luvussa 6 osoitan, miten teoreettisia löytöjä voidaan praktisesti soveltaa. Johdannon alkuluvuissa tarkastelen musikologian ja musiikin suhdetta, musikologian ja musiikin teorian sekä analyysin suhdetta, musikologian ja musiikkipedagogian suhdetta ja lopuksi musikologisen käsitteellistämisen perusteita (liberaali ja normatiivinen musikologinen käsitteistö). Sen jälkeen esitän laadullisen tutkimuksen kriteerit sekä tutkimukseni rungon laadullisen tutkimuksen valossa[4]; esittelen tutkimukseni yleiset taustatekijät, jossa perustelen tarpeen löytää uusi, systeeminen ajattelutapa hypoteettis-deduktiivisen ajattelun tilalle ja tuon esille sen, että musikologia ei oikeastaan kuvaa musiikkia vaan sen käsitteellistämistä[5]; kuvaan musikologisen pedagogian ja kasvatuksen tilanteen ja problematiikan Suomessa tutkimuskysymykseen liittyen sekä esitän henkilökohtaiset tutkimusintressini[6]. Tämän jälkeen pohdin tilanteen kognitiivisia ja filosofisia syitä painottaen erityisesti konstruktivistisen näkökulmaa eräänä systeemisyyden muotona[7]. Tuon esiin tarkempia musiikkitieteellisiä syitä tutkimukselleni, kuten 1980-luvulla musikologiassa tapahtuneen ratkaisevan jaon ”vanhempaan ja uudempaan musikologiaan” ja sen seuraamukset musiikkitieteessä sekä heijastukset musiikin analyysin ja teorian asemaan. Sen jälkeen tuon esille sen missä määrin systeemistä tutkimusta musikologiassa on aiemmin toteutettu – hyvin vähän tietojeni mukaan – ja perustelen, että kun ajattelemme, me konstruoimme käsitteellisesti ja että tähän tarvitsemme käsitteitä. Sen jälkeen tuon esiin musikologian ja musiikin välisen paradoksin: musikologia ei ole musiikin kuvaamista vaan oletettua musiikin käsitteellistämistä. Tutkimukseni johdanto päättyy tutkimuskehyksen kuvaukseen[8]: *tutkimuksen tavoite ja tutkimussuunnitelma* (tutkia musiikin teorian ja analyysin käsitteistöä systeemisestä näkökulmasta); *työhypoteesi* (musikologisia käsitteitä voidaan kuvata systeemeinä); *tutkimusstrategia* (kartoittaa ja valita systeemisyyteen ja käsitteellisyyteen liittyvät keskeisimmät teoriat sekä niihin liittyvät päätutkimusalat suhteessa musikologiaan); *tutkimusmetodi* (abduktiivisen metodin alustava esittely);

4 1.2.
5 See 1.6.5.
6 1.4.4.
7 1.5.1; 1.5.2.
8 1.7.

tutkimusoperaatiot (heurismi, analogia, hermeneutiikka); *tutkimusaineisto ja taustakirjallisuus* (valikoidusti liittyen musikologian määrittelyihin ja musikologiseen käsitemateriaaliin, abduktioon, grounded-teoriaan, induktioon, deduktioon, hypoteettis-deduktiiviseen metodiin, konstruktivismiin, käsitteisiin, terminologiaan, kategorioihin, semiotiikkaan, systeemeihin ja systeemisyyteen).

Musiikin suhde kieleen ja käsitteisiin. Yleistä problematisointia

Luku 2 käsittelee tutkimukseni pääproblematisointia eli musiikin suhdetta sitä määrittelevään musikologiaan ja musikologian suhdetta käsitteisiin ja kieleen. Musiikki on osa ontista todellisuutta ja käsitteet, kuten musikologiset käsitteet, ovat osa ontologista todellisuutta. Käsitteillä on suhde kieleen, jonka avulla niitä ilmaistaan. Tuon esille esimerkkejä musiikin kielellisestä kuvaamisesta deskriptiivisenä musikologiana (yleiskieli) ja normatiivisena musikologiana (musikologinen kieli) ja osoitan, että kummassakaan tapauksessa emme tavoita musiikin todellisuutta. Kaikki yritykset kuvata musiikkia ovat vain ontologista musikologista käsitteellistämistä suhteessa ontiseen musiikkiin. Esitän myös vertailun kielen ja käsitteiden välillä pohtien merkityksen sijaintia näiden suhteen.

Koska musiikkia yleisesti pidetään abstraktina muotona ja musikologisen terminologian valtaosa liittyy yrityksiin kuvata musiikin rakenteita, tasoja, muotoja ja kaavoja, tarkastelen, miten muotoa voidaan käsitteellistää kielen avulla. Designin kieli ja käsitteistö sekä niiden luokittelu (Karihalme) paljastaa uusia mahdollisuuksia myös musikologisen kielenkäytön, terminologian ja käsitteistön systeemiseksi ymmärtämiseksi.

Hypoteettiset ratkaisumallit

Luvussa 3 esittelen aluksi tutkimusprosessini intuitiiviset alkulähtökohdat (mm. posteriesitelmäni musiikkitieteen seminaareissa) ja sen jälkeen löytämäni ja rajaamani teoreettiset lähtökohdat (kts. kaavio 7). Käsittelemäni useat teoriat ja paradigmat eivät ole tutkimukseni tutkimusteorioita, vaan tutkimusmateriaalia, jota pitää koossa (käsitesilta-ajatus/concept bridge idea) ja joiden käsitteellinen attraktori on systeemisyys ja abduktiivinen tarkastelutapa. Luvuissa 3.3.3 ja 3.3.4 esitän ratkaisumallien välisen valinnan, ja esittelen abduktiivisen metodin tarkemmin suhteuttaen sen systeemiseen lähestymistapaan ja tuon esille sen etuja verrattuna hypoteettis-deduktiiviseen eli hempeliläiseen metodiin.

Käsitteet, systeemit, kieli, grafiikka ja musiikki

Luku 4 sisältää ratkaisumallin empiirisen koettelun ensimmäisen osan (toinen osa on luku 5), jolloin reflektoin abduktiivisesti käsitteisiin liittyviä eri teorioiden näkökulmia: miten käsitteitä kuvataan yleiskielessä, kybernetiikassa, terminologiatieteessä, semiotiikassa sekä kognitiotieteiden piirreteorioiden (erityisesti klassisen kategoriateorian ja Roschin prototyyppiteorian) kannalta. Kullakin näillä on sanottavansa. Erityisesti terminologiatiede luokittelee hienojakoi-

sesti ja monissa tasoissa käsitelajeja ja niiden suhteita. Tässä mielessä se liittyy lähinnä perinteisempään strukturalistiseen ja normatiiviseen systeemisyyteen, mutta antaa samalla oivallista käsitemateriaalia dynaamisen ja ei-lineaarisen systeemisen kompleksisuuden ymmärtämiselle. Semiotiikan merkki (sign) käsitteellisine osineen on systeemisyyden valossa ei ainoastaan käsite vaan myös systeemi. Tarkastelusta voidaan päätellä, että käsite, systeemi, merkki, 'merkitty', (signified) 'aistimus' tai 'mieli' (sense) ovat toistensa yli ja lomaan liukuvia käsitteitä.

Luvun loppupuolella[9] tarkastelen monipuolisen käsitteellisyyden merkitystä asiantuntisuudelle sekä tarkastelen graafisen ja visuaalisen esityksen suhdetta kirjallisiin teksteihin ja käsitteellistämiseen[10]. Osoitan, että kirjallinen, lauseina ja sanoina kulkeva teksti on Line-aaria, ja vaatii uusia selittäviä rinnakkaistekstejä, kun taas grafiikka on valmista intergrafiikkaa, interkonseptuaalisuutta ja intertekstuaalisuutta. Näin ollen monikerroksellisen kompleksin käsitteellistämisen mallintaminen tarvitsee avukseen grafiikkaa, mitä mm. terminologiatieteen ISO/FDIS 1087-1: 2000 (E/F) kansainvälinen luokitusstandardi käyttää hyväksi.

Systeeminen tarkastelutapa ja systeemit

Luku 5, joka jatkaa empiiristä koettelua, kartoittaa ja perustelee aluksi systeemisen tarkastelutavan tarpeellisuuden uutena esille nousseena tieteellisenä paradigmana. Sen jälkeen esittelen systeemisyyden terminä ja käsitteenä, systeemilajit systeemitieteissä ja kybernetiikassa, entropian ja negentropian käsitteet sekä niiden suhteen informaation ja tiedon käsitteisiin. Näiden esille ottaminen on perusteltua, koska musikologiaa ylläpidetään ja kommunikoidaan tieto- ja informaatioaineksena.

Luvussa 5.5 tarkastelen musikologian suhdetta kybernetiikkaan ja systeemitieteisiin ja esitän, että (perinteinen normatiivis-strukturaalinen) musikologia on kuvaustavaltaan lähempänä kyberneettistä tarkastelua ja "musiikin tekeminen" ja musiikkikasvatus lähempänä systeemitieteitä[11]. Tutkimuksessa tuodaan esiin vallalla oleva jako *kybernetiikkaan ja systeemitieteisiin*, vaikka nykyisin niiden ero ei ole enää ankara vaan alat liukuvat toistensa läpi. Kybernetiikassa – ankarimman tarkastelutavan mukaan[12] – systeemit eivät ole olemassa olevia "todellisuuksia" vaan aina tarkastelijan itsensä konstruoimia käsiterakenteita. Systeemitieteiden pohjana on yleinen systeemiteoria[13], jonka mukaan on olemassa myös tarkastelijan ulkopuolella olevia ontisia systeemejä. Systeemitieteissä muutenkin löytyy "pehmeiden systeemien" tutkijoita, jotka suosivat sosiologisia tutkimuksia.

Luvun 5 keskeisimpiä asioita on tuoda esille *ei-lineaarinen kompleksinen* näkökulma. Kyberneettiseltä kannalta (mm. Heylighen) kompleksisuus muodos-

9 4.6.9.
10 4.7.1; 4.7.2.
11 Kuten Banathyn human activity systems, kts. esim. 5.4.9.
12 Radikaali konstruktivismi, esim. Krippendorff.
13 General Systems Theory, von Bertalanffy.

tuu negentropian ja entropian "välimaastoon". Kompleksisuus on läsnä silloin kun toteutuu suuri määrä erilaisuutta ja suuri määrä kytkentöjä. Musiikissa esimerkiksi atonaalinen dodekafoninen säveljärjestelmä (tietty sävelrivi ja sen mutaatiot) sisältää suuren joukon erilaisia ja eriarvoisia säveliä (=erilaisuus), jotka kytkeytyvät toisiinsa monipuolisesti. Tästä muodostuu kompleksi kokonaisuus, jota on hyvin vaikea hahmottaa käsitteellisesti.

Kompleksisuutta lisää myös ns. skaalatasofaktori (scale level factor), joka selittää ylä- ja alasysteemien välisiä hierarkiasuhteita. Kompleksisuus on näin ollen avoin systeemi. Kompleksisen käsitteellisyyden etu verrattuna strukturaaliseen ajatteluun on se, että sen puitteissa voidaan jatkuvasti löytää uusia käsitteellisiä näkökulmia. Kompleksisen näkökulman valossa voidaan tarkastella mm. tulkintoja musiikin kehityksestä[14] tai millaisia käsitetasoja löytyy esim. musiikin sävel- tai rytmijärjestelmissä[15].

Luvussa 5.8.3 vertailen analyyttista ja systeemistä näkökulman välillä. Vertailu paljastaa kuinka analyyttinen näkökulma edustaa strukturalistista ja normatiivista (suljettujen systeemien) ajattelua ja systeeminen puolestaan edustaa abduktiivista (avoimien systeemien ajattelua). Sen jälkeen tuon esille analogian, metaforan ja metonymian systeemisyyden valossa koska musikologisen käsitteistön syntyä ja yhteyksiä muuhun käsitteistöön voidaan selittää niiden avulla.

Abduktiivista tutkimusotetta edellyttävä ratkaisun hyväksymistä vastaava osa on luvussa 5.10. esittämäni systeemisyys-sateenvarjo-idea, jossa on rinnakkain semiotiikan ja systeemitieteiden/kybernetiikan pääkäsitteistö systeemisen tarkastelutavan kannalta. Siitä näkyy, että kumpikin paradigma liukuu käsitteellisesti toisensa läpi ja että kummaltakin puolelta löytyvät skaalafaktorin valossa toisiaan vastaavat käsitetasot, joille kummankin paradigman käsitehierarkia voidaan sijoittaa. Tasoina erottuvat abstrakti taso, ideologinen taso, representaatiotaso ja suhde todellisuuteen–taso. Semiotiikan puolella musiikki on ideologisella tasolla oleva tekstuaalisen koodin alalaji: esteettinen koodi ja musikologia on tekstuaalisen koodin alalaji: tieteellinen koodi. Systeemitieteiden puolella ne ovat myös ideologisen tason ilmiöitä. Musiikki ja musikologia kuuluvat muotoiltuihin käsitesysteemeihin (designed concept systems), joiden paradigmatasoja ovat taide (musiikki) ja teoria tai filosofia (musikologia). Semiotiikka ei tiettävästi ota kantaa kasvatus- ja koulutusfilosofiaan, mutta systeemitieteiden kannalta musiikin ja musikologian koulutus kuuluvat ihmisaktiviteettisysteemeihin, joiden ihanteellisimmat toteutusmuodot (Banathyn mukaan) olisivat joko heuristinen ihmisaktiviteettisysteemi, joka suosii kokeilevaa kasvatusta, avoimia ja komplekseja systeemejä, tai tarkoitusta etsivä ihmisaktiviteettisysteemi, joka on kohti ihanteita suuntautunut ja suosii myöskin avoimia ja kompleksia systeemifunktioita ja rakenteita.

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14 See Borroff 5.7.1.
15 5.7.3; 5.7.4.

Käytännön sovelluksia musikologisen käsitteistön systeemisestä kuvauksesta

Ratkaisun soveltamista käytäntöön tarkastelee luku 6, jossa esittelen useita esimerkkejä musikologisista systeemikuvauksista. Näitä ovat oppikurssini musiikin systeemisistä käsitejärjestelmistä ja esimerkit analogioiden ja mallien systeemisestä käytöstä kuten musiikkiteos satelliitti-käsitesysteeminä, systeemissemanttinen kenttä tietosanakirjassa, systeeminen tarkastelukulma tekstuuriin/satsiin, Krohnin muoto-oppi systeemisestä näkökulmasta, musiikin parametrit systeemisesti esitettynä, intialaisen musiikin *raga* systeemisestä näkökulmasta, systeeminen näkökulma duuri-molli-tonaaliteettiin, systeeminen näkökulma musiikin tyylikausiin (Borroffin taksonominen kaavio 27) ja systeemisen lähestymistavan soveltaminen luokkahuoneopetustilanteessa (fiktiivisiä keskustelutilanteita opettajan ja opiskelijoiden välillä).

Päätelmä

Tutkimukseni tarkastelee pääasiallisesti musiikin teorian ja analyysin käsitteitä systeemisestä näkökulmasta. Tämä helpottaa musiikin holistista hahmottamista, vaikkakin olen sitä mieltä, että musikologia, joka on tekstuaalisia ja graafisia metaforia, analogioita ja malleja muodossa tai toisessa, ei tosiasiallisesti pysty kuvaamaan musiikkia. Musikologiset käsitteet kuvaavat vain omaa käsitemaailmaansa ja musiikki kuuluu toiselle, ontiselle, tasolle. Kuitenkin ymmärtämällä paremmin musikologian maailmaa voimme käsitteellistää sitä paremmin ja loogisemmin. Silloin käytämme myös musikologian kieltä tarkemmin ja selkeämmin ja voimme myös ymmärtää paremmin mitä muut haluavat ilmaista käsitteillä. Tutkimukseni osoittaa, että musikologisia käsitteitä voidaan tutkia systeemisesti monella mielenkiintoisella tavalla. Vastaavaa tutkimusta ei ole tiettävästi aikaisemmin tehty musikologian piirissä.

Tutkimusmetodini on laadullis-abduktiivinen, johon kuuluu suurehko määrä teoreettista materiaalia käsitteistä, terminologiasta, kielestä, kategorioista, systeemeistä, kompleksisuudesta, informaatiosta, analogiasta jne. Tämä kaikki muodostaa tarvittavan systeemisen käsitteellisen kompleksisuuden. Abduktiivinen metodi on lisännyt luovaa ymmärrystäni tutkittavasta asiasta ja tuottanut uusia käsitteitä ja uustermejä[16]. Kenties tärkein löytöni on painottaa ei-lineaarin dynaamisen systeemisen kompleksisuuden tietoista käyttöä musikologisten käsitteiden tutkimisessa ja kuvaamisessa. Tämä helpottaa irrallisten tiedonpalasten asettumista loogisille paikoilleen käsitteellisyyden systeemisessä hierarkiassa.

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16 Teoreettinen musikologia (theoretical musicology 1.1.5; 1.1.6), oppiainemusikologia (study course musicology 1.1.6); merkitysklusteri (meaning cluster: 4.6.1); polyteksti (polytext: 4.7.1); interkäsite (interconcept: 4.7.2); intergrafiikka (intergraphics, in several places); sointumelodia (chord melody: 5.9.4); pintarytmi, runkorytmi (surface rhythm: 2.7.; 5.4.5) core rhythm : 6.13); kommunikaatioenergia (communication energy: 5.4.9); *paluujakso* (4.6.6; 6.11), kognisfääri (cognisphere:1.7.1; 4.4.17; 4.7.2).

Tutkimukseni alkukimmoke oli musikologisessa pedagogiassa kokemani ongelmat, jotka olen kuvannut tiivistelmässä. Tämän johdosta olen joutunut myös kritisoimaan perinteistä strukturalistis-deduktiivisesti orientoitunutta musiikin pedagogiaa. Tutkimukseni musikologiset syyt liittyvät johdannossa esitettyyn musikologian tietyllä tavalla ongelmalliseen tilanteeseen, "vanhan ja uuden musikologian" kahtiajakoon.

Koska musikologista käsitemateriaalia ei ole mahdollista eristää täysin omaksi käsitesysteemiksi interkonseptuaalisista ja intertekstuaalisista syistä, jaoin tutkimuskohteeni ratkaisujen empiirisen koettelun kahteen tutkimusalueeseen: A. käsitteisiin liittyvä teoreettinen materiaali (luku 4) ja B. systeeminen tarkastelutapa ja systeemeihin liittyvä teoreettinen materiaali (luku 5). Näihin yhdistin mukaan relevantin musikologisen käsite-esimerkkimateriaalin. Tutkimukseni huipennus on systeemisyys-sateenvarjo, joka ei ole valmis teoria vaan teoreettinen tarkastelukulma, jossa alustavassa mielessä asetetaan rinnakkain semiotiikan ja systeemitieteiden/kybernetiikan pääkäsitteet systeemisinä tasoina ja käsitesysteemeinä. Sen jälkeen käsittelin tarkemmin erään systeemisen lähestymistavan eli systeemiajattelun pääelementtejä[17] yhdistyneenä musikologisiin esimerkkeihin. Olen ottanut tutkimukseeni mukaan runsaasti semiotiikan käsitteistöä ja termejä, koska semiotiikka tarjoaa valtavan varaston systeemisesti käyttökelpoista kielen käyttöön liittyvää käsitteistöä. Kieli on myös musikologisen käsitteistön tärkein kommunikointiväline.

Laadullinen tutkimus edellyttää osoitusta käytäntöön soveltamisesta. Tätä palvelevat luvussa 6 esitetyt esimerkit musikologisten käsitteiden systeemisestä kuvauksesta.

Kybernetiikan ja systeemitieteiden mahdollisuudet antavat hyviä välineitä käsitteiden kompleksisuuden ja suhteellisuuden ymmärtämiseen. Niiden avulla voidaan välttää staattis-strukturalistinen ajattelu, joka vaivaa virallisia laitostuneita koulutusmuotoja. Systeemiajattelu mahdollistaa suuren musikologisen tieto- ja käsitemäärän fokusoinnin järjestyneeksi systeemiseksi tiedoksi. Abduktiivisen ajattelun ja analogiaperiaatteen avulla voidaan luoda uutta tietoa, jopa uusia musikologisia oppiaineita vanhemman käsitemaailman pohjalta.

Tutkimukseni osoittaa, että käsite voidaan määritellä mm. systeemiksi ja/tai informaation muodoksi; käsite on 'merkitty' tai käsitesisältö (signified) sekä 'aistimus' tai 'mieli' (sense); käsitteet ovat mielen energiaa (mind energy), käsiteattraktoreita, kategorioita ja prototyypejä. Nämä ontologiset määritelmät eivät ole kuitenkaan itse ontisia käsitteitä; sitä paitsi mikään määritelmä mistään ei ole absoluuttinen eikä lopullinen.

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17 Etupäässä Melan materiaalia käyttäen.

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Abbreviations of Sources in Footnotes

Grovemusic = The New Grove Dictionary of Music and Musicians, 2nd ed. 2000, web version
ISO/FDIS 1087-1:2000 = International Standard ISO/FDIS 1087-1: 2000 (E/F).
OIMTS = Otavan iso musiikkitietosanakirja
Toimikunnista termitalkoisiin = Toimikunnista termitalkoisiin. 25 vuotta sanastotyön asiantuntemusta.
WDCS = Web Dictionary of Cybernetics and Systems. Principia Cybernetica Web

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