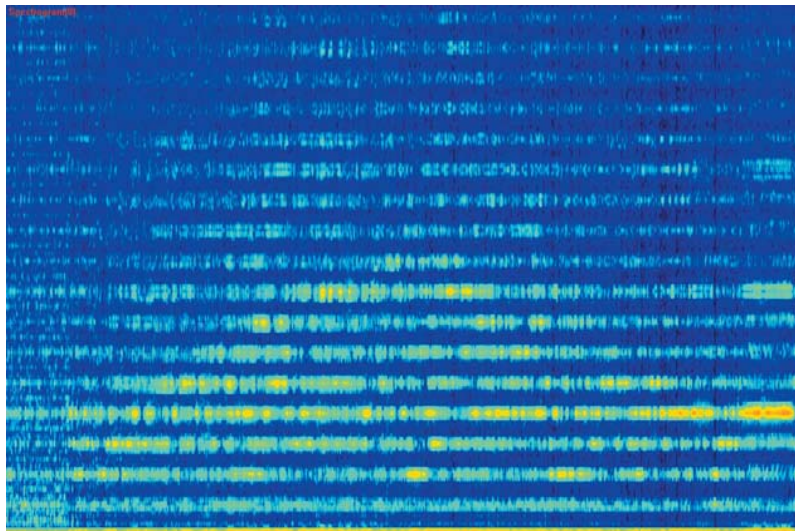


Jaana Utriainen

A Gestalt Music Analysis

Philosophical Theory, Method, and Analysis
of Iegor Reznikoff's Compositions



JYVÄSKYLÄ STUDIES IN HUMANITIES 39

Jaana Utriainen

A Gestalt Music Analysis

Philosophical Theory, Method, and Analysis
of Iegor Reznikoff's Compositions

Esitetään Jyväskylän yliopiston humanistisen tiedekunnan suostumuksella
julkisesti tarkastettavaksi yliopiston vanhassa juhlasalissa (S212)
elokuun 12. päivänä 2005 kello 12.

Academic dissertation to be publicly discussed, by permission of
the Faculty of Humanities of the University of Jyväskylä,
in Auditorium S212, on August 12, 2005 at 12 o'clock noon.



UNIVERSITY OF JYVÄSKYLÄ

JYVÄSKYLÄ 2005

A Gestalt Music Analysis

Philosophical Theory, Method, and Analysis
of Iegor Reznikoff's Compositions

JYVÄSKYLÄ STUDIES IN HUMANITIES 39

Jaana Utriainen

A Gestalt Music Analysis

Philosophical Theory, Method, and Analysis
of Iegor Reznikoff's Compositions



UNIVERSITY OF JYVÄSKYLÄ

JYVÄSKYLÄ 2005

Editors

Matti Vainio, Department of Music, University of Jyväskylä

Pekka Olsbo, Marja-Leena Tynkkynen

Publishing Unit, University Library of Jyväskylä

Jyväskylä Studies in Humanities

Editorial Board

Heikki Hanka, Department of Art and Culture Studies, University of Jyväskylä

Toivo Nygård, Department of History and Ethnology, University of Jyväskylä

Ahti Jääntti, Department of Languages, University of Jyväskylä

Matti Vainio, Department of Music, University of Jyväskylä

Minna-Riitta Luukka, Centre for Applied Language Studies, University of Jyväskylä

Raimo Salokangas, Department of Communication, University of Jyväskylä

Cover picture: The acoustical representation of the "bird's voices" in *Liturgie fondamentale* (1:41.09-2:00, 1500 Hz).

URN:ISBN:9513921816

ISBN 951-39-2181-6 (PDF)

ISSN 1459-4331

ISBN 951-39-2143-3 (nid.)

ISSN 1459-4323

Copyright © 2005, by University of Jyväskylä

Jyväskylä University Printing House, Jyväskylä 2005

ABSTRACT

Utriainen, Jaana

A Gestalt Music Analysis. Philosophical Theory, Method, and Analysis of Iegor Reznikoff's Composition

Jyväskylä: University of Jyväskylä, 2005, 222 p.

(Jyväskylä Studies in Humanities

ISSN 1459-4331; 39)

ISBN 951-39-2181-6

Diss.

The aim of this study is to develop a Gestalt Music Analysis (GMA) theory and method that belongs to the field of cognitive musicology, music philosophy, and aesthetics. The GMA consists of three parts: theoretical, methodological, and music-analytical. I theorize analytic frames, and introduced a method by which the Gestalt of a composer's music can be analysed and interpreted in the context of a philosophy of (musical) mind. Another aim of the study is to investigate the claim that a musical Gestalt is a representation of the composer's inner creative process, and that said process can be analysed with the GMA. The results of the study revealed the composer's inner creative Gestalt as a formulaic circular process, as emotional formulas of micro-structural findings, and as performance. The study also reveals the Gestalt quality of music as the "third dimension" of composition.

The music is analyzed according to Gestalt philosophical theories, this is to say, theories of the conscious (musical) mind and phenomenology. Original Gestalt theory is derived from Austrian philosopher Christian von Ehrenfels's essay, "Über Gestaltqualitäten" (1890), which sheds light on this entire study. Prof. Jukka Louhivuori's formula theory of development and Prof. Marc Leman's representation theory are the basic modern Gestalt theories used in the analysis. I developed and adapted these theories in analyzing compositions of the French chanter and composer, Professor Iegor Reznikoff. Therefore, both voice-analysis theory and spectral analysis play an important role in the GMA.

The study has revealed that the method and theory were functional, providing answers to crucial questions. Formula analysis and its various parameters have revealed that creativity was based on unexpected formula Fe and the unconscious formula Ff, and their relations to the whole. The formula circle represents inner creative processes with content formulas that form a circular movement. The inner impulse x, or creative formula paradigm, was found from the frequency level of around 83 Hz (E) with a looping phenomenon, and was also hypothesized as a genetic formula at the micro-structural level.

The *Jubilus* formula was the main manifestation of the inner creative Gestalt of Iegor Reznikoff, and it may represent his individual, audible, or visual experience of God or the sacral. The agent of the Gestalt was commonly the melismatic formula Fa with the vowel / a /, and the pre-Gestalt was mainly found from the formula content levels of Fc, Fd, or Fe with their movements toward formula Fa. Performance analysis bolstered results by examining the tension Gestalt in performance formulas. The Gestalt quality, or third dimension of the music, was found in individual consciousness with a meaningful moment between two forms. As a result of collective consciousness, the Gestalt quality was revealed by "inside" and "outside" experiments of the compositions, which we may say refer to the human being, Gestalt, or God.

From the present study we can conclude that all musical components of the analysis express the philosophical-aesthetic Gestalt phenomenon of musical dualism: high and low voices, upwards and downwards, mental and physical, mind and body, spirit and earth, as well as God and the mundane.

Key words: Cognitive Musicology, Gestalt Theory, Music Philosophy and Aesthetics, Voice Analysis, Iegor Reznikoff

Author's address Jaana Utriainen
University of Jyväskylä, Finland

Supervisor Prof. Jukka Louhivuori
Department of Musicology
University of Jyväskylä, Finland

Reviewers Prof. Mauri Kaipainen
Tallinn University, Estonia

Prof. Ilkka Taitto
Sibelius-Academy, Finland

Opponent Prof. Mauri Kaipainen
Tallinn University, Estonia

FOREWORD

A meaningful moment in my studies led me to Gestalt music analysis about five years ago. The problem of finding scientific answers with the method and theory in turn led me to cognitive musicology, music philosophy and aesthetics, as well as computer music analysis. When attending heard a lecture about Western musical history, a meaningful clause seemed to leap out at me: "there are few musicians that do not shout to be heard in this world". This seeming trivial incident brought me to the world of Igor Reznikoff's music of quiet yet powerful voices. Finally, the spectral representation of "invisible" music affected me so greatly that it resulted in this dissertation as somehow being essential to my development as a musicologist. Between those moments and the present study, I have written on Gestalt analysis in several essays, studies, seminars, papers, and theoretical and methodological outlines, in addition to doing fieldwork on the harmonic chanting of Reznikoff and participating in the recording of a CD of his chants. My being an art teacher and constantly interacting with creative persons spurred me to look deep into the mystery of the power of human creativity in music, and in art generally.

Many people receive my warmest greetings. Firstly, I express my gratitude to Professor Jukka Louhivuori in the Department of Musicology at Jyväskylä University. With his scientific support this book came real. I owe my thanks also to my supervisor Alfonso Padilla in the Department of Musicology at Helsinki University, for his guidance to find scientific answers to my musicological questions. Prof. Ilkka Niiniluoto, in the field of theoretical philosophy, helped me to clarify my views of Gestalt philosophy. Cognitive musicologists, Prof. Marc Leman and Prof. Louhivuori, inspired me to generate my own view of Gestalt music analysis. Sakari Lukkarinen gave me a proper analytic tool and advice in the field of spectral analysis. Pauli Laine receives my warmest thanks for to his willingness to discuss, read, and comment my texts and thoughts. Cognitive musicology revealed to me the limits of scientific functioning, and convinced me that the best future research will involve cooperation among several fields in the explication of music.

To Igor Reznikoff I give flowers, for discussing his music and my research aims. Also, his chanting groups and friends receive my gratitude for their cooperation in this study, and my thanks also to Aija-Leena Ranta who helped me make modern notations of Gallican chant. I give my warmest thanks also to my friends, who participated in various experiments and encouraged me in my studies. Thanks also to Martine Vornanen who helped me in the French translations, as well as Richard Littlefield, for his revisions of the English manuscript. I wish to thank Helsinki University, for making available its many resources and economic support. I owe thanks to Painokotka and Ari Halinen who helped me in the typesetting of the manuscript, as well as thanks to Matti Mäkelä for his graphic design. The research foundations of Kotka receive my thanks, as well, for their support of the present study.

There have been many uphill battles as an adult post-graduate student during the dissertation process. An Asian philosophical view, concerning Japanese Gestalt music analysis, gave me inner strength. For example (anonymous): "writing is like a water in the river, it begins somewhere, and ends somewhere in due form and due time". This is like the research process: when a question arises, you must study it. And when you have the answers, they "write themselves".

Finally and foremost my family - Pertti, Julia, Joonas and Julius - receive my most loving thanks. With their support this project became real. Also my parents, especially my beloved father, receive my heartfelt thanks. My hope is to grow ever upward in the shadow his musical dignity. Finally, I send my respectful thanks to Dr. Eero Rechartt, for our stimulating discussions of the origin of the creative source, its power, and its vital capacity to express human life through art.

In Kotka
March 1, 2004
Jaana Utriainen

FIGURES

FIGURE 1	Model of the GMA.	22
FIGURE 2	(a) Composer's creation of the musical Gestalt around impulse x; (b) author's analysis to find the musical agent x of the Gestalt from the musical unity.	25
FIGURE 3	Mental Realm and Physical Realm, in which mind is a representation of mental world, and brain is a representation of the physical world (Guttenplan 2001: 88).	29
FIGURE 4	Schematization of Theory II (Jackendoff 1989: 24).	31
FIGURE 5	Map of Mind, in which the relationship of features are shown among experiences (consciousness), attitudinizing (attitudes), and action (actions) (Guttenplan 2001: 24)	32
FIGURE 6	Time representation according to the Multiple Drafts model (Dennett 1993: 136).	34
FIGURE 7	The Kinds of Self (core self and autobiographical self) which correspond to two kinds of consciousness (core consciousness and extended consciousness) (Damasio 2000: 199).	36
FIGURE 8	The Levels of Life Regulation, with Damasio's categorization of three emotional states: Primary emotions, Secondary emotions, and Background emotions (Damasio 2000: 55).	37
FIGURE 9	Schools and Influences in the Gestalt Tradition (Smith 1988: 229). ..	39
FIGURE 10	Temporal and non-temporal Gestalt qualities according to von Ehrenfels (author's summary of the theory).	41
FIGURE 11	Symbolic representation of a musical note. A note represents an abstract tone with defined duration and height. Other parameters, such as loudness and articulation, can be added as well. a) note as a sign in a traditional score; b) note as described in Adagio: "P57" is the la in the fourth octave, "u200" stands for a duration of 200 hundreds of a second, "190" stands for a loudness of 90/127 and "n200" stands for the next note at 200 hundreds of a second. c) note as described by a structure that in the Prolog syntax would read: "pitch_event (1 pitch (1,4), duration (q), loudness (mf))." (Leman 1993: 125.)	43
FIGURE 12	Acoustical representation: Waveform of a Shepard tone (Leman 1993: 127).	44
FIGURE 13	The singer creates the melody from traditional formulas, and the performer may select different formulas to use in different performances (Louhivuori 1988: 50).	47
FIGURE 14	Formula store A and B according to Louhivuori (1988: 54).	48
FIGURE 15	Schematic representation of the voice organ (Sundberg 1987: 7).	49
FIGURE 16	Vocal classifications in some languages (Wiik 1998: 59).	50
FIGURE 17	Vocal tract profiles for the vowels / a, e, i, o, u / (Sundberg 1987: 21).	50
FIGURE 18	Phonation frequency curves of the voices of three actors who pronounced the same sentence in the indicated modes. Phonation frequency descends slowly in sorrow and exhibits rather wild jumps in the more excited emotional modes (Sundberg 1987: 149).	51

FIGURE 19	Spectrogram of vowels / i, u, a / (Rossing 1990: 351).	53
FIGURE 20	Spectrum of vowel sound / a / (Rossing 1990: 351).	53
FIGURE 21	Time-domain view: Amplitude modulated signal (Roads 1999: 223)	54
FIGURE 22	A sine and cosine waveform (Roads 1999: 18).	54
FIGURE 23	Cheironomy signs, and neumes in the chant <i>Alleluia: l'Esprit souffle</i> (Reznikoff 2002).	56
FIGURE 24	A layered conceptual framework (Camurri <i>et al.</i> 2001).	57
FIGURE 25	Segmentation model of emotional space in performance	58
FIGURE 26	The GMA model.	60
FIGURE 27	Author's sketch of symbolic, acoustical, and sub-symbolic representation in the GMA.	61
FIGURE 28	Reznikoff, <i>Alleluia: l'Esprit souffle</i> . Different representations of the syllable / l'E /: (a) the syllable symbolically represented with "staff notation"; (b) the syllable as acoustical representation (part of the sound spectrum); (c) sub-symbolic, linguistic fragments of the syllable.	61
FIGURE 29	Basic model of the GMA.	62
FIGURE 30	Words of the chant <i>Alleluia: l'Esprit souffle</i>	63
FIGURE 31	Sound spectrum (acoustical representation) of the <i>Alleluia</i> formula (0:01 - 0:06, 5000 Hz).	65
FIGURE 32	Structural schema of the formula analysis of <i>Alleluia: l'Esprit souffle</i>	65
FIGURE 33	Acoustical formula analysis parameters in the sound spectrum of <i>Alleluia: l'Esprit soufflé</i> . Time is represented in the sound spectrum on the x-axis, and frequency on the y-axis. The time-domain amplitude is represented with the symbol z. ..	66
FIGURE 34	Melodic formula: Fundamental frequency (fs0) and its first overtone.	68
FIGURE 35	Variation ratio of the fs0 across the whole sound spectrum according to fundamental frequency movements across the sound spectrum.	68
FIGURE 36	Harmonic formula A1:a1 in which the fundamental fs0 generates overtones or partials with harmonic relations to the fs0 in <i>Alleluia: l'Esprit souffle</i>	69
FIGURE 37	Rhythmic (time-unit) formula structure in forms A ¹ and A ² in <i>Alleluia: l'Esprit souffle</i>	70
FIGURE 38	A rhythmic formula and its paradigmatic structure in the formula A ¹ :a ¹	70
FIGURE 39	Sound spectrum of the melismatic alleluia formula Fa (A1:a1) in <i>Alleluia: l'Esprit souffle</i> (0:27-0:42, 5000 Hz).	71
FIGURE 40	Sound spectrum of the neumatic formula Fb (A:a ¹), "Reine de Misericorde", <i>Salve</i> (0:06 - 0:12.6, 5000 Hz).	72
FIGURE 41	Sound spectrum of the syllable formula Fc (C ² :c ¹), "Et tu entends sa voix", <i>Alleluia: l'Esprit souffle</i> (1:56.4 - 2:07.6, 5000 Hz). ..	72
FIGURE 42	Sound spectrum of the mixed formula Fd (C ¹ :c ³), "niu", <i>Alleluia: l'Esprit souffle</i> (1:10 - 1:13, 5000 Hz).	73

FIGURE 43	Sound spectrum of the unexpected formula Fe ($B^2:b^3$), “Nous et ne”, <i>Une lumière a resplendi</i> (1:55 - 2:02, 5000 Hz).	73
FIGURE 44	Sound spectrum of the vowel / ou / of the unconscious formula Ff ($A:a^1$), <i>Liturgie Fondamentale</i> (1:42 - 1:58, 5000 Hz).	74
FIGURE 45	Formula content schema with content center (x).	74
FIGURE 46	Formula content schema with content patterns.	74
FIGURE 47	Formula levels of consciousness (unconscious, conscious, superconscious), types of self (proto self, core self, autobiographical self), and musical content.	75
FIGURE 48	Temporal formula circles: (a) content-centre formula circle, in which the symbol (x) in a circle designates conscious formula levels of the (musical) mind; (b) pattern formula circle, in which the formula pattern in the circle represents conscious formula levels of the (musical) mind.	76
FIGURE 49	Non-temporal formula circles: (a) circulation formula circle, in which one formula is illustrated with a whole circle on its conscious formula level; (b) stable-point formula circle, in which one formula represents a stable point in the formula circle. ...	77
FIGURE 50	Formula circles classified according to their formula content: (a) super-conscious formula circle; (b) conscious formula circle; (c) unconscious formula circle.	78
FIGURE 51	Formula relations: (a) stable, (b) increasing, (c) decreasing.	79
FIGURE 52	<i>Alleluia: l'Esprit souffle</i> : (a) form relations between A^2 and B^1 ; (b) formula relations between $A^1:a^1-a^2$; (c) paradigmatic formula relations between the syllables / le / - / lu / ($A^1: a^1_2:a^1_3$)	79
FIGURE 53	Amplitude representation and relations of the formula paradigms (shown with arrows) in <i>Alleluia: l'Esprit souffle</i>	80
FIGURE 54	Formula content levels and relations in the formula content schema.	80
FIGURE 55	<i>Alleluia: l'Esprit souffle</i> : spectral formula content levels and relations in the formula schema.	81
FIGURE 56	Micro-analytical representation of an hypothesized emotional formula in <i>Alleluia: l'Esprit souffle</i> : (a) sound spectrum (0:56.5 - 0:57.5, 500 Hz); (b) amplitude (0:57 - 0:57.1)	81
FIGURE 57	<i>Alleluia</i> variations in the GMA analysis of <i>Alleluia: l'Esprit souffle</i> : (a) basic formula structure in form A^1 ; (b) variation formula F^v in form A^2	83
FIGURE 58	Hypothesis of the genetic formula that designates micro-structural musical unit, or formula paradigm, that exists in every composition of delimited oeuvre in <i>Alleluia: l'Esprit souffle</i>	85
FIGURE 59	Basic perception process in the GMA.	85
FIGURE 60	The Standard Polarity Profile grid with its dimensions and parameters (Rauhala 1973).	86
FIGURE 61	Basic composition process in the GMA.	87

FIGURE 62	A Temporal Gestalt Process according to the author's illustration: (a) Pre-Gestalt, (b) Gestalt, and (c) Trace Gestalt. B: Non-Temporal Gestalt Process. In A and B: first the Pre-Gestalt exists in the mental field, and we can perceive a strong Prägnanz; thereafter the Pre-Gestalt receives its Gestalt, and in the end the tendency of the Prägnanz formation tapers off, becoming a "Trace Gestalt" that can be observed to fulfilment.	89
FIGURE 63	A composer's creation process in the (musical) mind, in which the core consciousness is situated on the border of the mental and the physical; the core self is situated above the border; and the protoself is situated below the border (the author's figure).	89
FIGURE 64	Model of analysis for comparing the compositions of St Gall (G1) and Reznikoff (G2) so as to reveal the composer's creative Gestalt (CcG).	91
FIGURE 65	Sketch of Reznikoff's composition process, 15 January 2001.	100
FIGURE 66	French transcription of the <i>Alleluia: l'Esprit souffle</i> (Igor Reznikoff 9.4.2002 [sic]).	102
FIGURE 67	Words of the chant <i>Alleluia: l'Esprit souffle</i>	103
FIGURE 68	Words and linguistic formulas (structure) in the <i>Alleluia: l'Esprit souffle</i>	104
FIGURE 69	Sound spectrum of the chant <i>Alleluia: l'Esprit souffle</i> (0:00 - 2:58, 5000 Hz).	105
FIGURE 70	Sound spectrum of the word / niu / in <i>Alleluia: l'Esprit souffle</i> (1:10 - 1:12, 1000 Hz).	106
FIGURE 71	Forms and their linguistic content in <i>Alleluia: l'Esprit souffle</i>	106
FIGURE 72	Formula structure in the chant <i>Alleluia: l'Esprit souffle</i>	107
FIGURE 73	Sound spectrum of syllabic voice structure in the formula C1:c1 "Et tu entends sa voix" in the <i>Alleluia: l'Esprit souffle</i> (0:56.5 - 1:02.5, 5000 Hz).	107
FIGURE 74	Looping progress of forms in <i>Alleluia: l'Esprit souffle</i>	108
FIGURE 75	Rhythmic amplitude structure of forms and formulas in <i>Alleluia: l'Esprit souffle</i>	108
FIGURE 76	Voice movements in the fs0 in <i>Alleluia: l'Esprit souffle</i> (simplified version; see Ch. 3.3.4).	110
FIGURE 77	Variation ratio of the fundamental frequency in <i>Alleluia: l'Esprit souffle</i> (simplified version; see Ch. 3.3.4).	110
FIGURE 78	Neumes and their occurrence in the transcription of the chant <i>Alleluia: l'Esprit souffle</i>	110
FIGURE 79	Some main Gregorian signs and their interpretation (Mocquereau 1989: 146).	111
FIGURE 80	Form A ¹ with fs0 movements in the <i>Alleluia: l'Esprit souffle</i> (0:00 - 0:20:3, 500 Hz); highly simplified.	112
FIGURE 81	Form B ¹ and its fs0 in <i>Alleluia: l'Esprit souffle</i> (0:41 - 0:57, 500 Hz).	112
FIGURE 82	Form C ¹ and its fs0 movements in <i>Alleluia: l'Esprit souffle</i> (highly simplified; 0:57 - 1:25, 500 Hz).	113
FIGURE 83	Harmonic spectra of <i>Alleluia: l'Esprit souffle</i> , formulas A ² :a ¹ , a ² (0:24 - 0:30, 1500 Hz).	114

FIGURE 84	Avs movements in <i>Alleluia: l'Esprit souffle</i> (greatly simplified).	114
FIGURE 85	Formula content of <i>Alleluia: l'Esprit souffle</i>	115
FIGURE 86	Formula content with content center (x) of the chant <i>Alleluia: l'Esprit souffle</i>	115
FIGURE 87	Formula circle of the chant <i>Alleluia: l'Esprit soufflé</i> (see Fig. 48).	115
FIGURE 88	Looping phenomenon in formula relations $B^2:b^2$ (1:50.4 - 1:51, 350 Hz) in <i>Alleluia: l'Esprit souffle</i>	116
FIGURE 89	Sound spectrum of the formula (B1:b1) "l'Esprit" in <i>Alleluia: l'Esprit souffle</i> (0:42 - 0:46, 5000 Hz).	118
FIGURE 90	Formula paradigm / l'E / $B^2:b^1$ (0:42 - 0:44, 300 Hz).	118
FIGURE 91	Sound spectrum of the formula $A^1:a^1$ with the basic vowel / a / (0:38.4 - 0:39.5, 400 Hz) with microstructural amplitude... ..	119
FIGURE 92	Sound spectrum of the formula $A^1:F^v$, and variations in the voice of the vowel / a / (0:30.3 - 0:31.4, 400 Hz) with micro-structural amplitude.	119
FIGURE 93	Transcription of the chant <i>Tuuli puhalttaa</i> (Igor Reznikoff 2001).	120
FIGURE 94	Composer and chanter, Igor Reznikoff.	120
FIGURE 95	"Tuuli" formula of the chant <i>Tuuli puhalttaa</i>	121
FIGURE 96	"Puhalttaa" formula of the chant <i>Tuuli puhalttaa</i>	121
FIGURE 97	"Missä tahtoo" formula of the chant <i>Tuuli puhalttaa</i>	122
FIGURE 98	"Ja sinä kuulet sen humanan" formula of the chant <i>Tuuli puhalttaa</i>	122
FIGURE 99	"Mutta et tiedä mistä se tulee ja minne se menee" formula of the chant <i>Tuuli puhalttaa</i>	122
FIGURE 100	The <i>refrain</i> formulas "alleluia" of the chant <i>Tuuli puhalttaa</i>	123
FIGURE 101	The <i>jubilus</i> formula "a — —, a — — a" of the chant <i>Tuuli puhalttaa</i>	123
FIGURE 102	Main movements in the performance of <i>Tuuli puhalttaa</i> adapted to Camurri's segmentation model of emotional space (Fig. 25).	124
FIGURE 103	Nouns of the PGA1, <i>Alleluia: l'Esprit souffle</i>	126
FIGURE 104	Standard Polarity Profile of the composition <i>Alleluia:</i> <i>l'Esprit souffle</i>	127
FIGURE 105	Nouns in the CGA1 <i>Alleluia: l'Esprit souffle</i>	127
FIGURE 106	Words of the <i>Salve</i> , in French and English.	129
FIGURE 107	Sound spectrum of the chant <i>Salve</i> (0:00 - 2:14, 5000 Hz).	130
FIGURE 108	Sound spectrum of the syllables / mi-sé-ri / in the chant <i>Salve</i> (1:01.5 - 1:03.5, 400 Hz).	131
FIGURE 109	Sound spectrum of the phrase "Salut !" in the chant <i>Salve</i> (0:19.65 - 0:22.95, 400 Hz).	131
FIGURE 110	Sound spectrum of the phrase "Et Jésus le fruit de" in the chant <i>Salve</i> (1:07 - 1:12, 300 Hz).	132
FIGURE 111	Progress of forms A and B, and formula content in the <i>Salve</i>	132
FIGURE 112	Rhythmic time-unit structure of formulas in the <i>Salve</i> represented with amplitude.	133
FIGURE 113	Sound spectrum of voice movements in the fs0 in <i>Salve</i> (simplified example).	133
FIGURE 114	Variation ratio of fs0 movements in <i>Salve</i> (strongly simplified).	134
FIGURE 115	Formula $A:a^8$ "O clémente" on the sound spectrum (1:24 - 1:27.20, 600 Hz).	134

FIGURE 116	Formula a ⁶ “Et Jesus” on the sound spectrum (1:07.44 - 1:10.33, 300 Hz).	135
FIGURE 117	Harmonic (avs) movements in the chant <i>Salve</i> (simplified illustration).	136
FIGURE 118	Sound spectrum of the “harmonic gap” in the <i>Salve</i> (0:50-1:22, 2000 Hz).	136
FIGURE 119	Formula content of the chant <i>Salve</i>	136
FIGURE 120	Formula-content schema with content center (x) of the chant <i>Salve</i>	137
FIGURE 121	Formula circle of the chant <i>Salve</i>	137
FIGURE 122	Sound spectrum of “miséri” with nasalized vowel / i / in the chant <i>Salve</i> (1:02.50 - 1:02.75, 400 Hz).	138
FIGURE 123	Amplitude representation of the formula “Notre vie” and its vowel / i / in the chant <i>Salve</i> (0:14.235-0:14.364).	138
FIGURE 124	Sound spectrum of the words “le fruit de” in the <i>Salve</i> (1:10.5-1:11.4, 300 Hz).	139
FIGURE 125	Mixed formula A:a ⁵ ₁ with vibrato in the sound spectrum of the <i>Salve</i> (0:51.29-0:55.30, 350 Hz).	140
FIGURE 126	Echo phenomenon between formulas A:a ⁵ ₁ and A:a ⁶ in the chant <i>Salve</i> (1:06.38-1:07.7, 350 Hz).	140
FIGURE 127	Amplitude of melismatic vowels in the <i>Salve</i> formula B:b ¹ : (1) / a-a-a / (1:46.5-1:47.5); (2) / e-e-e / (1:52.1-1:53.1).	141
FIGURE 128	Nouns as representation of individual consciousness in <i>Salve</i> . .	142
FIGURE 129	Standard Polarity Profile of the composition <i>Salve</i>	142
FIGURE 130	Nouns as a representation of CGA2 in <i>Salve</i>	143
FIGURE 131	Latin and French words of <i>Une lumière a Resplendi</i> , with English translation.	145
FIGURE 132	Sound spectrum of the chant <i>Une lumière a resplendi</i> (0:00 - 3:49, 5000 Hz).	146
FIGURE 133	Sound spectrum of the word “nous” (1:55 - 2:01.5, 5000 Hz) in <i>Une lumière a resplendi</i>	146
FIGURE 134	Sound spectrum of the words “et deus” in <i>Une lumière a resplendi</i> (0:25 - 0:28.7, 3000 Hz).	147
FIGURE 135	Formula structure in the chant <i>Une lumière a resplendi</i>	148
FIGURE 136	Progression of linguistic forms in the chant <i>Une lumière a resplendi</i>	148
FIGURE 137	Amplitude representation of rhythmic time-unit formula structure in <i>Une lumière a resplendi</i>	148
FIGURE 138	Sound spectrum of voice movements in the fs0 of <i>Une lumière a resplendi</i> (example greatly simplified).	149
FIGURE 139	Variation ratio of the fundamental frequency in <i>Une lumière a resplendi</i> (strongly simplified).	150
FIGURE 140	<i>Une lumière a resplendi</i> : sound spectra of (a) highest fs0 level B2:b3 (1:55 – 1:57, 660 Hz); and (b) lowest fs0 level D:d2 – d3 (2:29.5 – 2:30.5, 460 Hz).	150
FIGURE 141	Harmonic avs movements in the formula D:d ¹ “Le Régne”, in <i>Une lumière a resplendi</i> (2:14.76-2:20; 4000 Hz).	151
FIGURE 142	Main avs movements in <i>Une lumière a resplendi</i> (strongly simplified).	151

FIGURE 143	Formula content structure of the composition <i>Une lumière a resplendi</i>	151
FIGURE 144	Formula content schema with content center (x) of the composition, <i>Une lumière a resplendi</i>	152
FIGURE 145	Formula circle of the composition <i>Une lumière a resplendi</i>	152
FIGURE 146	<i>Une lumière a resplendi</i> : sound spectrum of the syllable / (d)e / and its melismatic vowel / e / in the Fe formula A:a ² ₁ (0:26.0-0:27.2, 600 Hz).	153
FIGURE 147	<i>Une lumière a resplendi</i> : sound spectrum of the Fe formula B ² :b ³ and its vowel / o / (1:55.30-1:56.50; 600 Hz).	154
FIGURE 148	<i>Une lumière a resplendi</i> : sound spectrum of the formula D:d ¹ and its syllables / le - rég / (2:14.9-2:15.5, 500 Hz).	154
FIGURE 149	<i>Une lumière a resplendi</i> : sound spectrum of the formula D: d ³ , and its syllable / nom / (2:34.4-2:36, 500 Hz).	155
FIGURE 150	Amplitude representation of the vowel / o / (FE) in <i>Une lumière a resplendi</i>	155
FIGURE 151	Nouns as representation of individual consciousness in PGA3, <i>Une lumière a resplendi</i>	156
FIGURE 152	Polarity profile of the composition <i>Une lumière a resplendi</i>	156
FIGURE 153	Nouns as representation of the composer's creation in CGA3.	157
FIGURE 154	Words of the chant Liturgie fondamentale in French and Latin, with English translation.	159
FIGURE 155	Sound spectrum of the chant <i>Grand Magnificat</i> : <i>Liturgie fondamentale</i> (0:00 - 31:03, 5000 Hz).	160
FIGURE 156	Fundamental frequency ascending in micro-intervals, first section of <i>Liturgie fondamentale</i> (3:10 - 5:50, 1000 Hz).	161
FIGURE 157	Macro-structure for creating overtone formulas (birds' voices) in <i>Liturgie fondamentale</i> (1:41:09 - 2:00, 1500 Hz).	161
FIGURE 158	Melismatic chanting on the vowel / a / in the <i>Liturgie fondamentale</i> (11:34.33 - 11:43.50, 1500 Hz).	162
FIGURE 159	Voice intensity with transition of the vowel / u / in <i>Liturgie</i> <i>fondamentale</i> (18:11 - 18:39, 1500 Hz).	162
FIGURE 160	Voice pattern of ten formula paradigms on "Alleluia-aa-aa-aa" (28:46 - 29:49, 1500 Hz) in the <i>Liturgie fondamentale</i>	163
FIGURE 161	Microinterval structure with the vowel / u / in the <i>Liturgie fondamentale</i> (3:11 - 3:28, 350 Hz).	164
FIGURE 162	Tension formula / ai / in the <i>Liturgie fondamentale</i> (26:52 - 27:01, 2000 Hz).	165
FIGURE 163	Birds' voices with the nasalized vowels / a i / in <i>Liturgie fondamentale</i> (26:56- 26:60, 600Hz).	166
FIGURE 164	Forms and their linguistic content in <i>Liturgie fondamentale</i>	166
FIGURE 165	Formula structure in <i>Liturgie fondamentale</i>	167
FIGURE 166	Linguistic progress of the forms in the <i>Liturgie fondamentale</i>	167
FIGURE 167	Voice in the "silence" (echo sound) in the <i>Liturgie fondamentale</i> , near or below the sense of hearing frequency 20 Hz (12.28 - 12:41, 500 Hz).	168
FIGURE 168	<i>Liturgie fondamentale</i> : rhythmic time-unit formulas represented as amplitude	168

FIGURE 169	Spectral representation of voice movements in the fundamental frequency in <i>Liturgie fondamentale</i> (500 Hz; simplified diagram).	169
FIGURE 170	Variation ratio of the fundamental frequency in <i>Liturgie fondamentale</i> (strongly simplified).	170
FIGURE 171	Formula in form C with four paradigmatic patterns of / u / in <i>Liturgie fondamentale</i> (18:14 - 18:35, 3000 Hz).	170
FIGURE 172	Main avs-level movements in the chant <i>Liturgie fondamentale</i> (diagram simplified).	171
FIGURE 173	Formula content of the <i>Liturgie fondamentale</i>	171
FIGURE 174	Schema of the formula content, with content center (x), of the <i>Liturgie fondamentale</i>	172
FIGURE 175	Formula circle of the <i>Liturgie fondamentale</i>	172
FIGURE 176	Looping phenomena in the <i>Liturgie fondamentale</i> (14:00.5 - 14:01.5, 300 Hz).	173
FIGURE 177	Macro-structural echo between formula relations in the <i>Liturgie fondamentale</i> (12:30 - 12:39, 500 Hz).	174
FIGURE 178	Micro-structural echo (seen but not heard) between formula relations in <i>Liturgie fondamentale</i> (12:34.9 - 12:35.0, 150 Hz).	174
FIGURE 179	The vocalisation / ou / on the border of the sense of hearing (21.4 Hz) in the chant <i>Liturgie fondamentale</i> (0:32.41 - 0:32.56, 80 Hz).	175
FIGURE 180	<i>Liturgie fondamentale</i> (2:13.25 - 2:13.29): amplitude of birds' voices in Reznikoff's overtone singing.	175
FIGURE 181	Overtone voices (birds) in the sound spectrum in <i>Liturgie fondamentale</i> (1:48.67 - 1:48.84, 2000 Hz).	176
FIGURE 182	<i>Liturgie fondamentale</i> (1:48.44 - 1:49.43, 300 Hz): fundamental frequency with resonance, which produces two overtones.	176
FIGURE 183	Single transitio of the voice / u / - / o i y i / in the <i>Liturgie fondamentale</i> (5:54 - 6:02, 1000 Hz).	177
FIGURE 184	Amplitude of the single transitio of the voice / u - oi / in the <i>Liturgie fondamentale</i> (5.55- 5:55.1, 1000 Hz).	177
FIGURE 185	Double transitio (transitio 2) of voiced / u / with overtones (9:10 - 9:24, 700 Hz).	178
FIGURE 186	Podium transitio of the voiced / a / a / ai / in the <i>Liturgie fondamentale</i> (26:52 - 27:00, 700 Hz).	179
FIGURE 187	Nouns as representation of individual consciousness in the <i>Liturgie fondamentale</i>	180
FIGURE 188	Standard Polarity profile of the composition <i>Liturgie fondamentale</i>	180
FIGURE 189	Nouns as a representation of CGA4 of the <i>Liturgie fondamentale</i>	181
FIGURE 190	Schema of the High Mass (Grout et al.1996: 36).	182
FIGURE 191	Alleluia schema in the Gregorian tradition (Grout 1996: 47).	183
FIGURE 192	Words of the G1 <i>Alleluia: Dies sanctificatus</i> in Latin and English.	183
FIGURE 193	Words of the G2 <i>Alleluia: l'Esprit souffle</i> , in French and English.	183
FIGURE 194	Modern notation of Alleluia formulas (A1) of G1 (<i>Alleluia. Dies sanctificatus</i>), and G2 (<i>Alleluia. l'Esprit souffle</i>).	184

FIGURE 195	Amplitude representation of Alleluia formulas (A1) in G1 (<i>Alleluia. Dies sanctificatus</i>), and G2 (<i>Alleluia. l'Esprit souffle</i>).	185
FIGURE 196	Formula structure and formula circle of G1 (<i>Alleluia. Dies sanctificatus</i>).	185
FIGURE 197	Formula structure and formula circle of G2 (<i>Alleluia. l'Esprit souffle</i>).	186
FIGURE 198	Sound spectrum of the syllable (di) i---i of the word "dies", notated with quilisma, G1 (<i>Alleluia. Dies sanctificatus</i>) (0:26:27 - 0:27:00, 600 Hz).	187
FIGURE 199	Onset of / A1 / in the sound spectrum of G1 (<i>Alleluia. Dies sanctificatus</i>): formula A1:a1 (0:01.5 - 0:02.7, 600 Hz).	188
FIGURE 200	Onset of / A1 / in the sound spectrum of G2 (<i>Alleluia. l'Esprit souffle</i>): formula A1:a1 (0:01.5 - 0:01.6, 600 Hz).	188
FIGURE 201	The formula content-ratio of all formula units in the compositions, in which Fa is a melismatic formula, Fb is a neumatic formula, Fc is a syllable formula, Fd is a mixed formula, Fe is an unexpected formula, and Ff is a hypothesized unconscious formula (see Ch. 3.3.7).	193
FIGURE 202	The ratio of words, syllables, and prolonged vowels in the four compositions by Reznikoff.	195
FIGURE 203	Alleluia formula pattern (a1, a1, a2, a2(Fv), a3) with variation formula in <i>Alleluia. l'Esprit souffle</i> (0:20 - 0:42, 4000 Hz).	195
FIGURE 204	Amplitude representation of the unexpected formula Fe occurring in the middle of <i>Une Lumière a Resplendi</i> (1:40 - 2:15, 4000 Hz).	197
FIGURE 205	Formula and formula paradigmatic relations in <i>Alleluia. l'Esprit souffle</i> "il vient, ni..." (2:07.42 - 2:09.7, 250 Hz).	199
FIGURE 206	Looping or genetic frequency level of 83 Hz in <i>Alleluia. l'Esprit souffle</i> , (a) formula paradigm C1:c2 (2:08 - 2:08.2, 250 Hz), and (b) formula relation C1:c2-c3 (2:09.0 - 2:09.3, 250 Hz)	199
FIGURE 207	Looping or genetic waves in amplitude / vi / (2:07.98 - 2:08.02). ..	200
FIGURE 208	Genetic formula paradigm / a-a-a / in <i>Alleluia. l'Esprit souffle</i> (0:09.31 - 0:10.4, 225 Hz).	200
FIGURE 209	Hypothesis of Iegor Reznikoff's genetic formula paradigm at the fs0 level of 83 Hz (E).	201
FIGURE 210	The Gestalt process of Iegor Reznikoff's compositions in the alleluia formulas (A: a ¹ , a ² , a ³): a Pre Gestalt, the Gestalt, a trace Gestalt, in <i>Alleluia. l'Esprit souffle</i> (0:00 - 0:20, 1500 Hz). .	204
FIGURE 211	The microstructural x in Iegor Reznikoff's composition / a-a-a / in <i>Alleluia. l'Esprit souffle</i> (0:09.11 - 0:09.40, 230 Hz).	205
FIGURE 212	A meaningful moment in the transition from form A to B, or from the vowel / u / to / a / , in <i>Liturgie fondamentale</i> (0:11.00 - 0:11.05, 1500 Hz).	206

CONTENTS

ABSTRACT
FOREWORD
FIGURES
CONTENTS

1	INTRODUCTION	21
1.1	The Field of Gestalt in Music	22
1.2	Problems in Applying the GMA	24
2	THEORETICAL FRAMES OF GMA.....	27
2.1	Music and the Philosophical Mind	27
2.1.1	Expressing Mind with Music	27
2.1.2	Philosophical Mind	29
2.1.3	Mind and Computational Models	30
2.1.4	The Map of Mind	32
2.1.5	Consciousness and Unconsciousness	32
2.1.6	Explaining the Consciousness	32
2.1.7	The Light of Consciousness.....	34
2.2	Gestalt Theory	37
2.2.1	Gestalt Movements	38
2.2.2	Christian von Ehrenfels: On Gestalt Quality	39
2.3	Music and Representation	41
2.3.1	Theory of Musical Representation	42
2.3.2	Symbolic, Acoustical and Sub-symbolic Representation	42
2.3.2.1	Symbolic Representation	43
2.3.2.2	Acoustical Representation	43
2.3.2.3	Sub-symbolic Representation	44
2.4	Formula Theory	45
2.4.1	Movements in Formula Theory	45
2.4.2	Formula Theory	46
2.5	Voice Analysis	48
2.5.1	Voice Analysis	48
2.5.2	Vowels and Consonants	49
2.5.3	Emotions and Acoustical Voice Analysis	50
2.5.4	Spectrum Analysis	51
2.5.5	Modulation	53
2.5.6	Fourier Analysis.....	54
2.5.7	Amore 5.1	55
2.6	Performance Analysis	55
3	THE GESTALT MUSIC ANALYSIS METHOD	59
3.1	The Representation of Music in the GMA	60
3.2	The Gestalt Music Analysis.....	61
3.2.1	Context Analysis	62
3.2.2	Content Analysis	62
3.2.3	Linguistic Analysis	63

3.3	Formula Analysis	64
3.3.1	Formula Structure	65
3.3.2	Formula Parameters	66
3.3.3	Aural Voice Space	67
3.3.4	Melodic Formula	68
3.3.5	Harmonic Formula	68
3.3.6	Rhythmic Formula	69
3.3.7	Formula Content	70
3.3.8	Formula Levels of Consciousness	75
3.3.9	Formula Circle	76
3.3.10	Formula Circles and Their Unity	72
3.3.11	Formula Relations	78
3.3.12	Formula Structure Relations	78
3.3.12.1	Acoustical Formula Relations	78
3.3.12.2	Amplitude Formula Relations	80
3.3.13	Formula Content Relations	80
3.3.14	Micro Analytical Formulas	81
3.3.15	Formula and Phoneme Store	82
3.3.16	Variation Formula	82
3.3.17	Emotional Formula	83
3.3.18	Genetic Formula	84
3.4	Perception Gestalt Analysis PGA	85
3.4.1	Global and Analytical Listening	85
3.4.2	Global Listening	85
3.4.3	Analytic Listening	87
3.5	Creation Gestalt Analysis CGA	87
3.5.1	Interviews	87
3.5.2	Composition Process Analysis	88
3.5.3	A Model of the Composition Process	89
3.5.4	Performance Analysis	90
3.6	Comparison Gestalt Analysis CcGA	90
3.7	Gestalt Quality	91
4	IEGOR REZNIKOFF	93
4.1	Composer and Chanter Reznikoff	93
4.2	The Musical Decades of Reznikoff	94
4.3	The Philosophy and Aesthetics of Reznikoff's Music	96
4.3.1	Voice and Chanting	98
4.3.2	Compositions	99
5	THE GESTALT MUSIC ANALYSIS	101
5.1	Alleluia. L'Esprit Souffle	102
5.1.1	Context and Content Analysis	102
5.1.2	Linguistic Analysis	103
5.1.3	Voice Analysis	104
5.1.3.1	Vowels, Consonances and Nasal Sounds	105
5.1.3.2	Special Features of the Voice	105
5.1.4	Formula Analysis	106
5.1.4.1	Formula Structure and Linguistic Content	106

5.1.4.2	Rhythmic Formula Analysis	108
5.1.4.3	Melodic Formula Analysis	109
5.1.4.4	Harmonic Formula Analysis	113
5.1.4.5	Formula Content	114
5.1.4.6	Formula Circle, and Levels of Consciousness	115
5.1.4.7	Formula Relations	116
5.1.4.8	Micro-Structural Formula Analysis	117
5.1.4.9	A Performance Analysis	120
5.1.4.10	Descriptions of the Composition	120
5.1.4.11	Movements	123
5.1.4.12	Emotional Space, or Emotional Performance Formula	124
5.1.5	Perception Gestalt Analysis PGA1	125
5.1.5.1	Global Listening: Free Associations	125
5.1.5.2	Global Listening: Standard Polarity Profile	126
5.1.6	Creation Gestalt Analysis CGA1	127
5.2	Salve	128
5.2.1	Context and Content Analysis	128
5.2.2	Linguistic Analysis	129
5.2.3	Voice Analysis	129
5.2.3.1	Vowels, Consonances and Nasal Sounds	130
5.2.3.2	Special Features	130
5.2.4	Formula Analysis	132
5.2.4.1	Formula Structure, and Linguistic Content	132
5.2.4.2	Rhythmic Formula Analysis	132
5.2.4.3	Melodic Formula Analysis	133
5.2.4.4	Harmonic Formula Analysis	135
5.2.4.5	Formula Content	136
5.2.4.6	Formula Circle and Relations	137
5.2.4.7	Micro Structural Formula Analysis	138
5.2.5	Perception Gestalt Analysis PGA2	141
5.2.5.1	Global Listening: Free Associations	141
5.2.5.2	Global Listening: Standard Polarity Profile	142
5.2.6	Creation Gestalt Analysis CGA2	143
5.3	Une Lumière a Resplendi	144
5.3.1	Context and Content Analysis	144
5.3.2	Linguistic Analysis	144
5.3.3	Voice Analysis	145
5.3.3.1	Vowels and Nasal Sounds	146
5.3.3.2	Special Features of the Voice	146
5.3.4	Formula Analysis	147
5.3.4.1	Formula Structure, and Linguistic Content	147
5.3.4.2	Rhythmic Formula Analysis	148
5.3.4.3	Melodic Formula Analysis	149
5.3.4.4	Harmonic Formula Analysis	150
5.3.4.5	Formula Content	151
5.3.4.6	Formula Circle, and Formula Relations	152
5.3.4.7	Micro Structural Formula Analysis	153
5.3.5	Perception Gestalt Analysis PGA3	155

5.3.5.1	Global Listening: Free Associations	155
5.3.5.2	Global Listening: Standard Polarity Profile	156
5.3.6	Creation Gestalt Analysis CGA3	157
5.4	Grand Magnificat. Liturgie Fondamentale	158
5.4.1	Context and Content Analysis	158
5.4.2	Linguistic Analysis	158
5.4.3	Voice Analysis	159
5.4.4	Special Features of the Voice	163
5.4.5	Formula Analysis	166
5.4.5.1	Formula Structure, and Linguistic Content	166
5.4.5.2	Rhythmic Formula Analysis	167
5.4.5.3	Melodic Formula Analysis	169
5.4.5.4	Harmonic Formula Analysis	171
5.4.5.5	Formula Content	171
5.4.5.6	Formula Circle	172
5.4.5.7	Formula Relations	172
5.4.5.8	Relations Between the Formulas	173
5.4.5.9	Micro Structural Formula Analysis	174
5.4.6	Perception Gestalt Analysis PGA4	179
5.4.6.1	Global Listening: Free Associations	179
5.4.6.2	Global Listening: Standard Polarity Profile	180
5.4.7	Creation Gestalt Analysis CGA4	181
5.5	Comparison Gestalt Analysis	182
5.5.1	Context Analysis	182
5.5.2	Content Analysis	184
5.5.3	Macro Analysis	185
5.5.4	Micro Analysis	186
5.5.5	Perception Gestalt Analysis PGA4 and PGA5	189
5.5.6	The Creative Gestalt of Iegor Reznikoff	189
6	SUMMARY OF THE ANALYSIS	190
6.1	Linguistic Analysis	190
6.2	Voice Analysis	191
6.3	Rhythmic, Melodic, and Harmonic Formula	191
6.4	Formula Relations	192
6.5	Formula Content and Formula Circle	193
6.6	Formula and Phoneme Store	194
6.7	The Variation Formula	195
6.8	Emotional Formula	196
6.9	The Genetic Formula	198
7	DISCUSSION	202
7.1	The Creative Gestalt and Gestalt Process	203
7.2	The Gestalt Quality - 3rd Dimension Exist	206
7.2.1	The Meaningful Moment in Individual Consciousness	206
7.2.2	The Meaningful Moment in Collective Consciousness	207
	YHTEENVETO	208
	REFERENCES	211
	APPENDIX	218

He/she who accepts the existence of Gestalt qualities is by no means committed to the view that all distinguishable presentational elements must give rise to yet further qualities.

Christian von Ehrenfels

1 INTRODUCTION

Gestalt¹ Music Analysis (GMA) theory and method are the focus of this dissertation. The GMA consist of three parts: theoretical, methodological, and music analytical. The theoretical and methodological views examine the frames of music analysis, and how music can be analysed and interpreted in the context of a philosophy of (musical) mind. From the music analytical viewpoint, the composer's music is analysed in the context of Gestalt theory, formula theory, and phenomenology of music. Vocal and spectral analysis are also crucial to the GMA.

I sought answers to the **claim** that a musical Gestalt is a representation of composer's inner creative process, and to see if this process can be analyzed with the GMA. The analytic results reveal the composer's inner creative Gestalt, which is a circular formulaic process, an emotional or expressive formula with micro-structural aspects as well as performance formulas. The results of the study also reveal the Gestalt quality of the music, that is, the "third dimension" of the compositions.

My aim was to create a model with which the Gestalt of music and its third dimension can be analysed. The model is mainly based on the composer's and on listeners' phenomenological experiences of music in their conscious minds. The tradition of Latin (Gregorian) chant has a strong effect on the music in this study, therefore the analysis aims to reveal the composer's own creative space within that traditions. I do this by comparing Reznikoff's music to traditional Gregorian music, in this case, that of St Gall. The music analytical part of the method examines the context of the music, and describes the philosophy, aesthetics, and structure of Reznikoff's music², how he composes, performs and chants, as well as how his music can be understood on the macro- and micro-analytical levels as derived by formula analysis.

¹ I have used the German term 'Gestalt' in my study, meaning 'shape', 'figure', or 'form', because the word refers to the Austrian and German Gestalt theoretical frameworks. Ehrenfels used Gestalt in a specific meaning of "A spatial shape or Gestalt and its perception". In sensing the elements and their spatial determinations we are able to apprehend the shape as an additional object (quality, attribute) as if it were side by side with its associated elements (see, e.g., Smith 1988, 14).

² The aim of the study is not primarily to advocate to Iegor Reznikoff's music. On the contrary, to apply his chant compositions to the Gestalt theory related to music, and forming a method with which his music may be analysed and interpreted.

In the GMA these perspectives are combined as in Figure 1.

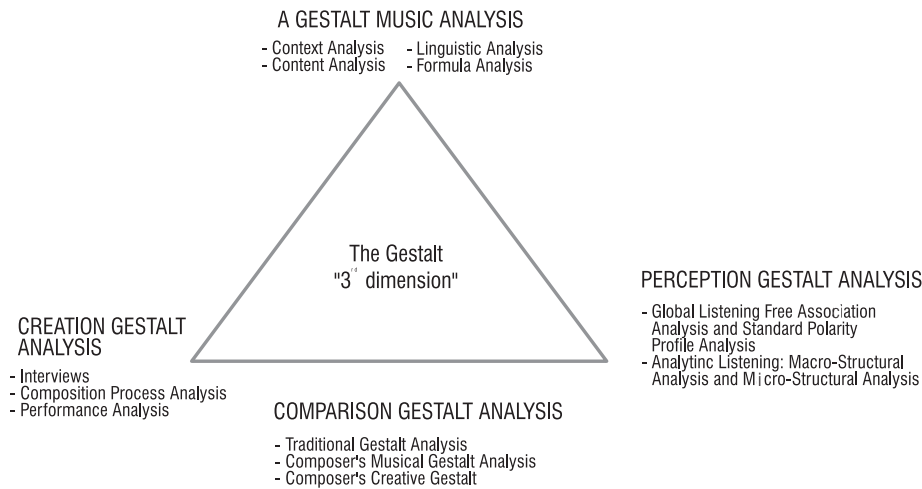


FIGURE 1 Model of the GMA.

Original Gestalt theory is outlined in the Austrian philosopher Christian von Ehrenfels's theory 'Über Gestaltqualitäten' (1890), which is applied in the theoretical part of the research. Musicologist Marc Leman's (1989) representation theory and Jukka Louhivuori's (1988) formula theory exemplify modern theories of Cognitive (Gestalt) music analysis that have contributed greatly to the analytic theory of GMA. I develop and adapt these theories to compositions by the French professor, chanter and composer, Iegor Reznikoff.

Here, the Gestalt Music Analysis is applied to four of Reznikoff's six³ French compositions, drawn from his enormous amount of other works. His music expresses "the style of ancient Christian chants", but also consist of Gregorian features, as well as interpretations of voices and melodies from various musical traditions of the world. His chants are performed in concert, as group chants, and in therapeutic applications in France, Finland, and Russia. In the present study the following compositions are analysed: *Le Chant du Thoronet* 1989 [1979]: *Une lumière a resplendi* (3:49); *Alleluia: l'Esprit souffle* (2:58); *Salve* (2:14); and *Le Chant de Fontenay* 1989: *Liturgie Fondamentale, Grand Magnificat* (31:02).

1.1 The Field of Gestalt in Music

As mentioned above, the present research continues the author's preliminary and graduate studies of Gestalt music analysis and of Reznikoff's music (Utriainen 2000a, 2000b, 2001a, 2001b, 2002b, 2003a). Gestalt music analysis theory draws in many ways on the work of philosopher von Ehrenfels and his original and significant theory of the Gestalt. At the beginning of twentieth century there appeared many different schools of Gestalt in Europe and the USA, for example, the schools of Graz, Berlin,

³ Reznikoff mentioned in an interview (In1) that he had written six compositions in the French language. The author has selected four of these to use for this study. The two other French compositions are as follows (recording durations given in parentheses), both written in 1992: *Le chant de Vézelay. Marie Madeleine: Le vase de parfum* (17:28); *Le chant de Vézelay. Ile Cantate a Ste Marie Madeleine: Marie Madeleine au tombeau* (23:10).

and Florence. The most important researchers and founders in the field of Gestalt included philosophers Edmund Husserl, Carl Stumpf, Alexius Meinong, and Max Wertheimer.

Ehrenfels's theories, while classic, remain inspirational to current musicology; hence the theoretical part of this dissertation devotes a lengthy outline of his main thoughts. In his theory ("Über Gestaltqualitäten") the musical Gestalt is formed from two elements and their relations, which combine to create a third dimension in the perceiver's mind. This relation can exist in this study, for example, between two notes, two formulas, or two phrases, as well as between audible and/or visual perceptions. The Gestalt of music is more than the structural sum of its elements. It is something new and individual in the phenomenal consciousness and in its cognitive process. In this dissertation, the Gestalt quality is interpreted as a result of the composer's creative process and the voiced outcome, as well as its being audibly experienced in the perceivers' consciousness; for example, low voices with high overtones, or unexpected relations between formula paradigms. The theory of Gestalt quality is adapted to Reznikoff's four compositions, and they are analysed from the acoustical and sub-symbolic levels based on Leman's theory of musical representation, as well as on Louhivuori's formula theory.

Marc Leman is a well known musicologist in the field of psychoacoustics and Gestalt analysis, with his wide-ranging research, articles and computer adaptations and programs. His book *Music and Schema Theory* (1995) and other writings shed light on new dimensions of musical representation with his use of the sub-symbolic concept as well as different cognitive representations or schemata; for example, SOM. Leman edited the book *Music, Gestalt and Computing* (1997) and wrote many articles concerning Gestalt phenomena in music and performances. He has also generated music analytical programs (for example, IPeM) for the Gestalt analysis of music.

Jukka Louhivuori is another modern cognitive musicologist, and he too has written many papers concerning Gestalt music analysis, alone and together with Leman and other scholars. He has edited, for example, the book *Kognitiivinen musiikkiteide* (1999), on the movement of Gestalt analysis in music, and his dissertation *Veisuun vaihtoehdot. Musiikillinen distribuutio ja kognitiiviset toiminnot* (1988) went to the development of formula theory.

Leman and Louhivuori number among other developers in Gestalt music analysis and cognitive musicology, for example Antonio Camurri, Albrecht Schneider, Marc Reybrouck and many others. On the forefront of twenty-first century musicology is Leman's view (S1) of future developments in computers and the development of analysis programs, as are his predictions concerning brain research, different kinds of mental mapping, as well as microscopic experimentation. Leman believes (ibid.) that the field of Gestalt or cognitive musicology needs more analytic results, since it is a quite new field of musicology. Jukka Louhivuori (In4) predicts that this century's musicology will focus on the bodily aspect of music analysis as well as on musical culture. He views cross-cultural music cognition as one of the main movements in the future. Consequently, performance analysis will become a main development in the field of Gestalt music analysis, where musicologist Antonio Camurri (2001) and his research partners are already active. In conclusion, let us note the unifying seminar topics of ESCOM (2003) in the field of cognitive musicology, where brain research of music analysis with maps, as well as gesture and movement analysis promise to be the main topics of seminars in the near future.

Gregorian music, according to Ilkka Taitto (In5), are enjoying a positive moment in popular awareness because of the recent outpouring of new recordings of them

and their popularity as “ambient” music. Modern Gregorian chant is more freely interpreted than before. In addition, we observe a movement to preserve nationalistic traditions, and Taitto cites (ibid.) Solesmes as a representative of the main scientific communities that have tried to revive the traditions of the Gregorian tunes of the Middle Ages in as original a way as possible. Performance practice belongs to oral tradition, and interpretations consist of variation with allusions as well as cognitive interpretations. We cannot find one “right” interpretation, therefore we cannot speak of any “absolute” or genuine style of Gregorian chant (In5).

1.2 Problems in Applying the GMA

One problem in the present research is the style of the composer Iegor Reznikoff. His musical style, includes not only ancient Classical chants, but also the features of traditional medieval Gregorian chant, not to mention his very personalized vocal techniques. He seems to promote a sacral and traditional view of Gregorian music; more precisely, he represents the Classical period of musical philosophy and aesthetics to which he has added transcriptions, neumes and traditions of Swiss St Gall, Mongolian throat-singing, as well as Tibetan and Japanese music traditions. According to Taitto (In5), Reznikoff represents “individual interpretation” in his “acoustical voice art”. Thus, the throat-singing with overtone phenomena are acoustical experiences that have no connection to Gregorian traditions. What is clearly Reznikoff’s own creation in his compositions and chanting is therefore problematic, mainly from a methodological view, since the analysis should be able to reveal the composer’s individual and internal musical Gestalt and style.

The conscious (musical) mind presents another problem for analysis. Theories of mind (consciousness) having “right” answers are still under construction, so to speak, and constitute one of the few remaining mysteries in the sciences. In this study I resort to both the earliest and the latest research and writings about consciousness, in which Descartes represents the first philosopher, and Daniel Dennett one of the most modern philosophers in the field of consciousness. Antonio Damasio’s theories, also contemporary, are used to develop my neuroscientific view of consciousness.

One problem in the GMA concerns the interpretation of the phenomenological and computational mind. According to Ray Jackendoff (1989: 21-27), “consciousness cannot compare or analyze, only the computational mind can”; or, “there is no causal connection from the phenomenological mind to the computational”. These statements reveal the critical frames of GMA analysis as regards the problem of interpretation, mainly in the comparison of listeners’ phenomenological experiences of music to the latter’s spectral representation. Hence, one aim of the present study is to *outline a method*, or to discuss how we could analyse and interpret the phenomenal and computational mind in music analysis within the critical frames of the given problem. By this I mean how we may point to certain acoustical formulas as combining with or representing the experience of music. According to the GMA, linguistic fragments (words) are experienced along with the listening process. We may even conclude that the whole affect of a composition is perceived and associated with sentences following the listening perception. In addition, the GMA method stresses the phenomenological, first-person person perspective, in addition to the author’s structural analysis. The focus is not on the psychological analysis of a physical, third-person’s laboratory experience or perception. We may conclude, then, that the setting problem

(phenomenal to acoustical) will be one research subject for future development, on which the present study throws light. We try to avoid possible contradictions in what follows, by taking this methodological or theoretical view into consideration in our analysis and interpretation.

GMA analysis is challenged by the opposing views of creation and analysis. By this I mean that the composer and author have a different perspective on the compositions. The composer creates the whole musical unity around a musical impulse, or creative unit x ; in contrast, the author's aim is to find the x from the musical unity. This problem is illustrated in Figure 2, and discussed in Chapter 7.1.

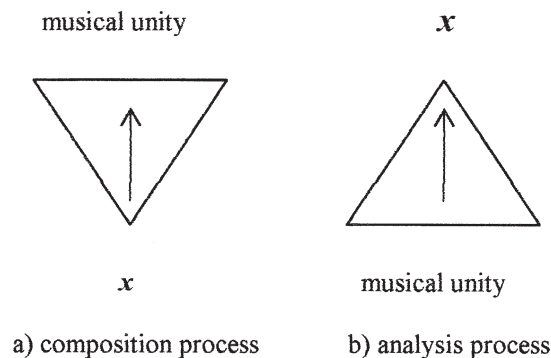


FIGURE 2 (a) Composer's creation of the musical Gestalt around impulse x ; (b) author's analysis to find the musical agent x of the Gestalt from the musical unity.

Finally, the GMA consists of many new, innovative and previously developed parameters, mainly in the concept of formula analysis as combined with spectral data. I have described and explained these parameters with justifications in Chapter Three. For example, take the formula circle and its formula content levels: super-conscious formula level, conscious formula level, and unconscious formula level are justified adaptations of different parameters of theories of mind, Gestalt philosophy, and psychology. The emotional formula in the sound spectrum is derived mainly by adaptations of theories of voice analysis, but other views are discussed, too. The hypothesis of a genetic formula is my own. Consequently, all parameters are adaptations or syntheses of theoretical views.

Chapter Two is theoretical, in which the focus is to describe in historical context the different theories used to solve the music analytical problems in the GMA. I introduce the basic theories and parameters of philosophical mind (Guttenplan 2001 [ed.]) with the concept of computational mind and phenomenal mind (Jackendoff 1989). Daniel Dennett's Multiple draft theory of conscious mind is explained and introduced, as well as Antonio Damasio's view and theory of conscious mind and Gestalt process. A historical view of the philosophy or aesthetics of musical mind is drawn from the work of Carl Dahlhaus (1999).

Also in Chapter Two, I outline Gestalt movements from the twentieth century to the present, and introduce Ehrenfels's detailed theory of Gestalt quality, as well as the notions of high and low levels of Gestalt, and aural and spatial Gestalt. The formation of the Gestalt quality is discussed and introduced in a more detailed and deeper way. Marc Leman's theory of music and representation is described, as is formula analysis theory, along with Jukka Louhivuori's and Hannu Saha's developments of the latter. I discuss vocal analysis theories, Fourier's spectral analysis theory, and Sundberg's voice analysis theory, in addition to the analysis software tool,

Amore 5.1. Chapter Two closes with a description of Antonio Camurri's performance theory with its emotional parameters.

Chapter Three focuses on methodology and analysis parameters in the GMA: the context, content and linguistic analysis, formula analysis, and various formula analysis parameters. I explain and describe the adaptations of the theories introduced in Chapter 2. In Chapter Three I also define and describe the Perception Gestalt Analysis method with global and analytical listening, as well as the Creation Gestalt Analysis method and parameters; this involves interviews, performance analysis, and composition-process analysis. In addition, Comparison Gestalt Analysis is introduced and Gestalt quality analysis is explained.

Chapter Four is descriptive and biographical. The composer Igor Reznikoff is introduced, along with the style and philosophy of his music and voice, and brief description of his composition process. This chapter serves as an introduction to Chapter Five, the content of which is analytic and comparative. In Chapter Five, the GMA theory, method and analysis tools are applied to four French compositions by Reznikoff on the sub-symbolic and acoustical representation levels. One of the compositions is analysed also with symbolic representation. This chapter consists also of the Comparison Gestalt Analysis of Reznikoff's Alleluia and the Alleluia of St Gall. The main results of the analysis are also summarized in Chapter Six.

Chapter Seven consists of a discussion of the results of the research, as compared to its initial aims as regards theory and method. Finally, light is shed on the Gestalt process of the composer and the musical representation of the Gestalt. We end with a discussion of whether it is possible to analyse and interpret the composer's inner musical Gestalt and its process with the GMA in the context of philosophy of musical mind.

2 THEORETICAL FRAMES OF GMA

In this chapter I discuss various theories and theorists whose views contribute to the analytic framework of the GMA to be developed in Chapter 3. What are these theories, why are they important to this project, and how do they affect our analyses?

2.1 Music and the Philosophical Mind

How is a Gestalt created in the conscious mind – and how does it exist in music?

We have an inner sound that affects our lives, consciously or unconsciously. It is an echo from our (musical) experience – a sound from nature, a lullaby, or a cultural phenomenon. How does this sound arise? What does it mean? How does it exist in music?

This chapter responds to these fundamental questions in terms of a theory of mind in musicological and philosophical contexts. The present view of (musical) consciousness and Gestalt is drawn partly from the theory of mind, partly from the world of computers. Musicologist Carl Dahlhaus (1999) lays out aesthetical and philosophical views on the musical Gestalt from a historical perspective. Philosophers Daniel Dennett (1993) and Samuel Guttenplan (2001, ed.), along with music-cognition researcher Ray Jackendoff (1989), contribute to this study in the area of the theory of conscious mind. Antonio Damasio (2000) represents a neuroscientific view of consciousness and its Gestalt process.

2.1.1 Expressing Mind with Music

Part of this chapter is an historical overview of the aesthetics of musical mind. Self-expression through music, such as composing, performing, and listening, is always bound to the style and time of particular musical phenomena, which in this study are those of the classical period and Middle Ages, as viewed from the twentieth century. Carl Dahlhaus (1999) sheds light on musical expression from a philosophical-aesthetic point of view, and Umberto Eco (1986) offers thoughts on music in the Middle Ages.

According to Dahlhaus (1999), music is an aesthetic object of contemplation. Musical sound exists when listeners recall what they have heard and experienced as a totality. Music may be said to create a Gestalt in which sound is condensed into an object that is "opposite us [and has] its own rules and laws". This concept of musical aesthetics is historical, according to Dahlhaus. In the classical period of ancient Greece, the main discussions about music centered on its essence, its relation to the universe and cosmological order, its connections with imitation (mimesis), its impact on human consciousness, and its role in education. Pythagoras, focusing on music and cosmology, considered the beauty of music to be based on unity, on structures, and on ratios among the latter. Plato and Aristotle defined music as a kind of imitation (mimesis), as were all the other arts (Dahlhaus 1999: 1-15). The present study shows that this tradition of musical aesthetics and philosophy frames Iegor Reznikoff's compositions.

In the Middle Ages music and its ratios reflected such intangibles as beauty and musical experience. According to Eco (1986), art was thought of in terms of intuition and feeling, in a culture for which these emotional parameters were fundamental attributes of the mind and, therefore, of the world. Art was seen as an organism, a Gestalt, in an age when nature, too, was conceived as evolutionary, or at least as a *Gestaltung*; that is to say, as exhibiting organic growth and development of forms (Eco 1986: 60-61). St. Augustine understood music as a part of liturgy and as cosmic ratios incarnated in sound. According to Boethius, music was open to rational analysis and could also affect emotions. Reflecting doctrinal views of God, music was classified as tripartite: *musica mundana*, *musica humana*, and *musica instrumentalis* (Dahlhaus 1999). Certain features of medieval music have indirectly influenced Reznikoff's compositions, as will be discussed later.

During the Renaissance period, most study went to the effects of music on emotions and to relations between music and speech. In the sixteenth and seventeenth century, empirical experimentation prevailed in scientific methodology. Mersenne and Descartes used this scientific method to interpret the emotive content of verbal texts combined with musical expression.

In the seventeenth century, metaphysical views came into fashion, and contemplation was considered the way to interpret art and music. The concept of *artistic unity* had both objective and subjective meanings as an aesthetic behaviour or feature of the mind. Unity was necessary for psychological beauty, and as a component of any Gestalt, individual perception always existed within some unity. Music in the seventeenth century was considered as the non-emotive imitation of sounds or voices, or as spiritual, emotional sounds that created a human being. Together, imitation and an aesthetic of emotions were the main ways of interpreting music during that century. "The reality of the highest art was a closed, independent musical work" (Dahlhaus 1980: 10-17). Later, Hegel viewed the inner essence of music as the place in which the Gestalt came into being and resided. The spirit was content, and content was spirit (Dahlhaus 1999: 47). The ways in which music entered into content could be either objective or subjective, according to Dahlhaus (1980). If on the Biblical view music extended to the deepest content of God's objective, all-permeating essence, then in the secular context it went to the subjective core of individual being.

In the eighteenth century musical aesthetics was part of history and tradition. Hence, interest was taken in philosophical reasoning and aesthetic value

judgements. In the nineteenth and twentieth centuries, hermeneutics, symbol theory, phenomenology, existentialism, and analytic philosophy entered into the philosophy and aesthetics of music (Dahlhaus 1999; 1980).

2.1.2 Philosophical Mind

The theory of mind (Guttenplan 2001), at least since Descartes' posing of the mind-body dualism, has been concerned mainly with how the "mental" is related to the "physical". Descartes claimed that in the brain is a little organ, the pineal gland, in which mental states acquire the power to affect physical ones. Such a view has no place in the philosophy of mind, according to Guttenplan (2001), and the pineal gland is to be understood either as mental or as material substance. This material substance adds a third dimension to the dualism, and thus generates a conceptual triangle of the mental, physical, and material. On this view, mind is a representation of the mental world, and brain is a representation of the physical world. Guttenplan argues that mental and physical chains of events only appear to be the result of interaction (2001: 87-90).

In this study, music is understood mainly from the mental view, though much musical phenomena belong to both categories. For example, singing or playing an instrument are mainly physical in nature, but they are also mental, since one is creating or imaging music "in the mind's eye".

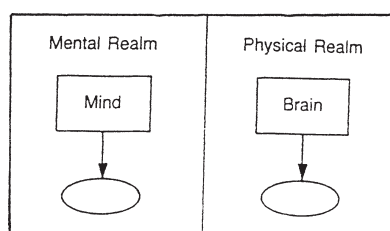


FIGURE 3 Mental Realm and Physical Realm, in which mind is a representation of mental world, and brain is a representation of the physical world (Guttenplan 2001: 88).

Linguistic and pictorial representations are the most prominent symbolic forms in human actions, but gestures, music notation, signs, maps and scale-models are also representational systems that play a role in communication and elsewhere. Representation means, according to Schwartz (2001), "standing for", "being about", and "referring to or denoting" something else. American philosopher C. S. Peirce, in his theory of signs, divides representations into Icons, Indices, and Symbols. Icons are signs that are said to be like or to resemble the things they represent. Indices are signs that are connected to their objects by some causal dependency. Symbols are those signs that are related to their object by virtue of use or association, and they are arbitrary labels. A prevalent view is that the use of Symbols exhibits or indicates the presence of mind and mental states. Schwartz (*ibid.*: 538) refers to Chomsky's view, in which representation characterizes mental states and activities, and to the adoption of computer models of mind. In addition, cognitive processing has prompted discussion about what kinds of representational systems are employed in cognition, and what type of "computer" a cognitive being is (Schwartz 2001: 536-541). Important to the present study are the symbols (words) employed in the act of listening and in associative analysis. Thus, in Chapter 3 I adopt this methodology.

2.1.3 Mind and Computational Models

Cognitive scientists in recent decades have often hypothesized the mind in terms of a computer (e.g., Smolensky 2001), but have done so in different ways. Some view the mind as a neural network, whereas others see it more "naturalistically", as a biological entity; for various approaches to mental representations, see Hautamäki and Saraste (1988: 122-133); Huotilainen and Tervaniemi (2003: 67-81); Janata (2001: 27-42); Kaipainen (1999: 149-169); and Rapoport (1997: 451-467).

Cognitive science has traditionally been based on symbolic computation, which means that a system of rules for manipulating structures is built up of tokens of different symbolic types; today, connectionist computation is increasingly employed. These two means of computation constitute idealized mental and neuronal processes, and form a ground to the mind-body problem. Further, Smolensky (ibid.) wonders how the mind can perform in accord with epistemic constraints, and how abstract mental elements can arise from a physical substrate and interact causally with the physical world. The answers depend on what kind of computer the mind/brain is alleged to be: is it a symbolic computer? a connectionist computer? or a mixture of the two? According to the classical computational theory of mind, mental representations are symbol structures, and mental processes consist in the manipulation of these representations according to symbolic algorithms based on symbolic rules (ibid.: 176-179).

Going somewhat deeper into this problem, Ray Jackendoff (1989) widens the computational and phenomenological view of consciousness, by dividing the conscious mind into *phenomenological mind* and *computational mind*. By "conscious mind" he means conscious awareness, or the experiencing of the world and of our own inner lives; all of us do this, and in a way that is inaccessible to others. By the "computational" notion of mind he means the latter as an information-bearing and information-processing system, in which the mind acts as the locus of understanding, knowledge, reasoning and intelligence. Jackendoff (ibid.) discusses the question raised, for example, by Dawkins (1981: 124-146): "Perhaps consciousness arises when the brain's simulation of the world becomes so complete that it has to include a model of itself..."; and, "could it be valid to suppose that the magic of human consciousness somehow arises from the closing of a loop whereby ... a true representational system perceives its own state in terms of its repertoire of concept[?]" (Jackendoff 1989: 6).

Jackendoff gives three different theoretical models for discussing mental and physical domains and their representation in experience and in the brain. (1) *Epiphenomalism* claims that the mental domain exists independently of the physical world, and that causal relations go only from physical to mental, and not the other way round. The elements of our conscious awareness are causally determined by what goes on in our brains, but cannot themselves have any effect on behavior. (2) *Parallelism theory* views the mental and physical domains as proceeding side by side in a relation of correspondence. This view seems to allow for connections between mental states; though dualistic, this theory resists the positing of absolutely distinct mental and physical domains. By (3) *Identity theory* Jackendoff means the existence of conscious experience, but holds that the distinction between mental and physical events is purely a mode of description. He reduces this to the notion of "mental states" or "experiences", and how those states feel from the inside of the organism that is in those states (ibid. 1989: 3-14).

The GMA consists of a synthesis of Jackendoff's theoretical views of the mind-body problem (described in Chapter 3.5.3). Epiphenomalism, parallelism, and identity theory all play a role in the GMA method.

The computational theory of mind, according to Jackendoff (1989), grows out of the conception of the brain as an information-processing device, analogous to a computer. Jackendoff views this computational mind in the light of his Theories I and II.

In *Theory I* Jackendoff claims that the brain attempts to divide the computational mind into black boxes and to identify some especially important one as the locus of consciousness. This theory hypothesizes, roughly, that the information and/or processing active within this particular black box is conscious, and the rest is unconscious. Thus these parts of the mind are of the same essential character.

In *Theory II* Jackendoff discusses various views of the mind-body problem, and formulates an identity theory in which the phenomenological mind is just a third way of describing the physical domain. This means that conscious experience is what it "feels like" to be a device in the relevant computational states (ibid.: 23). The identity theory might imply that a computer would be conscious if it duplicates the computational states of the human brain. Jackendoff comments, however, that this is more a matter of ideology, and that people come down on different sides as to the possibility of computer consciousness. In Chapter 3, I adapt and hypothesize these views in relation to the GMA.

The main argument of Jackendoff's Theory II taken as a critical position in this study derives from the following claim: "there are no causal connections from the phenomenological mind to the computational" [...] "it is a category error to speak of 'conscious representations' and 'conscious processes' versus 'unconscious representations and processes'", therefore "No representations and processes are conscious - they are in the computational mind, not in the phenomenological mind". Jackendoff adds the following: "the only sense that can be made of this locution is as shorthand for 'representations and processes projected into consciousness' versus 'representations and processes not projected into consciousness ..."; and he continues: "Consciousness cannot compare or analyse; only the computational mind can" (1989: 21-27).

The present study makes use of and further develops Guttenplan's and Jackendoff's insights into both the conscious and unconscious mind, especially those involving computer representation. Following the models of those authors, I employ computer representations of music, such as spectral images, to represent states of consciousness and other aspects of the "computational" mind (the brain imaged as computer).

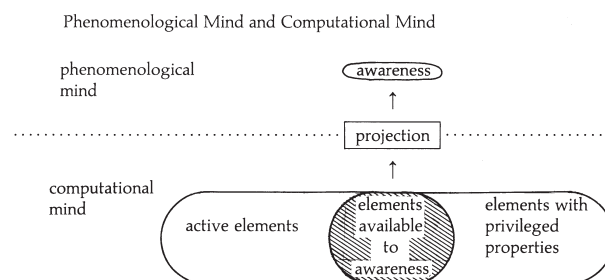


FIGURE 4 Schematization of Theory II (Jackendoff 1989: 24).

2.1.4 The Map of Mind

Mapping the mind, argues Guttenplan (2001), begins with a description of those features of the mind that figure in the landscape we are trying to map, which is in turn based on two views: The mind is knowable from the "inside", but real knowledge of the mind can be studied more objectively from the "outside". These features can create by listening, seeing, or otherwise experiencing. An adequate map must show the relationship among these features. Features are reported by verbs and nouns, and these mental realms are categorized as experiencing (consciousness), attitudinizing (attitudes), and acting (actions). Experience can be a noun or a verb; as a noun it represents the consciousness and "the self". These three features are fixed points or dimensions in the mental landscape, and with them we can produce a sketch of the mind (Guttenplan 2001: 6-29). In the GMA, Guttenplan's views are adapted in the perception (listening) analysis, in which linguistic associations and experiences of the music are put into groups of nouns to represent consciousness. After that, the nouns are compared to the composer's associations and experiments (nouns), as expressed in my interviews with him.

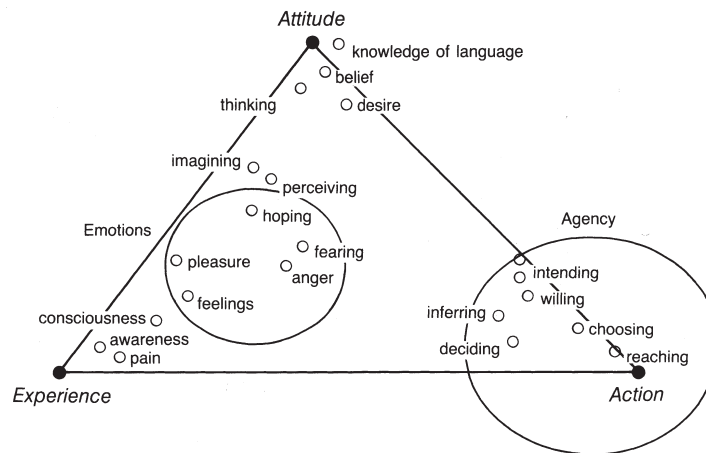


FIGURE 5 Map of the Mind, in which the relationship of features are shown among experiences (consciousness), attitudinizing (attitudes), and action (actions) (Guttenplan 2001: 24).

2.1.5 Consciousness and Unconsciousness

The concept of consciousness, in a phenomenal sense, offers synonyms, examples, and other types of pointing to the phenomenon, as well as subjective experiences and "what it is like to be us" (Block 2001; Hopkins 2001). Phenomenal consciousness can refer to conscious properties or qualities; for example, how things seem to us, the ways things look or sound, and more generally, the experiential properties of sensations, feelings, and perceptual experiences. Mental states and processes, as well as a range of motives, are often unconscious or unaware states of mind, as identified mainly in the field of psychoanalytic theory (Block 2001: 210-219; Hopkins 2001: 598). These concepts are adapted in the GMA in formulas for, say, interpreting the creative process of composing.

2.1.6 Explaining the Consciousness

Daniel Dennett (1993: 58) states that conscious image in the inner world is experienced as follows: "what it feels like to come to understand something: there

you are, encountering something somewhat perplexing or indecipherable or at least as yet unknown – something that in one way or another creates the epistemic itch, when finally receive the feeling ‘Aha! I’ve got it.’. This experience plays into the present study, in as much music generates a unity, or Gestalt, in the listener’s and creator’s conscious mind; and this unity is expressed with symbols, words, signs or notes.

According to Dennett (ibid.), consciousness is created from different phenomena, from physical influences as well as from the evolution and development of mind and brain. He also stresses that "mind" is not a synonym for "brain". The conscious mind is strongly based on biology, and some of its main features are based on cultural factors; therefore consciousness is not a physical event. He also states that conscious thoughts and phenomena are not merely phenomena of the brain. Dennett notes that a self (person, soul) is distinct from a brain or a body, and that it is deeply rooted in our ways of speaking and thinking. Therefore, it is quite natural to agree that "the self and its brain" are two distinct things, with different properties, no matter how much they depend on each other (1993: 28-58).

Phenomenology, according to Dennett (ibid.), is a term covering all the items that inhabit our conscious experience. For him, phenomenologist are "uncontroversial experts on that nature of the things that swim in the stream of consciousness". Kant distinguished the "phenomena" from the "noumena", the latter being things as they are in themselves. As a philosophical movement, Phenomenology grew from the work of Husserl and his theory of introspection, in which the outer world and all its implications and presuppositions were to be "bracketed" in a particular act of mind (epoché) – in pure conscious experience, as *noemata*. A phenom is divided into three parts: (1) experiences of the "external" world, such as sights, sounds, smells, feelings; (2) experiences of the purely "internal" world, such as fantasy images, the inner sights and sounds of daydreaming, of bright ideas; and (3) experiences of emotion or "affect" such as anger, joy, embarrassment, and anxiety. These phenomenal levels appear in the analysis of perception and creation in the present study, in which the music creates all these features in both listeners and composer. In addition, Dennett states that there is no single point in the brain into which all information funnels; that is to say, Cartesian dualism no longer implies a centralized gateway to the brain. Thus, the brain is Headquarters, the place where the ultimate observer is located (Dennett 1993: 44-45; 102-109.)

According to Dennett’s (ibid.) *Multiple Drafts model* of consciousness "... all varieties of perception are accomplished in the brain by parallel, multitrack processes of interpretation and elaboration of sensory inputs. Information entering the nervous system is under continuous 'editorial revision'." The editorial process takes place in just fractions of a second and in various orders, such that we experience a product of many processes of interpretation. They take in relatively raw and one-sided representations, in streams of activity occurring in various parts of the brain. In the Multiple Drafts model the detection and discrimination of features have to be made only once. That is to say, according to Dennett, a particular "observation" of some feature is made by a specialized, localized section of the brain, in which the information content thus fixed does not have to be sent elsewhere to be re-recognized and re-discriminated by some "master" discriminator. Dennett (ibid.) states that, "spatially and temporally distributed content-fixations in the brain are precisely locatable in both space and time, but their onsets do not mark the onset of consciousness of their content." He continues:

"... It is always an open question whether any particular content thus discriminated will eventually appear as an element in conscious experience [...] The stream of contents is rather like a narrative because of its multiplicity; at any point in time there are multiple 'drafts' of narrative fragments at various stages of editing in various places in the brain" (ibid.: 111-113).

Dennett's view has a universal impact on the GMA method, mainly on the formula circle theory with its representations, as well as on analysing the content of the formulas (Ch. 3.3.7) and on listeners' experience of music. Later in this study (Ch. 6.9), we interpret some formulas or content elements and their relations as looping phenomena that correlate with Dennett's time representation, as described in his Multiple Drafts model (shown in Figure 6).

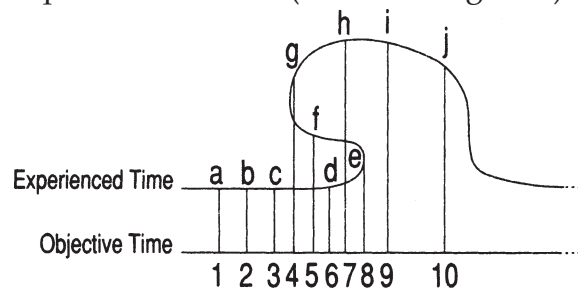


FIGURE 6 Time representation according to the Multiple Drafts model (Dennett 1993: 136).

2.1.7 The Light of Consciousness

Antonio Damasio's (2000) question, How do we step into the light of consciousness? is a powerful metaphor for the birth of the knowing mind, which he describes as a simple and yet momentous entry of the sense of self into the world of the mental. Damasio specifies "mind" as both conscious and non-conscious operations, so that it refers to a process, not a thing. In addition, mind, with the help of consciousness, is a continuous flow of mental patterns which are logically interrelated. The flow moves forward in time, speedily or slowly, orderly or disorderly, and on occasion it moves along not just in one sequence but in several. This relates to the present study, in that the act of composing represents a conscious/non-conscious process that has features similar to those described by Damasio. The theme or musical impulse in a composer's mind engenders musical elements or formulas that in turn create a musical unity.

Images are also mental patterns, according to Damasio (ibid.), which may occur in any sensory modality (visual, audial, etc.). To describe these images he uses the terms "neural pattern" or "map". Images can be conscious or non-conscious, which are never directly accessible. Conscious images can be accessed only from a first-person perspective. Neural patterns can be accessed only from a third-person perspective. To Damasio, the mystery is how these images emerge from neural patterns. He uses the terms "image space" and "dispositional space". In the image space images of all sensory types occur explicitly. Some of those images constitute the manifest mental content that consciousness lets us experience, whereas some images remain non-conscious. By dispositional space he means dispositions that contain the knowledge base and mechanisms from which images can be constructed by recall. The contents of dispositional space are implicit. We can know the contents of images, but we can never know the contents of dispositions directly; they are always non-conscious and exist in dormant form (Damasio 2000: 317-337).

Damasio argues that the first fact in processes of consciousness can be related to the operation of specific brain regions and systems. The second fact is that consciousness and wakefulness, as well as consciousness and low-level attention, can be separated. The third fact is that consciousness and emotion are not separable. Although the fourth fact is that consciousness is not monolithic, at least not in humans, it can be separated into simple and complex kinds. The simplest kind is *core consciousness*, and provides the organism with a sense of self about one moment (now) and about one place (here). Core consciousness does not illuminate the future – there is no elsewhere, no before, no after. It is a simple, biological phenomenon, having one single level of organization, and it remains stable throughout the lifetime of the organism. It is not exclusive to humans, and is not dependent on conventional memory, working memory, reasoning, or language. This core consciousness is born, according to Damasio, with a feeling of the self from two perspectives, as an inner and outer phenomenon. The description of this phenomenon is a simple, wordless story that develops in time and consists of a beginning, middle, and end. More complex is *extended consciousness*, which consists in many levels and gradations, and provides the organism with an elaborate sense of self, that is to say, with identity and personhood. It is a complex biological phenomenon with several levels of organization, and it evolves across the lifetime of the organism. Extended consciousness is also present in some non-humans, at rudimentary levels, but realizes its full potential in humans; also, it depends on conventional memory and on working space. When extended consciousness reaches its peak in humans, it is also enhanced by language. Core consciousness is the rite of passage into knowing, and extended consciousness is built on the foundation of core consciousness.

In Damasio's view (*ibid.*), these two kinds of consciousness correspond to two kinds of self. The sense of self that emerges in core consciousness is the *core self*, a transient entity. The traditional notion of self is linked to the idea of identity and corresponds to unique facts and ways of characterising a person. This is called the *autobiographical self*, and it depends on systematized memories of situations in which core consciousness was involved with the organism's life – with who we are, what we are like, and so on.

According to the fifth fact, consciousness is explained simply in terms of other cognitive functions, such as language, memory, reason, attention, and working memory. These functions are necessary for the top tiers of extended consciousness to operate normally. According to Damasio they are not required for core consciousness. Damasio proposes that the earliest forms of consciousness precede inferences and interpretation, that they are part of the biological transition that eventually enables inferences and interpretations. A theory of consciousness should account for the more simple, foundational kind of phenomena, which occur close to the non-conscious representation of the organism and which can support the later developments of identity and personhood. Natural, low-level attention precedes consciousness, while focused attention follows the unfolding of consciousness. Besides, Damasio states, that “attention is as necessary to consciousness as having images” (Damasio 2000: 15-18).

In the GMA, Damasio's theory is adapted, for example, in the formula content definitions of conscious levels of (musical) mind, and in the formula circle definitions (Ch. 3.3.8; 3.3.9), as well as in the interpretation of the creative process of composing.

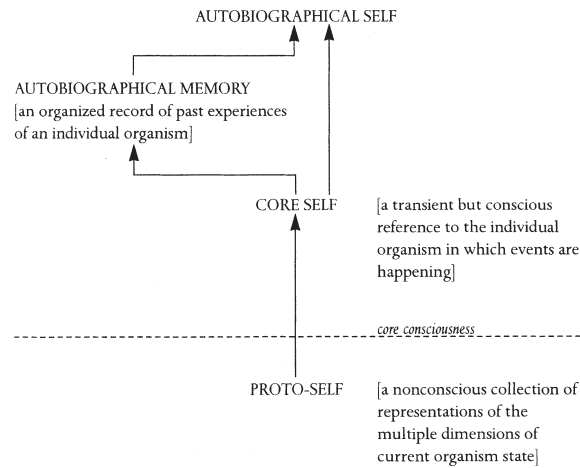


FIGURE 7 The Kinds of Self (core self and autobiographical self) which correspond to two kinds of consciousness (core consciousness and extended consciousness) (Damasio 2000: 199).

Consciousness begins, according to Damasio (2000), "when brains acquire the power of telling a story without words, the story that there is life ticking away in an organism, and that the states of the living organism, within [bodily] bounds, are continuously being altered by encounters with objects or events in its environment, or, for that matter, by thoughts and by internal adjustments of the life process." This story can be told using the universal, non-verbal vocabulary of body signals. The apparent self emerges as the feeling of a feeling. Damasio suspects that consciousness prevailed in evolution because knowing the feelings caused by emotions proved indispensable to the art of living, and because the art of living has been such a success in the history of nature (ibid.: 30-31). We can analyse the signals of consciousness in terms of performance analysis (Ch. 3.5.4), and interpret emotional expressions based on the fundamental frequency (Fig. 18).

"This is the tune but there are no words, the words are only speculation." In the case of humans, however, the second-order, nonverbal narrative of consciousness can be converted into language immediately. Damasio believes that the human brain automatically generates a verbal version of the story. We have no way of stopping that verbal translation. Whatever would seek to play in the nonverbal tracks of our minds is rapidly translated into words and sentences. That is the nature of the human, language-speaking creature. Consciousness might be explained by language alone. Consciousness occurs when, and only when, language comments on our mental situation. Therefore, only humans with substantial mastery of the language instrument can have conscious states; animals and babies are forever unconscious (ibid.: 185). In this study, we notice similar phenomena in the perception or creation of music, in which listener's reactions are immediately transformed into symbols, or words, used also by the composer to describe his music.

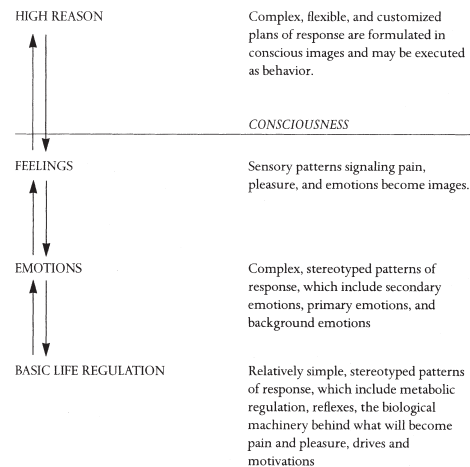


FIGURE 8 The Levels of Life Regulation, with Damasio's categorization of three emotional states: Primary emotions, Secondary emotions, and Background emotions (Damasio 2000: 55).

Life Regulation (Fig. 8) illustrates Damasio's categorization of three emotional states: (1) *Primary emotions*: happiness, sadness, fear, hate, surprise, and dislike; (2) *Secondary emotions*: embarrassment, jealousy, feelings of guilt, and pride; (3) *Background emotions*: well-being or malaise, calm or tension (2000: 50-56). Damasio argues that emotions form patterns, which are determined processes that appear automatically, without conscious deliberation. The body serves as the theater in which they perform. He goes on to describe emotions as having varied temporal profiles. Some occur in *burst* patterns, which go through a fairly rapid onset, a peak of intensity, and rapid decay (anger, fear, surprise, disgust). Other emotions have a *wavelike* pattern, as is the case, for example, with sadness and with all of the background emotions (listed above). When emotional states become fairly frequent or continue for long periods of time, they become *moods*, and a particular background emotion can be sustained over time to create a mood. If you constantly sound a prevailing emotional note, then you are "moody" (ibid.: 54-56; 341-342). In the GMA, Damasio's categorization is adapted for emotional formula analysis (Ch. 3.3.17), and is also used in several interpretations of the formulas.

2.2 Gestalt Theory

Is Gestalt quality a conscious phenomenon in the mind?

In preparation for presenting the theory and method of GMA, we here discuss Gestaltist aspects of philosophy and musicology, provide an historical survey of Gestaltist movements, and an overview of the Gestalt theory of Christian von Ehrenfels (1890). Philosopher Barry Smith (1988) provides our philosophical and historical view of Gestalt development, and Marc Leman *et al.* (1997) provide a musicological view of these developments.

2.2.1 Gestalt Movements

In 1890 the Austrian philosopher Christian von Ehrenfels published the essay "On Gestalt Qualities"¹ that initiated his trend of thought. He was a passionate musician; hence his theory consisted of musicological content. According to Leman & Schneider (1997: 16) music plays a major role also in general Gestalt theories. Ehrenfels's essay, according to Smith (1988: 11-13), enjoyed a powerful position in the philosophy and psychology of the first half of the twentieth century, and more recently in the area of cognitive science, above all in artificial intelligence (AI). In cognitive musicology, Gestalt movements engaged in the study of auditory phenomena (Leman *et al.*). They focused, for example, on the perception of rhythm and pitch, melody, consonance, timbre, structural organization of musical space, as well as directional hearing. Modern cognitive musicology consists of various kinds of research, from data analysis, sound synthesis, simulation of processes of perception, to the production of music for which computers have become an important tool. Leman (*ibid.*) states that Gestalt concepts have often been lauded for their ability to describe things in terms of intuitive human experience and closeness to the real world. Gestalt concepts play a central role also in aesthetic theories that focus on the interplay between ratio and affect (Leman *et al.* 1997: 16-23.)

In philosophy, the Gestalt movement is identified with the Austrian School, which focused on Gestalt quality. The other prominent school was that of Berlin, which centered on psychology and focused on Gestalt as a totality (Smith 1988). The Austrian Gestalt school is related to the work on formal ontology of early Husserl (1979, see also, 1964), according to which our experience is structured by "Gestalt qualities" of complexes of data given in experience. Each such quality is determined by, and is existentially dependent on, the constituent elements of the complex with which it is associated. In contrast, according to the later Berlin conception, a collection of data does not have a Gestalt but rather is a Gestalt, "a whole whose parts are themselves determined as being such that they can exist only as parts of a whole of this given kind" (Smith 1988: 11-13). Gestalt psychology and its main theoretization was based on three exponents: Wertheimer (1912), Koffka (1935), and Köhler (1969), and their research question, quoting Köhler (1969: 164): "Why do brain processes tend to produce perceptual organizations of remarkable clearness of structure?" This theoretization generated, for example, several views in visual perception such as the Gestalt laws (e.g. The law of Prägnanz or good figure, the law of simplicity), or other Gestalt theories (e.g. similarity, good continuation, proximity or nearness, common fate, or meaningfulness), in addition to theories concerning music and modern movements in Gestalt theory related to Psychology (see. e.g. Goldstein 2002: 148-154).

¹ The original essay, entitled "Über Gestaltqualitäten", appeared in the Vierteljahrsschrift für wissenschaftliche Philosophie (Smith 1988: 11).

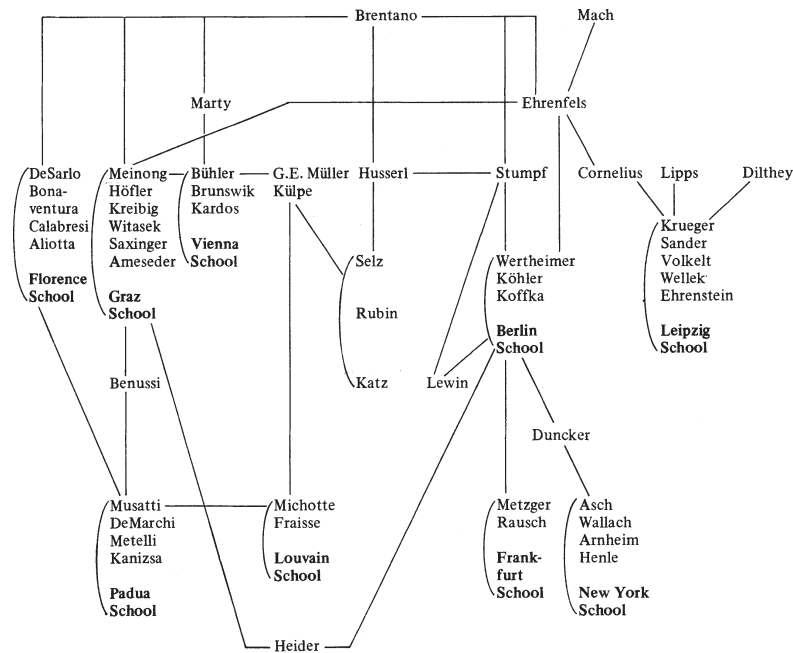


FIGURE 9 Schools and Influences in the Gestalt Tradition (Smith 1988: 229).

2.2.2 Christian von Ehrenfels: On Gestalt Quality

Philosopher Franz Brentano had the most important influence on Ehrenfels's thinking, along with other gifted and original thinkers, such as Meinong, Husserl, and Stumpf. Ehrenfels's philosophical writings consisted of a theory of cognition, a theory of value, aesthetics, as well as psychological papers. Ehrenfels's essay "Über Gestaltqualitäten" contained the first concentrated reflections on the question of "what complex perceived formations such as spatial figures or melodies might be" (Smith 1988: 11-12; See also Murray 1995). The early Gestalt concepts were, according to Reybrouck (1997), highly intuitive and philosophical in essence, and he states that Ehrenfels was the first to introduce the Gestalt concept as being an overall quality of a content of consciousness that transcends its components parts. This concept has two major qualities, that are called the von Ehrenfels-criteria: the whole is more than the sum, and the Gestalt can be transposed (Reybrouck 1997: 58.) The following summary is based on points made in Ehrenfels's original essay (Smith 1988):

The starting point of the theory of Gestalt qualities was the attempt to answer a question: what is melody? The most obvious answer: the sum of the individual tones which make up the melody. But opposed to this is the fact that the same melody may be made up of quite different groups of tones, as happens when the same melody is transposed into different keys. If the melody were nothing other than the sum of the tones, then we would have to have different melodies, since different groups of tones are involved [...].

The decisive step in the founding of the theory of Gestalt qualities was now the assertion on my part, that if the memory images of successive tones are present as a simultaneous consciousness-complex, then a presentation of a new category can arise in consciousness, a unitary presentation, which is connected in a peculiar manner with the presentations of the relevant complex of tones. The presentation of this whole belongs to a new category for which the name "founded content" came into use. Not all founded contents are intuitive in nature and related to the presentation of a melody. There are also non-intuitive founded contents, as for example relations. What is essential to the relation between

the founded content and its fundament is the one-sided determination [Bedingtheit] of the former by the latter. Every founded content necessarily requires a fundament. A given complex of fundamental presentations is able to support only a quite specific founded content. But not every fundament must as it were be crowned and held together by a founded content [...].

Gestalt qualities may be divided into apprehension [Auffassung] of processes and apprehension of momentary states [...]. Examples of processes are melody and motion; of momentary states, harmony, and what in everyday life is called spatial shape [Raumgestalt]. But there is melody and even harmony not only in the aural sphere; here are also, for example, colour-melodies and colour-harmonies. Indeed, in the realm of all sense-qualities it must be possible to find analogues of melody and harmony [...]. In the first place there is Gestalt not only in the realm of sound, but also in that of the resonance-sensations which, in contrast to musical tones and sounds, we call "noises". Language is composed of such noises, even if, in the individual vowels, tones are distinguishable as elements. Every word of a language is a Gestalt quality. One can form some idea of the extent of Gestalt qualities in psychical life from the fact that the so-called laws of association operate much more frequently in relation to Gestalten than in relation to elements [...]. The so-called mnemonic aids, too, are based on Gestalt qualities. Their essence consists in this, that a Gestalt quality is found which for some reason or other is easily imprinted on the memory and whose parts stand in a certain stereotypical relation to the objects of presentation to be retained in memory. (Smith 1988: 121-123; quoting von Ehrenfels 1932)

In 1932, Ehrenfels referred to his philosophical monograph *Kosmogonie* (1916) in order to describe Gestalt quality as follows:

[...] it is necessary to distinguish higher and lower Gestalten from each other. Every determinate body has some kind of Gestalt. He who compares the Gestalt of a clod of earth or of a heap of stones with Gestalten of say a swallow will however at once have to admit that the tulip, or the swallow, has realized the particular genus Gestalt to a greater degree than have the clod or the heap. In like manner, all visible objects have some kind of colour. Still, every unprejudiced person will agree that a brilliant red is colour to a greater degree than, say, grey. But in order to characterize this being colour to a greater degree [Mehr-Farbensein], there is nothing to which we can point except the visual impression: being of higher as opposed to lower Gestalt, however, can be determined very well by distinguishing marks. Higher Gestalten are those in which the product of the unity of the whole and multiplicity of the parts is greater. (Smith 1988: 123; quoting von Ehrenfels 1932)

According to Ehrenfels, the Gestalt is dependent on its basis or fundament (Smith 1988; Ehrenfels 1932). This means that the existence of the object(s) which form(s) the basis of a Gestalt is a necessary prerequisite for the existence of the Gestalt, but not vice versa. Gestalten are *moments*, that we actually see or hear on a given occasion. Husserl 1970 [1900/01] calls these Gestalt qualities moments of unity "figural moments", and according to Meinong they are "founded contents" (Smith 1988: 20-21; 165.) A spatial shape or Gestalt is perceived, or is given in "visual presentation", on the basis of a complex of sensations of individual elements having "distinct spatial determinations". In sensing the elements and their spatial determinations we are able to apprehend the shape as an additional object (quality, attribute) side by side, as it were, with its associated elements. Our total experience is therefore something distinct from the experience of a mere sum or complex of sensory elements. According to von Ehrenfels (ibid.), "wherever we have a relation of this sort, between a complex of experienced elements on the one hand and some associated unitary experience of a single invariant structure on the other,

we are to conceive this latter structure as a Gestalt, and to understand the given unitary experience as structurally analogous to the experience of a spatial shape." Spatial and temporal complexity are to be treated not as separate groups of phenomena correlated with different faculties of mind rather than instances of a single species, in which mental processes of the same sorts are involved in every case (Smith 1988: 14; quoting von Ehrenfels 1890, *passim*). In this study we may experience these Gestalts or moments from the music, and we can see their representations on photographs of the sound spectrum. Ehrenfels continues:

By a Gestalt quality we understand a positive content of presentation bound up in consciousness with the presence of complexes of mutually separable (i.e., independently presentable) elements. That complex of presentations which is necessary for the existence of a given Gestalt quality we call the foundation [Grundlage] of that quality. (Smith 1988: 93; quoting von Ehrenfels 1890)

As shown in Figure 10, Ehrenfels divided Gestalt qualities into two types: spatial and temporal Gestalt (Smith 1988; von Ehrenfels 1890). All possible Gestalt qualities can thereafter also divide into the non-overlapping categories of temporal and non-temporal. The latter category was understood to comprehend those Gestalt qualities whose perception required no time, nor those whose appearance in consciousness required a simultaneous grasp of all elements of their foundation, but rather, those for whose foundation distinct temporal determinations of the separate objects of presentation were not required. Temporal Gestalt qualities thus comprised the qualities whose elements were distinctly located in time. Non-temporal Gestalt qualities are those whose foundation can be given completely in perceptual presentation, or sensation; whereas in temporal Gestalt qualities, one element at most can be given in perceptual presentation, the remainder being present via memory-images (Smith 1988: 93-94).

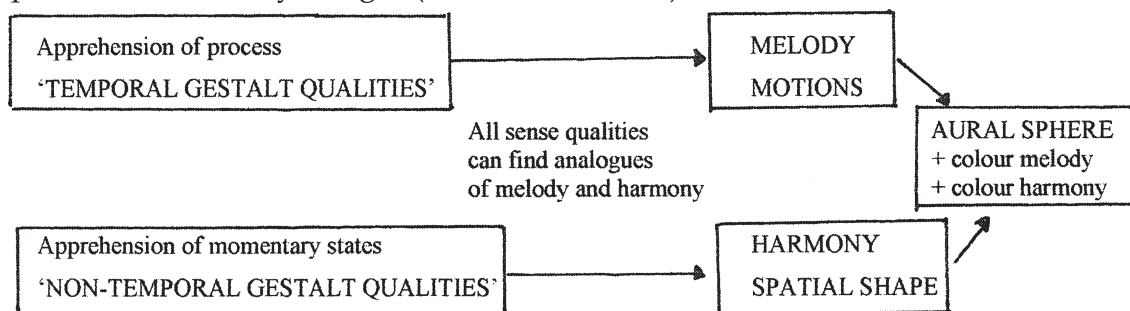


FIGURE 10 Temporal and non-temporal Gestalt qualities according to von Ehrenfels (author's summary of the theory).

2.3 Music and Representation

What can be experienced behind the musical phenomenon?

Music is a sonic way of expressing the musical creativity of feelings, images, and musical thoughts. Music that we hear and see is a result of a process by which the composer's inner musical idea is transformed into musical symbols, for example, notes, scores, melodies, and performances; these are in addition to acoustical representations and phenomenal experiences among listeners.

The focus in this chapter is on acoustical, symbolic, and sub-symbolic approaches to musical representation. Marc Leman's (1993, 1995) theories of representation considerably influence the GMA, but other of his views are discussed as well.

2.3.1 Theory of Musical Representation

The word "representation", according to Leman (1993), differs from mere description. A representation has generic features that several descriptions have in common. By this he means that representation is related to the meaning of things and how they are imagined. Description, by contrast, is more often connected with meaning and its expression or conceptualisation (Leman 1993: 124). Alternatively, Curtis Roads defines the word representation as "formal, symbolic and detailed descriptions, that are used in music analysis focusing on structures and meanings [involved] with computers" (Roads 1999a: 45).

Leman distinguishes four types of "representational categories" in modelling perception and cognition: *signals*, *schemata*, *images*, and *mental representations*, which he has adapted in his book to neural representations. A signal refers to the acoustical or wave-form representation of a sound. An image, or perceptive map, represents aspects of a signal in the auditory system. Schemata are control structures in the human brain that are sensitive to some frequently occurring pattern, either in the environment, in ourselves, or in the interaction of the two. Mental representations are knowledge structures used in performing specific tasks, and they refer to a "mental" world, rather than a "psychological" or "brain" world (Leman 1995: 33-41). In the GMA I have adapted and used Leman's representational categorization (Ch. 3).

2.3.2 Symbolic, Acoustical, and Sub-symbolic Representation

Music is traditionally represented with symbolic representation, whereby it is transliterated into notes and scores, for ease of performance and analysis. New representation levels were generated in the 1990's when computer music-analysis programs and techniques developed rapidly, and acoustical and sub-symbolic perspectives of musical representation were generated (Leman 1993). This development enabled deeper and more specific analysis of music cognition; for example, in studies focusing on cognitive processes of musical generation and modelling. The present study, too, benefits from this development, in dealing with oral music (traditional music without scores). These new representational methods also broadened the theoretical field of cognitive musicology. In particular, the sub-symbolic description and representation of music allowed for more meaningful uses and discussions regarding the nature of music analysis (Leman 1993: 119-164).

Sounds themselves and their symbol-based paradigms, together with computational linguistics, began to receive great attention, in place of (or along with) the former, almost total obsession with musical scores (Leman 1995: vii). Leman also concludes that symbolic descriptions are more appropriate for engaging with the generation of music and the description of action, whereas sub-symbolic descriptions are more appropriate for dealing with musical knowledge from a perceptual point of view (Leman 1993: 148). In the present study, the perception-analysis method is based on the sub-symbolic view of music, along with phenomenal experiences of music in the consciousness.

2.3.2.1 Symbolic Representation

The power of the human mind is, according to Leman (1993: 127), concerned with its ability to deal with symbols. He calls the human mind a “symbol-manipulator”, and understands symbols as the vehicles of our thoughts. The traditional musical score is an example of a symbolic description, referring to “objects” such as pitch, loudness, and articulation. In addition, Kaipainen (1999: 157) argues that symbols are ultimately linguistic, even if they can be referred to with numbers or other signs. He also states that, from the symbolic and atomistic point of view, the phoneme is the smallest unit in linguistic symbols, whereas a note is the smallest unit in musical symbols. Leman (*ibid.*) clarifies symbolic representation such that a note represents an abstract tone with defined duration and height, to which other parameters can be added, such as loudness and types of articulation. In Figure 11, (a) a note represents a sign in a traditional score; (b) it represents a note as described in Adagio; and (c) is a note as described by a structure that the Prolog syntax would read (Leman 1993: 123-131).

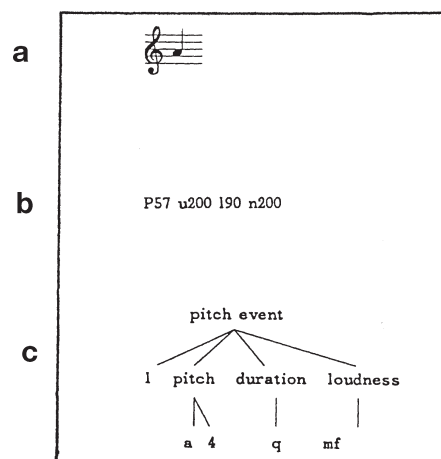


FIGURE 11 Symbolic representation of a musical note. A note represents an abstract tone with defined duration and height. Other parameters, such as loudness and articulation, can be added as well. a) note as a sign in a traditional score; b) note as described in Adagio: “P57” is the *la* in the fourth octave, “u200” stands for a duration of 200 hundreds of a second, “190” stands for a loudness of 90/127 and “n200” stands for the next note at 200 hundreds of a second. c) note as described by a structure that in the Prolog syntax would read: “pitch_event (1 pitch (1,4), duration (q), loudness (mf)).” (Leman 1993: 125.)

Symbolic representation is typically separated from its content, such that we may read the label and translate it into other languages, while not knowing what the label represents. One symbol can be transformed into another symbol, and Leman mentions that computers are excellent devices for this kind of symbolization. Also, artificial intelligence (AI) has contributed to the symbolic representation of music (Leman 1993: 126-129).

2.3.2.2 Acoustical Representation

Acoustical representation designates the sonological representation of music that is closest to the physical properties of sound (Leman 1993). The waveform is a representation of the variance of amplitude, or sound pressure, and is produced by a musical instrument or acousmatic device. It can be encoded in many different

ways, for example, by conversion from digital to analogue. Leman concludes that the conversion process symbolizing signals is reversible. He characterizes acoustical representation according to the unity of form and content, where the form of the waves defines the characteristics of the tone. Thus, the representation is iconic, that is, the signs involved are said to be like or resemble the things they represent. Sonograms and spectrograms are genuinely acoustical representations of music; they are descriptions derived from the waveform itself (Leman 1993: 126). In the present study, the spectrogram is used as the representation of acoustical sounds produced by the human voice.

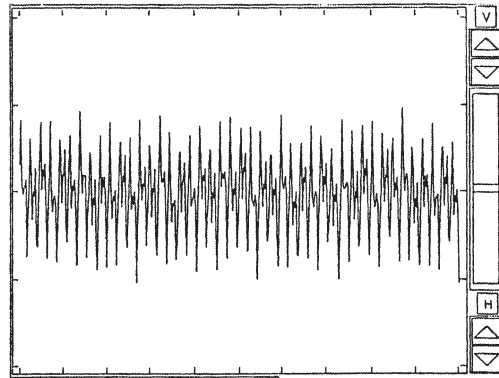


FIGURE 12 Acoustical representation: Waveform of a Shepard tone (Leman 1993: 127).

2.3.2.3 Sub-symbolic Representation

Leman (1993) assumes that the sub-symbolic representation of music consists more of mental representation than of symbols, and he clarifies his thought with an example: when imaging a chord, we do not recall the symbols; rather, we hear it internally. This process he calls "imagination". On his view, the definition of a sub-symbolic representation is diffuse from the beginning, and it can initially be defined as the level between acoustical and symbolic representation. Sub-symbolic accounts are often connected with aural descriptions, and may also describe "non symbolic knowledge" of actions in performance, and perhaps also in composition (Leman 1993: 132-135).

Alternatively, Kaipainen (1999) defines sub-symbols as signals that are generated by perception or cognitive processes, and that indicate the presence of some phenomenon. Kaipainen emphasizes that the musical voice is mainly a sub-symbolic representation, which may be analyzed in terms of cognitive structures and processes below the level of symbols. He mentions also that the sub-symbolic level is foundational to the symbolic level, such that sub-symbols crystallize or agglomerate into symbols (Kaipainen 1999: 157-165). According to Leman (1993: 132-133), most sub-symbolic descriptions should be considered hybrid descriptions when they involve features of symbolic representations, or even of acoustical representations.

2.4 Formula Theory

Is a formula something more than an analytic Gestalt pattern in music?

Music is a sound unity that consists of different elements, patterns, or parts. A composition can be analysed in various ways, which in turn depend on the theory used. In this study I use formula theory, because folk and traditional music, as well as traditional liturgical (Gregorian) chant, are formulaic in nature. In addition, formula theory is the most suitable one for analysing music that has acoustical and sub-symbolic representations. Milman Parry (1971), Albert Lord (2001), and Leo Treitler (1974) are some representatives of early formula theory. Representatives of recent formula theory include Vaira Vikis-Freiberg (1978, 1984), Hannu Saha (1996), and Jukka Louhivuori (1988, 1999).

2.4.1 Movements in Formula Theory

Milman Parry defined the term "formula" in 1930 as "a group of words which are regularly employed under the same metrical conditions to express a given essential idea". Formula theory was used mainly in the description of Homeric epic and textual analysis; it consisted in counting repetitions, classifying similar phrases, and thus describing the technique of composition in terms of formula manipulations. With Parry's formula definition, the ambiguity of "repetitions" was eliminated (Lord 2001: 30).

According to Parry's associate, Albert Lord (*ibid.*), a singer hears several different, repeated formulas when studying songs. When the singer has studied enough formulas and their combinatorial rules, he or she can "compose" genuinely in the given style. Different singers, individually and collectively, always hear the formulas in different ways; thus, the songs continually vary in their minds and memories (Lord 2000: 30).

Though appearing in all kinds of music, formulas are especially prevalent in the Latin chant; for example, as algorithms for recitation. Psalm tones, and other kinds of chant, are normally categorized according to liturgical function, content, and duration. Formulas are connected with the modes, form, melody, and rhythm of the chants, and occur in various combinations (Grout *et al.* 1996: 40-42). Musicologist Leo Treitler (1974, 1975) has applied formula theory in his analyses of Gregorian chant and formula theory, for which he invoked the pioneering research of Milman Parry and Albert Lord on the oral transmission of epic poetry (about Treitler's work in this area, see Jeffery 1992). Treitler suggests that the use of stereotypical melodic passages in Gregorian chant, so-called "centonizations", should be viewed as a musical counterpart of Parry's and Lord's formula theory. However, Treitler's central concept for analyzing oral transmission is not that of "formula", but rather of "generative system". For Treitler, the transmission of chant is generated by actual aural performance (an example of oral transmission). Moreover, transmission involves acts of mental recreation, which said acts occur during the writing of melodies and which rely directly upon previously written transmission (Jeffery 1992: 14-15; Treitler 1974: 355-372; and 1975: 11).

Vikis-Freiberg (1978, 1984) divides formulas into three main categories, based on aspects of their linguistic content and structure: syntagmatic, paradigmatic, and semantic. Syntagmatic formulas occur in the connected, "chronologically"

ordered chain of words as they appear in the musical object. Paradigmatic formulas, on the other hand, designate verses that are identical (or nearly so) in syntax; these are selected, according to given rules, from the syntagmatic chain and classified "a-temporally" as paradigms. These are available for insertion into the ordered, syntagmatic chain of verses (or any other content). Lastly, "semantic formula" describes cases that seem not to have any shared word(s), but whose form of expression can be generated by the same syntactic rules (Vikis-Freiberg *et al.* 1978: 329-339, 1984: 331).

Hannu Saha (1996) has developed and applied formula theory to Finnish traditional music (*kantele* music in the Perho River Valley). His main focus was variations as a primary element in the musical style, as well as the creative process of variation as the central component of folk music. Applying formula theory to describe variations in melody and in accompaniment patterns, he classified the variations as stemming from eight, basic variational stores, by which he was able, for example, to formalize their interplay and connections (Saha 1996: 10, 317). Different formula theories have influenced the present study, in many ways and to various extents. Of all these, I have most emphasized Louhivuori's theory of formula analysis in the GMA.

2.4.2 Formula Theory

Louhivuori (1988) has developed formula theory in his research to discover the laws governing musical distribution in spiritual folk melodies, based on oral tradition, of Beseercherism in Southwestern Finland. The main development in his study was a reductive method of analysing folk melodies, but he adapted network theories of cognitive psychology and other fields (Louhivuori 1988: 318-324).

Louhivuori went on to become one of the developers of formula theory (among cognitive musicologists and AI researchers²) in the field of schema theory, which is an advanced form of the formula theory. Schema theory of the 1980's focused on the neural network and its melodic archetypes (cognitive schemata). According to Louhivuori, the network produces new musical phrases interpretable by formula theory (1999: 169-189).

In his research (1988) Louhivuori mentions that the formula concept, which consists of several, sometimes contradictory definitions, has also been adapted for the analysis of folk music. These formulas appear as stereotypes in folk music melody, at the beginnings, endings, and transitions from one section to another. Formulas constitute the main part of the melody and can be compared to the motifs of traditional narratives. Typical examples of formulas include cadences in different musical styles and cultures. Louhivuori states that sorting these melodies according to formulas is more complicated in music than in linguistics. Sentence structures of a language can be analysed almost unequivocally, but in music it is not so easy to determine precisely how elements are combined. Musicologists can therefore construe the musical entity in different ways. The length of the formulas varies, according to Louhivuori, such that the shortest ones last only a few bars, and the longest ones no longer than a single phrase. The problem of how to define these formulas, and interpretation is based on the character and repetition of the musical theme (Louhivuori 1988: 48-52). In this study, the formula is defined according to audible and spectral features of the voice and vocal phrasing (see Ch. 3.3).

² For example Kohonen 1984, 1990; Leman 1995, Toiviainen 1999.

Louhivuori defines a formula as melodic and rhythmic elements that are often repeated, are of various lengths, and are transferred from one redaction³ to another. The formula theory is clearly illustrated by Figure 13, in which five differently coloured rectangles represent the formulas, and the lines represent three different performances: a, b and c (Louhivuori 1988: 14-50).

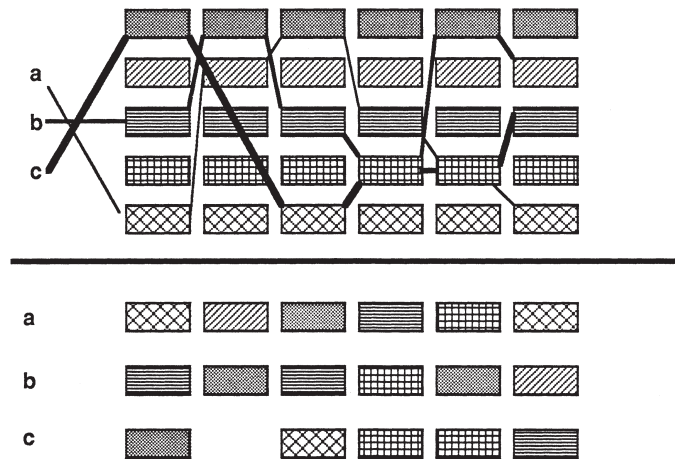


FIGURE 13 The singer creates the melody from traditional formulas, and the performer may select different formulas to use in different performances (Louhivuori 1988: 50).

Louhivuori (1988) states that, especially in Lord's formula theory, variation results from the study of many alternative elements, formulas, and their combinational rules. Consequently, performers can create several hours of varied music by drawing upon a relatively small store of formulas. They do not sing the songs from the memory, but rather according to the models they have learned. Louhivuori, who finds musical formulas to be synonymous to phrases, notes that it is important for the improviser to master a great number of repetitive phrases. Formulas help the performer to outline, learn, and recall musical constructions (Louhivuori 1988: 50-53).

Louhivuori takes an interesting view of the importance of variation and transformation. He notes that, in linguistic structures, information can remain the same even though certain elements are changed. This holds true in music as well, especially with regard to its paradigmatic⁴ elements (Louhivuori 1988; see also Pekkilä 1981; and Saha 1996). If the performer uses different formulas in different performances, then it is a question of transformation. In contrast, variation means that the sequence, quality, or incidence of the formulas change. In Figure 14, Louhivuori clarifies this notion of variation with a theory of formula store. He explains that, based on one performance, one can gain no knowledge of changes in formula incidences. With formulas A and B separated, however, a certain melody can be recorded in the same form (Louhivuori 1988: 53-55).

³ Redaction, according to Louhivuori, denotes a unity that is formed of at least two variants (1988: 9).

⁴ By "paradigmatic formula" Louhivuori means syntactically identical phrases, in which one segment of the chain can be replaced by another segment that is paradigmatically related to the former (1988: 51).

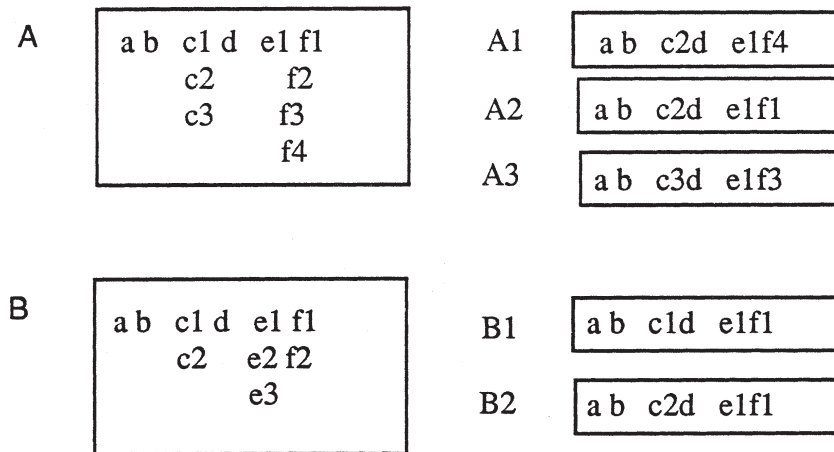


FIGURE 14 Formula store A and B according to Louhivuori (1988: 54).

In Figure 14, formula store A consists of formulas a-f and their paradigms (c1-f4). A1-A3 represent three performances. Even if every performance is different, this does not mean variation, because the formula store remains the same. In example B the formula store has changed, such that formulas e2 and e3 have increased and formulas c3, f3 and f4 have been omitted. Even the variants of A2 and B2 are identical. B2 indicates a variation, however, and therefore the formula store has changed. Louhivuori states that we have to know the formula store of the informant before we can determine if it is a question of variation or of transformation. Therefore, in variation analysis it is more important to pay attention to the formula store than to separate variants (Louhivuori 1988: 54-55). In the present study (Ch. 3.5.4; 5.1.4.9), I analyse Reznikoff's performance using a concept of performance formula adapted from Louhivuori's theory. I also use analytic concepts such as "formula store" and "phoneme store", in addition to variation formulas (Ch. 3.3.15; 3.3.16).

2.5 Voice Analysis

What does the voice reveal about the Gestalt of the chanter?

Voice analysis is used in this study because Reznikoff's compositions consist of the chanting of Christian texts. The voice analysis aims to reveal, both audibly and visually, the macro- and micro-structures of the chants. Macro-analysis describes the formulas of the compositions, and micro-analysis explicates the internal structures and relations of the formulas or formula paradigms.

In the upcoming analyses, I draw upon the spectral theories of Curtis Roads (1999) and Baron de Fourier (Roads 1999a; [1822]), and Johan Sundberg's (1987) theory of the singing voice. Kalevi Wiik (1998) as well as Laukkanen & Leino (1999) are our sources for the phonetic theory of speech sound, and Amore 5.1 (1996), a software program, represents the spectral analysis program in the GMA.

2.5.1 Voice Analysis

Sundberg (1987) defines the voice as speech-sound or sung notes, which are something personal to the chanter and composer. The term "voice" indicates that the sound is generated by the vocal mechanisms, including the vibrating vocal folds set in motion by the airstream from the lungs. The voice is modified first by the vibrating vocal folds, then by the rest of the larynx, the pharynx of the mouth, and sometimes the nasal cavities as well (as in the sound, / i /). The voice sound is a result of this vocal process. Phonation refers to sound generation by means of vocal-fold vibrations. In phonation, the vocal folds generate a primary sound as the airstream passes through them, and this sound is called "voice source" (Sundberg *ibid.*). The voice source passes through the vocal tract where it is shaped acoustically. This shaping depends on the vocal tract's configuration and is controlled by articulation. The breathing system in this process acts as a compressor, and the vocal folds and vocal tract serve as an oscillator. Voice timbre, which encompasses the overall sound characteristics of the voice, is determined in part by how the vocal organ is used and in part by the morphology of the voice organs; in this process, the mechanical characteristics of the vocal folds – their length, thickness, and viscosity – are of decisive importance (Sundberg 1987: 1-10).

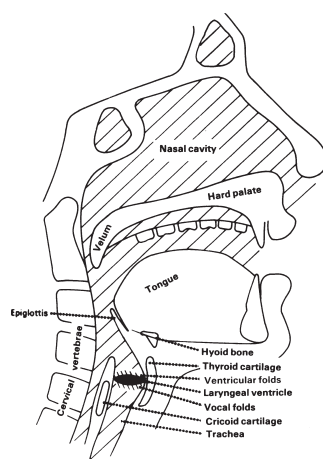


FIGURE 15 Schematic representation of the voice organ (Sundberg 1987: 7).

2.5.2 Vowels and Consonants

According to Wiik (1998), the universal features of speech sounds in all languages are divided into two groups – vowels and consonances. How the vowels and consonances are formulated as syllables depends on the language. In this analysis, the chants are mostly in French with Latin segments. Figure 16 clarifies some vowels and consonances in European languages.



FIGURE 16 Vocal classifications in some languages (Wiik 1998: 59).

In the typical production of vowels, the voice region is open, and the stream of air can flow freely from the middle of the mouth (Wiik 1998; Laukkanen *et al.* 1992). In contrast, in the normal production of consonants, the voice region is narrowed such that the air stream cannot flow out freely, as occurs, for example, with / p, t, k /; or the air may flow sparsely, creating a fricative noise (fricative), as in / f, s /. Researchers have determined that vowels are voice sounds wherein the vocal chords are vibrating (oscillating), and with consonants the vocal chords may or may not be vibrating; in other words, they are voiced or unvoiced consonances. Nasal sounds, for example / m / and / n /, are not vowels even if the air stream can sometimes flow out of the mouth; typically, however, in nasal sounds the stream of air flows totally out of the nose. The vowels of the French language, for example, are / a, e, ae i, o, u, y /, and by default we can define consonants as those sounds that are not vowels (see Fig. 17). Wiik (1998) explains that the International Phonetic Alphabet (IPA) divides vowels into posterior vowels (i, y, a, e, ae, oe), middle vowels (i, u), and fore vowels (a, u, o) (Wiik 1998: 35-99; Laukkanen *et al.* 1999: 61-66).



FIGURE 17 Vocal tract profiles for the vowels / a, e, i, o, u / (Sundberg 1987: 21).

2.5.3 Emotions and Acoustical Voice Analysis

Emotions are manifested acoustically in singing and in speech. The emotions (affect) in music have been one of the main interest of the philosophy of music since the classical period (Budd 1992; Kivy 2002; Meyer 1956). The emotions have also been a main focus in the aesthetics of music and in music analysis (Lippmann 1992). From the philosophical view, the emotions are situated in the music; in other words, the listeners experience their emotions or affect through music. From the musicological point of view, the emotions are analysed and interpreted from the representations of music (scores, notation). Cognitive music analysis has largely viewed the emotions in terms of acoustical and neural representations of music (Clynes 1989) as well as techniques and mannerisms of performance (Camurri *et*

al. 2001; Gabrielsson *et al.* 1996; Godøy *et al.* 2001). In the present study I have engaged the emotions in terms of their acoustical representation, and I have quoted mainly Sundberg's (1987) theory of voice analysis. Of course, other approaches to researching emotion in music may prove valuable and valid as well but lie outside the scope of the present study (see, e.g., Arnheim 1961, Meyer 1956, Juslin & Sloboda 2002).

Sedlacek and Sychra (Sundberg 1987), in a reading experiment, found eight emotional states: neutral, love, joy, solemnity, comedy, irony, sorrow, and fear. Listening tests conducted with different groups revealed that identification of these moods did not depend on an individual's ability to understand the language spoken in the test phrases. The authors examined phonation frequency, amplitude, and spectra in those sentences which showed the highest scores. The mean phonation frequency was found to be raised in joy, lowered in sorrow, and intermediate in the neutral emotional state. Sad modes consisted of a single phonation frequency peak followed by a slowly falling movement; and the presence of more peaks seemed to be associated with more active modes. Later, Williams and Stevens (*ibid.*) found four emotional states in the voice: neutral, anger, sorrow, and fear. The phonation frequency curve in a neutral state of emotion was found to be associated with slow changes and with no sharp contrasts. Phonation frequency in anger was normally higher than it was in a neutral state. Sorrow was represented with a low phonation frequency and little variation; thus the fundamental frequency fell slowly, almost without interruption, until the end of the sentence. Fear was manifested in many ways, including fast increases and decreases, and sharp contrasts. Later it was found that the average phonation was lowest for sadness, higher for the neutral state and fear, and highest for anger. The overtones above 1 kHz were most powerful in anger and weakest in sorrow (Sundberg 1987: 146-156.) These parameters of phonation frequency and emotional states are adapted in the GMA with the concept of the fundamental frequency fs_0 and the emotional formula FE (3.3.17). In addition, the concept of overtones above or below 1 kHz is adapted as an aural voice space (avs) in the formula parameters (Ch. 3.3.2; see also, Fig. 33).

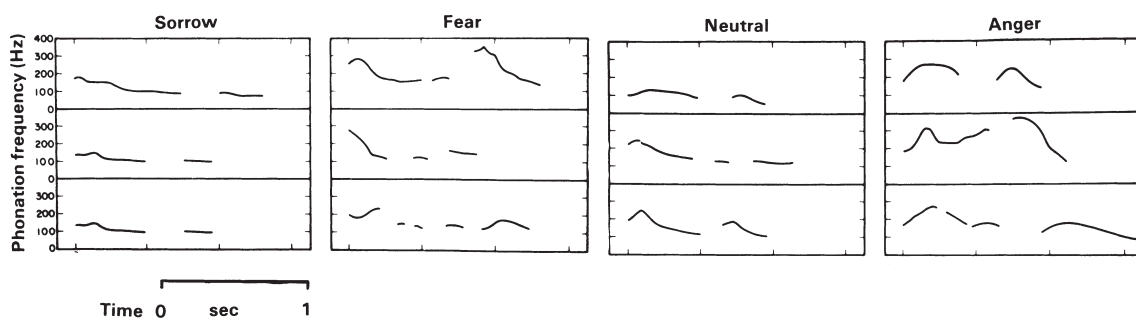


FIGURE 18 Phonation frequency curves of the voices of three actors who pronounced the same sentence in the indicated modes. Phonation frequency descends slowly in sorrow and exhibits rather wild jumps in the more excited emotional modes (Sundberg 1987: 149).

2.5.4 Spectrum Analysis

This study uses spectrum analysis and representation because of its capacity to reveal vocal quality, fundamental frequency, and intensity (Laukkanen & Leino 1999). Moreover, according to Leman (1993: 126), spectral analysis provides the

closest possible analogue of the physical properties of sound. "Voice quality" may designate, for example, that the voice is clear, audible, and that the sounds are produced easily and smoothly. The "fundamental frequency" is the one that is relatively pronounced and that produces overtones of varying intensity. Also the noise level is low, and the voice does not contain unintentional variations in fundamental frequency or amplitude. Tone quality, pitch, and variation of intensity is easily perceived, and the quality of voice is stable. Analysis parameters of the fundamental frequency include separate periods of amplitude peaks, shown by the oscilloscope, whereas intensity analysis can be measured, for example, with amplitude periods shown on a relational scale (Laukkanen *et al.* 1999: 85-91).

Amplitude representation can be divided into two categories: time-domain (Fig. 21) and frequency-domain (Fig. 20) representation (Roads 1999a). In this study I use a time-domain representation, which means (*ibid.*) that the sound waveform is drawn in the form of a graph of air pressure versus time. If the pressure varies according to a repeating pattern, the sound has a periodic waveform, and if there is no discernible pattern it is called noise. When in the time-domain representation the curved line is near the bottom of the graph, then the air pressure is lower, and when the curve is near the top of the graph, the air pressure has increased. The amplitude of the waveform is the amount of air-pressure change; amplitude can be measured as the vertical distance from the zero pressure point to the highest (or lowest) points of a given waveform segment.

Finally, frequency-domain, or spectrum representation, shows the frequency content of a sound, and it consists of the fundamental and other frequencies in a waveform. The individual frequency components of the spectrum are referred to as harmonics or partials. Any frequency component can be called a partial, whether or not it is an integer multiple of a fundamental. Roads notes that many sounds have no particular fundamental frequency (1999a: 14-20).

Spectrum analysis, according to Roads (1999a), involves "a measure of the distribution of signal energy as a function of frequency". The results of a spectrum analysis are typically an approximation of the actual spectrum. Therefore spectrum analysis should more properly be called "spectrum estimation" (Roads 1999a). A "spectrum plot", called a formula paradigm in this study, reveals the micro-structure of a vocal emission, as well as the characteristic frequency-energy of vocal tones. From the spectrum we can also see general features such as the onset of notes or phonemes, formant peaks, and major transitions. Roads (*ibid.*) mentions that many strategies exist to measure and plot spectra, and he divides these into two basic categories: static and time-varying. Static plots are still-images of sound and give a two-dimensional image of amplitude versus frequency. Time periods, or windows, can vary from a brief instant to several seconds or longer. In a time-varying spectrum, plots can be laid out as a three-dimensional graph of spectrum versus time, and these plots essentially line up a series of static plots, one after the other. The sonogram (or spectrogram) is a time-varying spectrum display, and is a common tool in speech analysis ("visible" speech). The spectrogram shows the frequency versus time content of a signal, where frequency is plotted vertically, time is plotted horizontally, and the amplitudes of the frequencies in the spectrum are plotted in terms of the on-screen darkness of the trace. Intense frequency components are plotted darkly, and soft frequency components are plotted lightly (Roads 1999a: 536-563).

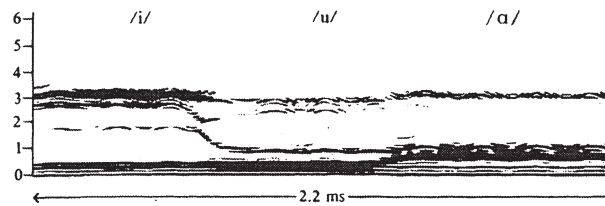


FIGURE 19 Spectrogram of vowels / i, u, a / (Rossing 1990: 351).

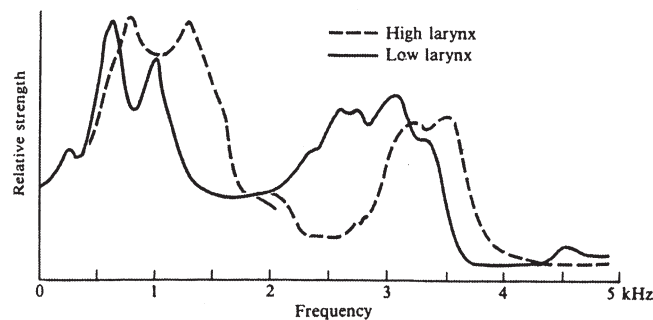


FIGURE 20 Spectrum of vowel sound / a / (Rossing 1990: 351).

In addition, Robert Cogan defines (1984) the sound spectrum as the total result of all the vibrations, both fundamental and partials. It includes all of the sounding elements that together make up any sonic impression. Cogan divides sounds into three very general categories on the basis of the sonic phenomena of language and music, and their spectral formation. The first consists of a sound that comprises only a fundamental, with no upper partials or other spectral elements. This sound is a sine tone, which is rare among real sounds.

The second category consists of those sounds whose spectrum is harmonic in relation to the fundamental tone. In a harmonic spectrum, the frequencies of the partials are whole-number multiples of the frequency of the fundamental (Cogan 1984).

The third category of spectra is typified by dense bands or swaths, such as those that immediately follow the strands of partials. Dense spectral bands are characteristic of many errant sounds, in other words, noise. Consonants in language frequently create such spectral bands, and their sounds activate not a single point in space, nor even a discrete set of points, but rather one or more entire regions of musical space (Cogan 1984: 9-12).

2.5.5 Modulation

Important in the GMA analysis are modulation phenomena in the macro-structure (changes in modes) and micro-structure (changes in phonemes). Therefore speech and singing are modulated signals (Leman 1995: 106). Formula relations consists of meanings according to the Gestalt theory (Ch. 2.2.2).

Modulation, according to Roads (1999a), means that some aspect of one signal (the carrier) varies according to an aspect of a second signal (the modulator). Effects such as tremolo (slow amplitude variation) and vibrato (slow frequency variation) in voices exemplify acoustic modulation. The carrier C can be a pitched tone, and the modulator M a relatively slow-varying function (less than 20 Hz). When the frequency of modulation rises into audible bandwidth (above 20 Hz or so), audible

modulation products or sidebands begin to appear. These are new frequencies added to the spectrum of the carrier. Roads divides modulations into ring modulation (RM) and amplitude modulation (AM) (1999a: 215-216). The present study uses amplitude modulation.

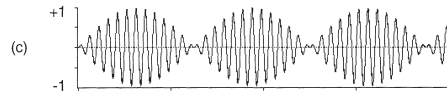


FIGURE 21 Time-domain view: Amplitude modulated signal (Roads 1999a: 223).

According to Leman (1995), fluctuation in the tone pattern may cause transitions (modulations) from one tone center to another (in this study, from one formula to another), and it means a retardation in the transition from one point to the other. Small fluctuations can have a maximal perceptive impact, and may even cause a so-called catastrophe of perception. Modulation is also characterized by an effect of hysteresis, or a retardation in the transition from one point to the other, because of attraction. The overlapping results from the retardation effect favour stable perception points. In music perception, the effect of hysteresis is often cancelled by an interpretation process in which the perceived information of a recent past is reconsidered in the light of new evidence (Leman 1995: 65). These transition parameters from one formula to another are described in Chapter 3.3.13 (formula content relations).

2.5.6 Fourier Analysis

Fourier analysis is a complement to spectral analysis (Roads 1999a). Baron de Fourier (1768-1830) developed the theory in which complicated vibrations can be analysed as a sum of many simple, simultaneous signals, and he proved that any periodic function could be represented as an infinite summation of sine and cosine terms. Because of the integer ratio relationship between the sinusoidal frequencies in Fourier analysis, this became known as harmonic analysis (Roads 1999a: 536-545).

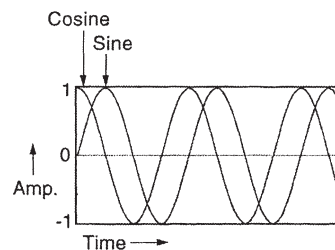


FIGURE 22 A sine and cosine waveform (Roads 1999a: 18).

According to Roads (1999a), “The Fourier transform (FT) is a mathematical procedure that maps any continuous-time (analogous) waveform to a corresponding infinite Fourier series summation of elementary sinusoidal waves, each at a specific amplitude and phase.” This means, “the FT converts its input signals into a corresponding spectrum representation. To adapt Fourier analysis to the practical world of sampled, finite-duration, time-varying signals, researchers molded the FT into the short-time Fourier transform or STFT” (Roads 1999a: 550). He continues that, for “a preparation for spectrum analysis, the STFT imposes a

sequence of time windows upon the input signal" (ibid.), with which he means that it breaks the input signal into a "short time" segment bounded in time by a window function that is a specific type of envelope designed for spectrum analysis. The window is usually time-framed within the range of 1 ms to 1 second, and the segments sometimes overlap. In addition, Roads mentions, that FFT is a "fast Fourier transform" in which each block of data generated by the FFT is called a frame (ibid.). Each frame contains two things: (1) a magnitude spectrum that depicts the amplitude of every analysed frequency component; and (2) a phase spectrum that shows the initial phase value for every frequency component (Roads 1999a: 550-552).

2.5.7 Amore 5.1

In this study I have used the spectral voice and sound analysis program Amore 5.1 as a tool to represent the voice analysis parameters in time, frequency, and amplitude. The program is suitable for analysing voice and sound in general; moreover, it is flexible and accurate in the macro- and micro-analysis of the voice. The basic technical data of the program is based on Fourier analysis, in this study, mainly STFT and FFT.

Technical data

Audio Monitor/recorder for 32-bit. Windows, demonstration version 5.1

Written by Kari Sikiö/Medivisio Ltd. Copyright 1996-2000.

Windows version 4.90, CPU type, Intel Pentium

Signal information:

Sampling frequency 44100 Hz

Resolution 16 bits

Channels 2

Average bytes/s. 176400

Action mode monitoring

Spectrogram Type: magnitude (dB)

FFT Window function: Hanning (-31 dB sidelobe, -18 db/octave roll off)

FFT Window samples: 512 data, 1024 total

Frequency Band varies 0 - 5000 Hz

Frequency axis type: linear

Intensity: low/medium

Hue Change: white-black

Music is converted to wav-Microsoft Waveform file with Awave ACDR v2.0, PCM 16-bit stereo, F.I.R. filter, Re sampled all waveforms 11025 Hz

2.6 Performance Analysis

What does performance reveal of the composer's Gestalt?

The performance is an important part of the composition, because Igor Reznikoff's chants are created partly during the performance. My analysis of performance is based mainly on descriptions of the emotional space and expressions in that space (on this method, see Ch. 3.5.4; see also the analysis in Ch. 5.1.4.9). Antonio Camurri *et al.* represent performance theory in the GMA; see also, Godøy and Jørgensen (2001: 181-289) and Clynes (1989: 75-83). Reznikoff's chants are based on words, neumes, and their chironomic signs. Neumes represent, according to the Solesmes tradition (Mocquereau 1989), the ascending or descending gestures of the hand in outlining the melody. Hence the main neumes indicate a rise or fall of the voice, normally without showing the precise musical interval. These signs belong to the milieu of oral traditions committed to memory with infinite patience (Mocquereau 1989: 148-150).

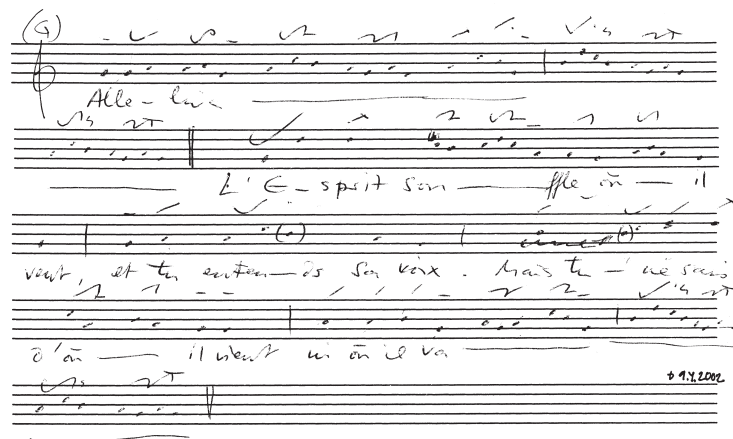


FIGURE 23 Chironomy signs, and neumes in the chant Alleluia: *l'Esprit souffle* (Reznikoff 2002).

Emotions and sounds, are according to Sundberg (1987), hidden body movements, and these invisible body movements can be found also in the laryngeal cartilages mostly involved in the regulation of voice pitch. Particular patterns of expressive body movements are typical of specific emotional modes, and these are translated into acoustic terms in voice production, so that voice function exemplifies the way the body movements may be coded into acoustic signals (Sundberg 1987: 152-156).

Traditionally, performance concepts have been analysed by descriptions, and such is the main analytic method in this study. In addition to description, Antonio Camurri *et al.* (2001) have created research frames to analyse the expressiveness of a performance. To be more specific, they have developed computational models to analyse music/dance/video performances interactively. For example, the analysis method MEGA (Multisensory Expressive Gesture Application) analyses physical emotions of the performances. I have used in the GMA some parameters of the MEGA theory, such as body-movement analysis, and expression or gesture analysis, along with descriptions of the performance. These parameters can

according to Camurri *et al.* (ibid.) appear in three levels of the music: high level, mid-level, and low level. The high-level refers to semantic concepts, and to synaesthetic and kinaesthetic metaphors. The mid-level features relate to semantic spaces, or maps, gestures, and Gestalten. The low-level concerns characteristics of the dynamics of the movement, and they are related to expressions such as tempo, sound level, spectral shape, articulation, attack velocity, pitch, and texture (Camurri *et al.* 2001).

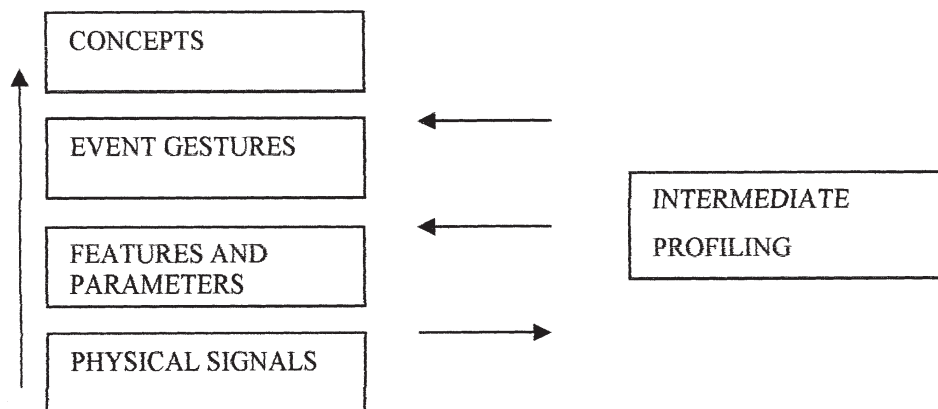


FIGURE 24 A layered conceptual framework (Camurri *et al.* 2001).

A Gesture is defined by Camurri *et al.* (2001) as a body motion that conveys information. Many gestures in artistic contexts are called expressive, which means they do not denote things in the outer world, but convey information related to the emotional or affective domain. Expressiveness in gestures is conveyed by a set of temporal and/or spatial characteristics that operate more or less independently from the denotative meanings of those gestures. These gestures have certain universal patterns and general rules. On a semantic map (mid-level), categories of semantic features are related to emotion and expression on a predefined grid. A gesture is a trajectory in this space, and each trajectory can be seen as a point in a trajectory-related space. Figure 25 shows the “emotional space” that Camurri *et al.* have used in computational analysis, and it is applied in this study with descriptions concerning the emotional state of the performer. The emotional space is usually divided into zones with symbolic names such as happiness, sadness, and excitement. Borders between zones, as well as emotional coordinates and forces, can be fuzzy (Camurri *et al.* 2001),

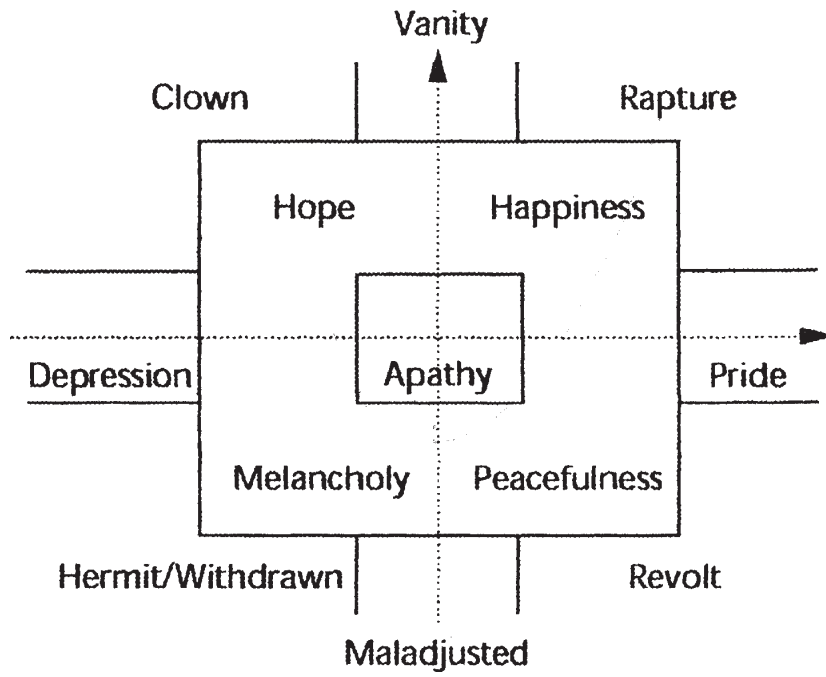


FIGURE 25 Segmentation model of emotional space in performance analysis (Camurri *et al.* 1998).

3 THE GESTALT MUSIC ANALYSIS METHOD

How to find a composer's Gestalt and Gestalt quality of the music?

This part of the study focuses on the methodology of analysing the Gestalt quality of a composer's music: the Gestalt process of the music, the composer's creative and individual Gestalt, and other results of using GMA. I explain in detail various methodological views and components of the method, and give examples of how to adapt the method to analysis.

For modern Gestalt theory in the field of cognitive musicology, the object of research is the human mind. "Soft" methods such as field work, interviews and observations belong to the analysis and broaden understanding of musical thinking; also included are "hard methods" such as computer analysis and modelling of the mind (Leman and Schneider 1997; Louhivuori 1997). Although the main interpretation in the GMA is done from the perspective of the (musical) mind, musical thinking cannot, according to Louhivuori (ibid.), be separated from the role of the human body in perception, nor from action through bodily movements, as occur, for example, in performances. The composer's physical activities figure largely into compositional processes, and the ways our mind adapts itself to a musical environment depends on the instruments through which the mind communicates with the external world. Louhivuori (ibid.) states that the philosophical background of cognitive science is based on physicalism. Consequently, the process of creating music in performances, as well as listeners' experiences of the music, add a physical aspect to the GMA analysis.

Philosophically, the method stresses the phenomenology of consciousness. Ehrenfels's theory of Gestalt quality is philosophical in nature, and is thus based on perception of music in the conscious mind. According to Castaneda (1980: 23), philosophy is mainly linguistic and relates to patterns of different types of experience, be they perceptual, theoretical, aesthetic, or religious. Phenomenology deals with what is "present to the mind when we exercise our senses", and concerns "whatever is in consciousness when something is seen, touched, heard, etc." (Guttenplan 2001). The phenomenal refers to that which passes through our consciousness in perception, and these phenomenal states or events are often called sensations, sense-data or qualia (qualities) (ibid.: 471). In music analysis the phenomenological method describes how the listener hears and the "gestalt" the music (Batstone 1969: 94-95). To this mental perspective we can add the physical aspect, how the music is felt in the body, and how that feeling accords with cognition.

I have structured the GMA method in four different parts, which I introduce and explain in the following figure and chapters. The first part is based on a music analytic view; the second part, on the composer's musical creation; the third part is based on listeners' perception and experiences of music; and the fourth part derives from traditional Gestalten that influences the composer's music and musical thinking.

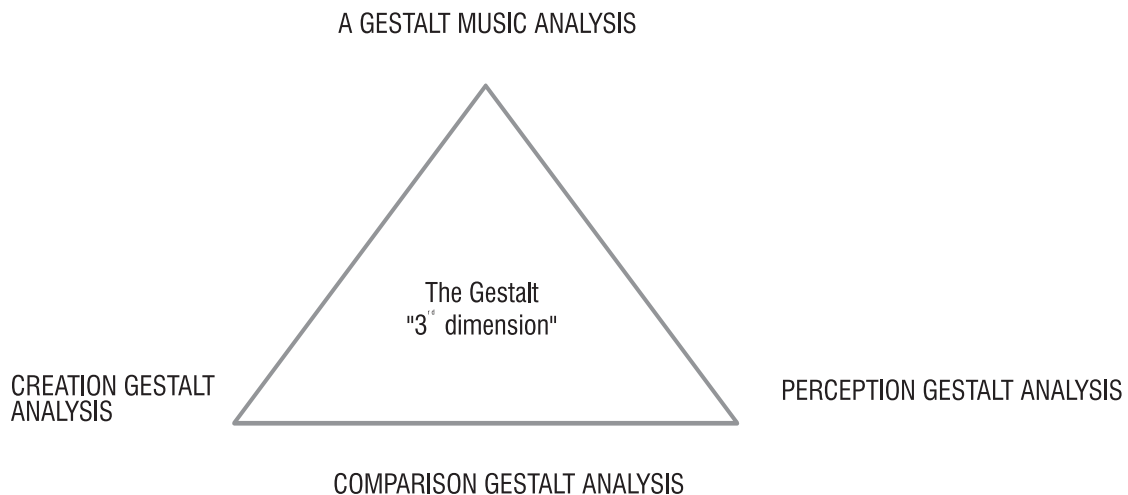


FIGURE 26 The GMA model.

3.1 The Representation of Music in the GMA

In the GMA music is represented and analysed with symbolic, acoustical and sub-symbolic representations, which are based on Leman's theory (Ch. 2.3.1). Acoustical and sub-symbolic representations are the main ones used here, but the analysis may contain symbolic representation as well.

The acoustical representation consists of spectral analysis of the music (sound spectrum) in time-frequency and amplitude level, and it is produced with Amore 5.1 program. The sub-symbolic representation in the GMA deals with musical images, experiences, and associations, as well as performance analysis. Leman states, for example, that the "sub symbolic account is often connected with [the] aural description level and may also account for 'non symbolic knowledge' [...]" (1993: 132-135). Symbolic representation consists mainly of the words of the chants (linguistic), but also includes neumes and other signs. As Leman notes with respect to representation theory: "a sub symbolic representation is diffuse from the beginning, and it can initially [be] defined as the level between the acoustical and the symbolic representation" (ibid.). Consequently, in the present I specify the acoustical representation of a two-dimensional sound spectrum with time (t) and frequency (y) axis. The three-dimensional sound spectrum is specified with a time-frequency-amplitude (x, y, z) axis as the "inside" sound (mental or spatial), from which the symbolic representation is transformed so as to cover "outside" space with symbols and signs (Fig. 27). Between these inside and outside representations is the sub-symbolic level of representation, which consists of phenomenal experiences, or inner images of music, from which the transformation into symbols occurs as a result of an "inside-outside" process.

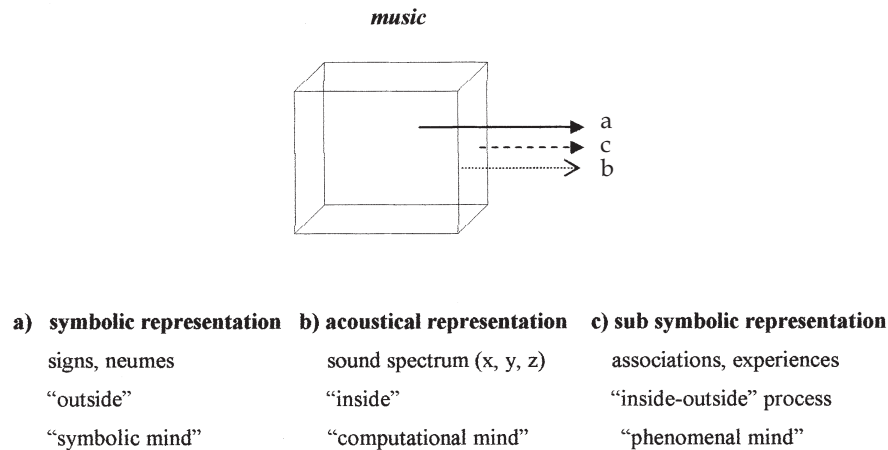


FIGURE 27 Author’s sketch of symbolic, acoustical, and sub-symbolic representation in the GMA.

In the GMA I hypothesize the transformation process of music such that listening-perception analysis, based on experiments, represents the *phenomenal mind*. The acoustical representation or sound spectrum represents the *computational mind*. Words, neumes and other signs represent the *symbolic mind*. One aim of the analysis is point up, in macro- and micro-structural details, any correlations between the representations, particularly interesting formulas and meaningful moments (Gestalt qualities). More specifically, my aim is to outline a method by which to analyse and interpret the phenomenal mind and computational mind in music analysis, as the relate to certain narrative and other formulas capturing musical experience (Ch. 1.2).

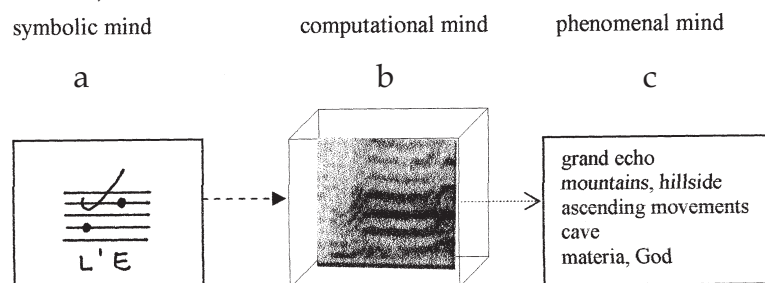


FIGURE 28 Reznikoff, *Alleluia: l’Esprit souffle*. Different representations of the syllable / l’E /: (a) the syllable symbolically represented with “staff notation”; (b) the syllable as acoustical representation (part of the sound spectrum); (c) sub-symbolic, linguistic fragments of the syllable.

3.2 The Gestalt Music Analysis

Is the musical Gestalt founded sporadically or systematically?

Here the GMA method first analyses music according to context, and then in terms of content. Linguistic analysis (words of the compositions) comes next, and then the whole composition is analyzed audibly and visually at the macro-structural level, according to formula theory. Finally, interesting and meaningful musical phenomena are analysed and interpreted on the micro-structural level. In what follows I stress formula analysis in explaining and describing the content of musical segments.

A Gestalt analysis concerning the composition process was carried out in interviews. Analysis of performance took place, to which were compared the composer's comments, so as to reveal the composer's creative gestalt (see Figs 26 and 29).

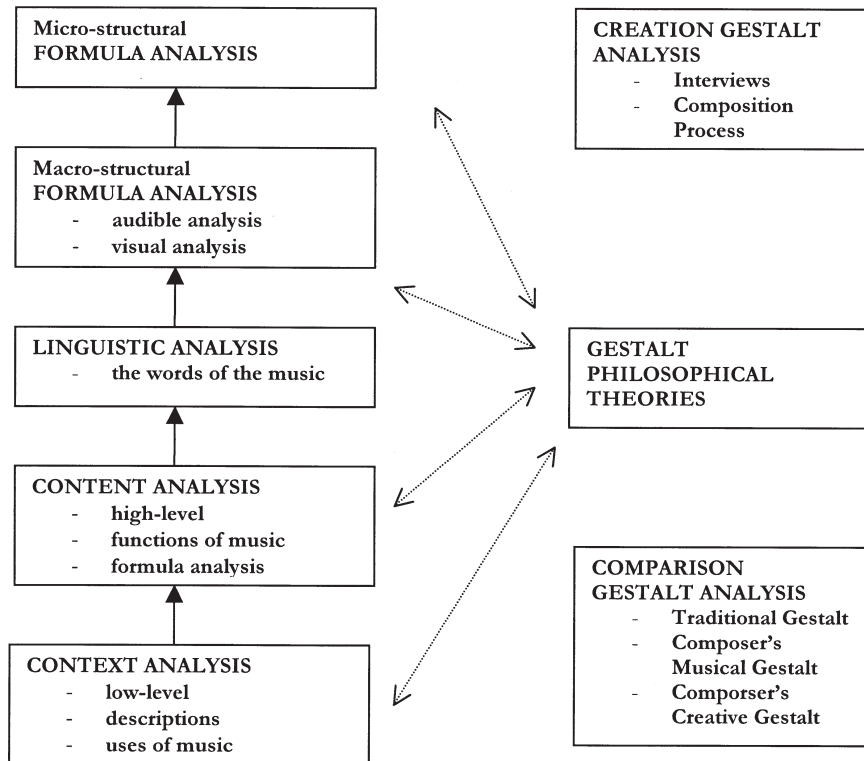


FIGURE 29 Basic model of the GMA.

3.2.1 Context Analysis

The context analysis deals with broader problems of understanding the musical phenomenon; it is a low-level perspective of the music. In context analysis, the musical whole is analysed with *descriptions* and according to its *uses*. Music description, for example, analyses musical style, text and textual sources, tonality or modality, melody and harmony, as well as rhythm and features of the sound spectrum. Music can be listened to in order to increase factual knowledge of it (Merriam 2000). Further, we want to describe where and in what situations the music is used, how it is practised, and how it is used in a given society (as a part of folk evaluation). Another aim is to clarify whether the music is secular, liturgical (sacral), or generally ritualistic.

3.2.2 Content Analysis

Content analysis is divided into the *functions of music* and *formula analysis*. Focusing on both macro- and micro-structure, content analysis represent a high-level perspective on the music.

The functions of music relate to the "big" questions (Merriam 2000: 209-227). What is music? Why is the music what it is? What does the music consist of?

What does it mean in a society, and why is it practised? In chants, the words and their relations to the sounds represent the deeper meaning of the music or culture, in other words, the semantic, symbolic and linguistic content. Such content deals with the connotations and denotations of the music.

Formula analysis at the macro-structural level concerns how compositions are divided audibly and visually into musical patterns or “algorithms”. Formula analysis at micro-structural levels produces detailed spectral descriptions of the music. Based on the visual and audible findings of macro-analysis, the micro-analysis can reveal interesting formulas, or formula paradigms, their relations, and details of the voices, such as phonemes and formants.

3.2.3 Linguistic Analysis

Linguistic analysis relates the meaning of a composer’s inner Gestalt with the words of the music. What kinds of words are favoured, and why? What does it mean for the composer to select certain kinds of text? Linguistic or symbolic analysis reveals the inner meaning of the texts, whereas the acoustical or spectral analysis reveal the vocal qualities behind the texts (words, syllables, and phonemes). Sub-symbolic representation reveals the phenomenological associations, experiences, and feelings as they relate to words conjured up in the mind as one listens to the chants.

Alleluia.
l’Esprit souffle où il veut
et tu entends Sa voix,
mais tu ne sais ni d’où il vient,
ni où il va.
Alleluia.

FIGURE 30 Words of the chant *Alleluia: l’Esprit souffle.*

I have used the following analysis process, adapted from Alan Merriam’s (2000: 187-208) theory of song text, in dealing with issues of linguistic description: (1) cultural context: in what country the text originates; (2) original style of the texts: prose, poetry, sacred or secular; (3) people and groups who use the texts; (4) reasons why they use the texts; (5) situations in which they use the texts; (6) sources of the texts: notation or oral traditions; (7) style of singing the texts; (8) ways of studying the texts and chants; (9) meaning of the text.

Niiniluoto (1999) states that the semantic content of linguistic expressions derives from the life-styles of the speakers. He also reminds us that one word may have several different meanings (homonyms), and that two different words can mean the same thing (synonyms). One word or sentence in a given situation can serve many functions at the same time. They may be positive or negative as to the feelings they project (for example, “holy God” may be taken in several ways). Therefore, linguistic meaning can divide into a main meaning and a “cued” meaning (Niiniluoto *ibid.*). A sentence consists of cognitive meaning when it can be evaluated as true or false (propositional content). At the same time, a sentence may consist primarily of emotional meaning when the emphasis is on feelings or values. In short, the main meaning of a sentence can be cognitive or emotional or both (Niiniluoto 1999: 90-117).

Linguistic analysis is crucial to this study because Reznikoff's chants are based on Biblical and liturgical texts, in addition to the troping, musical and verbal, that is typical of Gregorian tradition. According to Niiniluoto (1999), in the Middle Ages linguistics separated the form of the word into its referent (the Gestalt to which the word refers) and its meaning, or significatio (the concept the word produces in the human mind). According to Niiniluoto, "if we know in what kind of 'worlds' the sentences are true, then we know their meaning" (1999: 130-131). If we accept this statement as true, it causes some problems with my linguistic analysis, one of which is interpreting the genesis of biblical narratives. Quoting Markus (1996: 39): exegesis has always taken place within "the bounds of a textual community, or groups 'organized around common understanding of a script'. But even between the successful biblical interpreters Augustine and Gregory" disagreements arose in their individual interpretations. For example, says Markus, "Gregory could read his world through the Bible with an ease Augustine could not have dreamed of. The significations of the text that Augustine had to struggle to recover, for whose validation he felt driven to identify rules, gave Gregory little or no trouble. He could see straight through them - or rather past them - to the world of the spirit ... " (Markus *ibid.*).

In the present study I respect biblical norms of interpretation, but I stress the more general relationship of signification in my analysis. That is to say, I lean toward more of a cultural and universal view, and tend to play down the "double relationship of signification" (Markus 1996: 7-11). I have analysed the words as signs of universal symbols, of experiences of universal phenomena in the human mind. Another statement by Markus may help to qualify my approach to linguistic interpretation: "[Exegesis], we can say, is the incessant commentary that a culture makes on its symbolism, its gestures, its practices.... Exegesis proliferates from inside; it is a speech which nourishes the tradition of which it is a part, whereas interpretation emerges the moment there is an outside perspective, when some in a society begin to question, to criticize the tradition, to distance themselves with regard to the histories of the tribe" (1996: 38).

3.3 Formula Analysis

Is the formula a pattern of our musical thoughts?

Formula theory is a fundamental concept in the GMA method. I have defined the formulaic parameter in terms of theoretical aspects of the music¹. The music in this case is Gregorian chant of the Middle Ages, which consist of melismatic, neumatic and syllabic chanting that is analagous to spoken language; for example, the Alleluia-formula and how its choral *refrain* (alleluia) and *jubilus* are performed (Ch. 5.1.2). In addition, the definition of the formula is based on traditional music analysis, as well as the analysis program (tool) and sound spectrum analysis.

More specifically, by "formula" I mean an acoustical and sub-symbolic representation of music, and also a symbolic musical unit that is defined according to audible and visual analysis. The formula consists of a beginning, ending, and

¹ My definition of "formula" may be extended to modern music, and need not be limited to traditional or folk music.

the relations between them, as well as sound spectrum content (Ch. 3.3.7) and paradigmatic structures (Ch. 3.3.1, Fig. 32). The length of a formula, in the present study, ranges from a single vocalisation (phoneme, syllable or word) or sound, to an entire melismatic phrase.

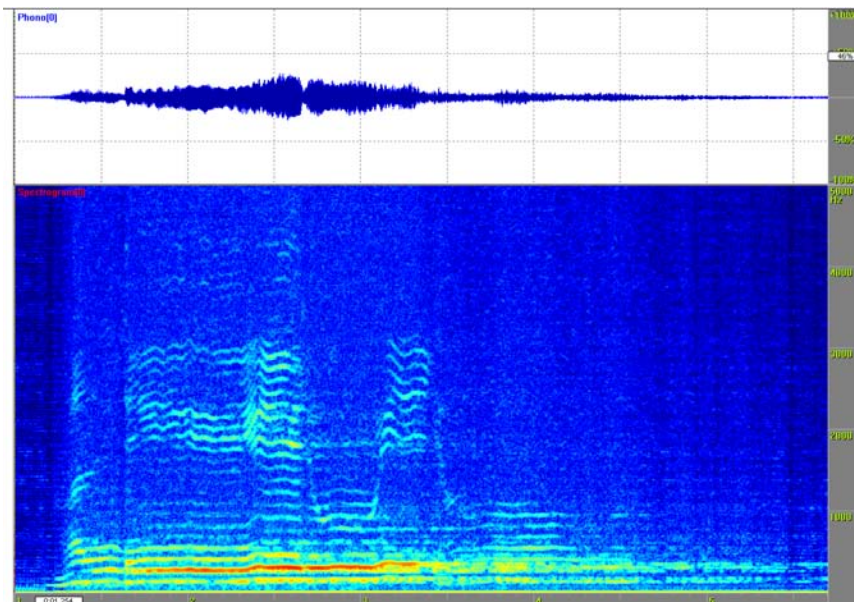


FIGURE 31 Sound spectrum (acoustical representation) of the Alleluia formula (0:01 - 0:06, 5000 Hz).

3.3.1 Formula Structure

I have defined the formula structure in the GMA according to its process and its analysis parameters (Ch 3.2, Fig. 29). First, we analyse the musical whole into forms on the macro-structural level, for example A B C, in which “form” designates a musical sentence or other unit of the chant. Then we analyse the forms by dividing them into formulas; for example A: a1, a2, a3; B: b1, b2; and C:c1, c2, in which the formulas are phrases, words, or smaller formula-paradigm units such as vowels, consonants, or phonemes. Thirdly, we carry out a contextual formula analysis that consists of melodic formulas, harmonic formulas, and sometimes rhythmic formulas. Using the results of the macro-structural analysis, we define audibly and visually what we take to be important in analysing the micro-structural level of the formulas and their interrelations. The focus may be, for example, on a syllable, a phoneme, an emotional/expressive musical paradigm, or some other micro-structural phenomenon.

When the whole composition is structured into forms, formulas and formula paradigms, they are arranged into a structural schema (Fig. 32):

Form	A ¹				A ²			B ¹	C ¹			A ³			B ²		C ²			A ⁴			
Formula structure	a'	a'	a'	a'	a'	a'	a'	b'	c'	c'	c'	a'	a'	a'	b'	c'	c'	c'	a'	a'	a'		
Formula paradigm	a	a	a	a																			
	1	2	1	2																			

FIGURE 32 Structural schema of the formula analysis of *Alleluia: l'Esprit souffle*.

3.3.2 Formula Parameters

Next I define, explain, and illustrate the formula Gestalt parameters of the GMA. Figure 33 displays an acoustical representation (sound spectrum²) of the composition *Alleluia: l'Esprit souffle*, which I divide into forms and formulas. The sound spectrum is represented with temporal (melodic) and non-temporal (harmonic) Gestalt quality-parameters of the music, according to Ehrenfels' procedure (Fig. 10). We may analyse³ visually the melody in the sound spectrum from the y-axis with the parameter fundamental frequency (fs0); we may analyze the frequencies of the partials (or harmonics) from the y-axis (Hz), as well. These components (x, y) generate the aural sphere of the voice timbre⁴ in the sound spectrum.

In addition, time is represented in the sound spectrum on the x-axis, and frequency on the y-axis. The time-domain amplitude is represented with the symbol z. Together these generate the analysis parameters of the whole sound spectrum (Fig. 33):

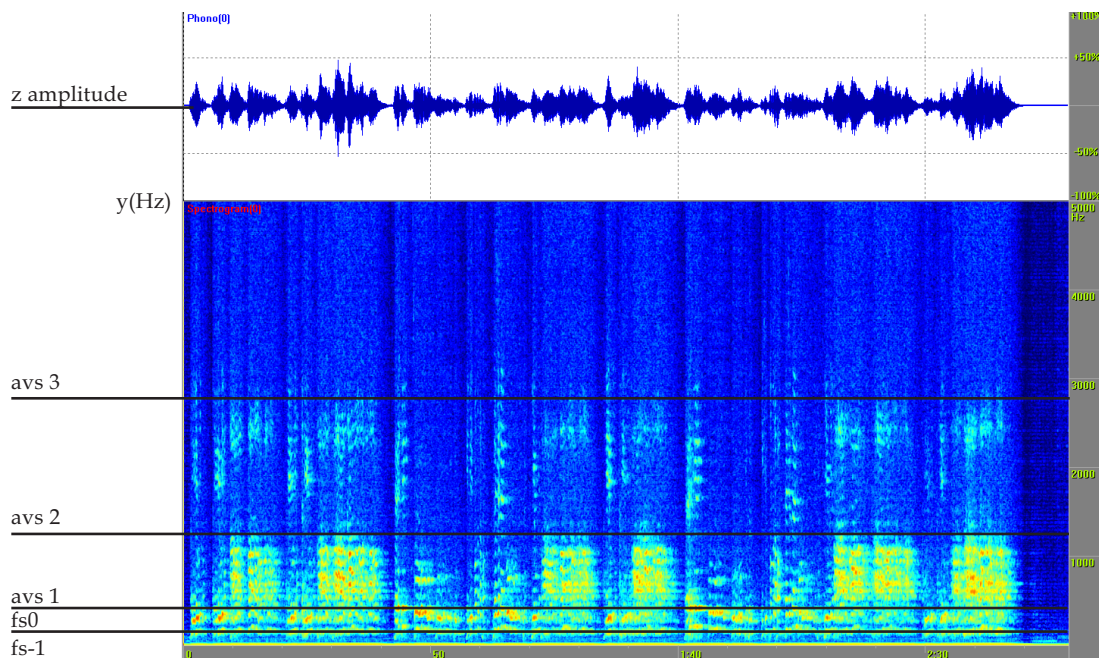


FIGURE 33 Acoustical formula analysis parameters in the sound spectrum of *Alleluia: l'Esprit souffle*. Time is represented in the sound spectrum on the x-axis, and frequency on the y-axis. The time-domain amplitude is represented with the symbol z.

² The sound spectrum best illustrates the voice, by providing visible information of every wave pattern (e.g., variations in the amplitude or fundamental frequency). The visualized sound spectrum is also closest to the physical properties of the sound. By contrast, visual notation is more suitable for developing performances of the music.

³ The analysis is both audial and visual, done approximately at the same time with the Amore-program software.

⁴ "Spectrum and timbre are related concepts, but they are not equivalent. The spectrum is a physical property that can be characterized as a distribution of energy as a function of frequency[...] Psychoacoustics uses the term 'timbre' to denote perceptual mechanisms that classify sounds into families; therefore timbre concerns the perception of sound signals" (Roads 1999: 544).

⁵ Low-level and high-level are Ehrenfels's definitions of Gestalt quality levels, in which he distinguishes higher and lower Gestalten from each other. Higher Gestalten are those in which the product of the unity of the whole and multiplicity of the parts are greater (Smith 1988: 123; quoting von Ehrenfels 1932).

3.3.3 Aural Voice Space

Fs0 denotes the fundamental frequency of the voice. It is the sound that insantiates the melody (phonation frequency curve) and vocal qualities (onset, duration, ending) to be analyzed.

"**AVS**" (aural voice space) is my own term, with which I designate a vocal sound spectrum as measured in vibrations-per-second (Hertz, or Hz). **Avs1** is the lowest avs level⁵ of the whole sound spectrum, in which the timbre (= frequency levels of the overtones or partials) is stressed. The analysis parameters in the avs are as follows: (a) voice timbre (sound colour), appearing as dark or light in the spectra; (b) harmonics, or overtones. In the GMA we can interpret the sonic impression of the music with the avs. It is moreover a way to compare the sound spectrum to one's perceptions of hearing the music, such that the voice timbre with fundamental **fs0** represent or may correlate with the emotional or aesthetic features of the music⁶, while the amplitude represents the intensity of the voice. According to Sundberg (1987), for example, the overtones above 1 kHz are most powerful in anger, and the overtones below 1 kHz are weakest in sorrow. The phonation frequency (**fs0** in GMA) in anger is higher than it is in a neutral state, and sorrow is represented with low phonation frequency and few variations.

AVS2 is the main avs level of the whole sound spectrum in Hz⁷, and stresses the frequency levels of the harmonics (voice timbre).

AVS3 is the highest avs level of whole the sound spectrum in Hz, in which the frequency level of the harmonics (or voice timbre) is both seen (and heard) with the analysis tool Amore⁸.

Fs-1 is the avs level below the fundamental frequency **fs0**. In this study it is hypothesized as an unconscious representation of the voice (see, e.g. [Freud, 1923b]; Strachey 1989: 18), and also as the physical or bodily aspect of the voice (see, e.g., Clynes' sentic states [1989:27-28]).

In analyzing the sound spectrum, I have used the following FFT frame parameters of the Amore 5.1 program:

Whole composition:		
Amplitude		30 percent of the frames ⁹
Spectra	Frequency	5000 Hz
	Time	whole composition in seconds/FFT frame
	Colours	white/black screen, medium intensity
Forms and formulas:		
Amplitude		30 percent of the frames
Spectra	Frequency	1500 - 5000 Hz
	Time	one form or formula
	Colours	white/black or black/white screen, medium intensity

⁶ Cogan & Escot were among the first to theorize and analyze what they call "sonic design", or the colour of sound and aesthetics (1976: 327-401).

⁷ The frequency band varies in the GMA between 0 - 5000 Hz.

⁸ In this study I use visual and aural analysis. The visual analysis of sound spectra, done with the Amore-program, takes place at approximately the same time as the aural analysis.

⁹ The spectral representation of the musical formula is divided into time-frequency frames with axis (x, y). The total height of the y-axis is 100 percent, and it is divided into amplitude in the upper part of the frames; the sound spectrum is shown below the amplitude representation. This 100 percent we can divide into the ratio of 10 - 90 percent of the frames, according to the parameter of interest. For example, a representation of 10 percent amplitude to 90 percent sound spectrum, or vice versa, etc. (see the original sound spectrum in the list of bibliographical references).

3.3.4 Melodic Formula

By “melodic formula” in the GMA, I mean the musical thought of the composition. Melody is explicated by use of the sound spectrum together with aural analysis. The main analysis parameters are the fundamental frequency line in Hz of the sound spectrum with the symbol fs_0 , and its first overtone,¹⁰ along with the amplitude representation of the form and formulas.

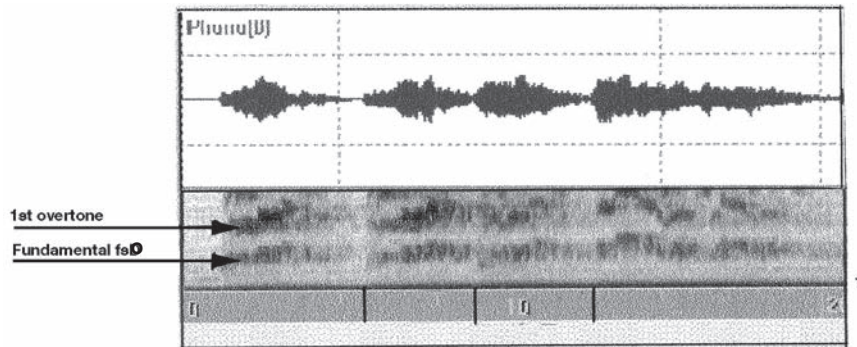


FIGURE 34 Melodic formula: Fundamental frequency (fs_0) and its first overtone.

From the fs_0 in the sound spectrum we can analyse different movements of the fundamental frequency; for example, the stable fs_0 , increasing fs_0 , or decreasing fs_0 . The melodic movements of the whole composition are indicated as a variation ratio of the fs_0 , which consists of the beginning, the lowest, the highest, the average, and the ending fs_0 measured in Hz. Figure 35 shows the fundamental frequency of the whole composition with a graphic diagram; in the left side of the frames appears the beginning frequency of the fs_0 (83 Hz), followed by the lowest frequency of the fs_0 (37 Hz). Next represented is the highest frequency of the fs_0 (240 Hz), and finally the ending frequency of the fs_0 (134 Hz).

We can also analyse the variation ratio of the voice movements by indicating the beginning, lowest, highest, and ending fs_0 's of the form or formula.

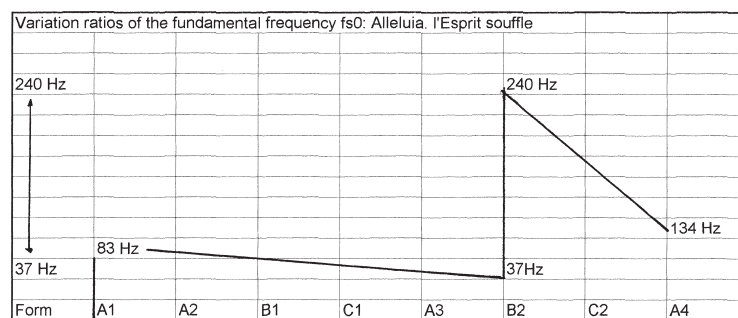


FIGURE 35 Variation ratio of the fs_0 across the whole sound spectrum according to fundamental frequency movements across the sound spectrum.

3.3.5 Harmonic Formula

Harmony is an apprehension of a momentary state, of “non-temporal Gestalt qualities”, and it designates a spatial shape of the music (Fig. 10). Together with

¹⁰ In vocal analysis the fundamental frequency and its first overtone express the main features of the voice (see, e.g., Laukkanen & Leino 1999: 76-77; and Fig. 20).

the melody (temporal Gestalt qualities), the harmony creates an aural sphere of sound colour - in our study, that of voice timbre - according to the perceptual view in psychoacoustics.

Harmonic relations to the fs_0 are one parameter of harmonic formula analysis, in which the fundamental fs_0 generates overtones or partials with harmonic relations (whole multiples) to the fs_0 , or dense spectral bands including noise and consonances (Fig. 36). The harmonic formula is used to analyse and interpret spectral features with avs parameters (Ch. 3.3.2). Questions here include, What are the avs levels? Does the fs_0 in the formula consist of clear overtones or dense spectral bands? And what kinds of overtones and spectral bands are they? Another aim is to determine if and how spectral musical features correlate feelings and emotions in the experiencing of music.

Taking a psychoacoustic point of view in perception, we may interpret the voice timbre from the sound signal in the harmonic formula in connection with the sonority (sound colour) of light or darkness together with aural analysis (analytic and experiential).

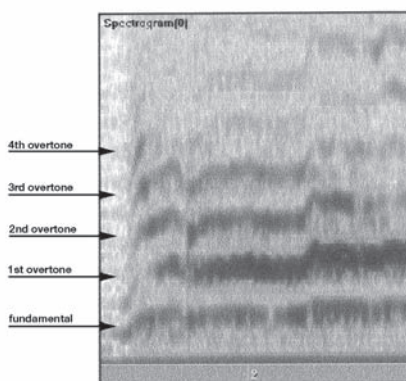


FIGURE 36 Harmonic formula A1:a1 in which the fundamental fs_0 generates overtones or partials with harmonic relations to the fs_0 in *Alleluia: l'Esprit souffle*.

3.3.6 Rhythmic Formula

Rhythmic formula in the GMA refers to linguistic and/or musical time units or segments, that consist of variations of short and longer note values based on theory of melismatic, neumatic, and syllabic phrases (formulas), of words or of vowels and consonances. These features are discussed and analysed in the formula content analysis (Ch. 3.3.7). In the present study, rhythms arise from the natural pronunciation and emphasis of freely pulsating text, based on Biblical and poetic meters and phrasing. In practise, the rhythmic formula structure can be seen from the structural schema of the formulas or formula paradigms (Fig. 32) and in the sound spectrum with amplitude (Fig. 37). Formula paradigms are analysed and discussed in more detail later, in the formula store analysis (Ch. 6.6), in variation formula analysis (6.7), and in the microstructural formula analysis (Ch. 3.3.14). One function of the rhythmic formula analysis is to interpret emotional features (mood swings, emotive changes) of the music, and to give a physical measure of the music (pulse rate, heartbeat).

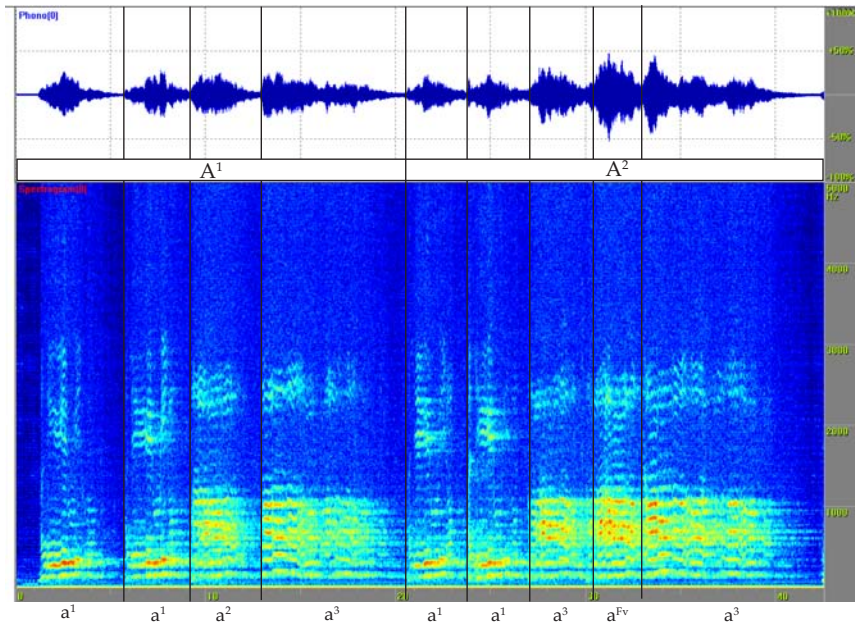


FIGURE 37 Rhythmic (time-unit) formula structure in forms A^1 and A^2 in *Alleluia: l'Esprit souffle*.

In rhythmic formula analysis we first structure the whole piece of music into parameters (forms, formulas, formula paradigms) measured in seconds or milliseconds on the time axis of the sound spectrum. Thereafter we analyse and interpret time-unit formula parameters such that a short rhythmic formula is symbolized with s , and lasts less than 7.5 seconds; a long rhythmic formula is symbolized with L and lasts 7.5 seconds or more; and an extra-long rhythmic formula is symbolized with eL and lasts 100 seconds or more. In the GMA I interpret short formulas (s) as representing energetic and/or emotional outbursts; long or melismatic formulas (L) represent background emotions. The extra-long formula (eL) represents or expresses a sustained emotional/musical mood.

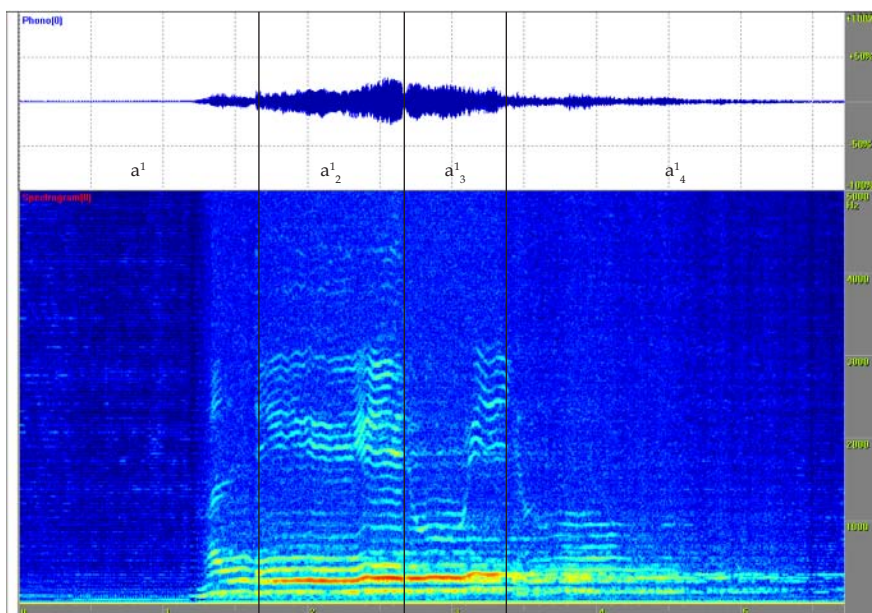


FIGURE 38 A rhythmic formula and its paradigmatic structure in the formula $A^1:a^1$.

3.3.7 Formula Content

After defining the formula structure of the music, we give content to the formulas. Content, characterized very roughly, consists of mental events, states or processes (Peacocke 2001:

219-225). This leaves open the possibility that unconscious states, as well as conscious ones, have content. Content is specified by and associated with, for example, words and sentences (Peacocke *ibid.*; see also, Dennett 1969). In this study, the formulas are defined by content, such that each one is given a symbol Fa, Fb, Fc, Fd, Fe, or Ff; the formulas are based on the grammatical rules and conventions of Gregorian chant. This means that the definitions of the words in the formulas correspond to the musical melody, or fs0, of the voices. In addition, I have analysed formula content visually from the sound spectrum, using a software program (Amore) along with *ad hoc* aural percepts.

The Fa formula is a *melismatic formula* in which one vowel corresponds to one or many tones.

The Fb formula is a *neumatic formula* in which one syllable corresponds to 2-4 tones.

The Fc formula is a *syllable formula* in which one syllable corresponds to one tone.

The Fd formula is a *mixed formula* that consist of variations in voices, vowels, words, notes, and phonemes.

The Fe formula is an *unexpected formula* with dissimilar voices that does not belong to Latin chant style.

By Ff formula I hypothesize an *unconscious formula* consisting of sound (or noise) that is not categorized as music.

For example, the following is the formula content structure of the *Alleluia: l'Esprit souffle*, according to the formula content analysis:

Formula content

A1: Fc / Fc / Fd / Fa

A2: Fc / Fc / Fa / Fd / Fa

B1: Fc / Fa / Fc

C1: Fc / Fc / F (d)¹¹a

A3: Fc / Fc / Fa

B2: Fc / Fa / Fc

C2: Fc / Fc / F (d)a / Fd / Fa

A4: Fc / Fc / Fd / Fa

In the following Figures 39 to 44 I have illustrated different formulas according to their musical and linguistic content.

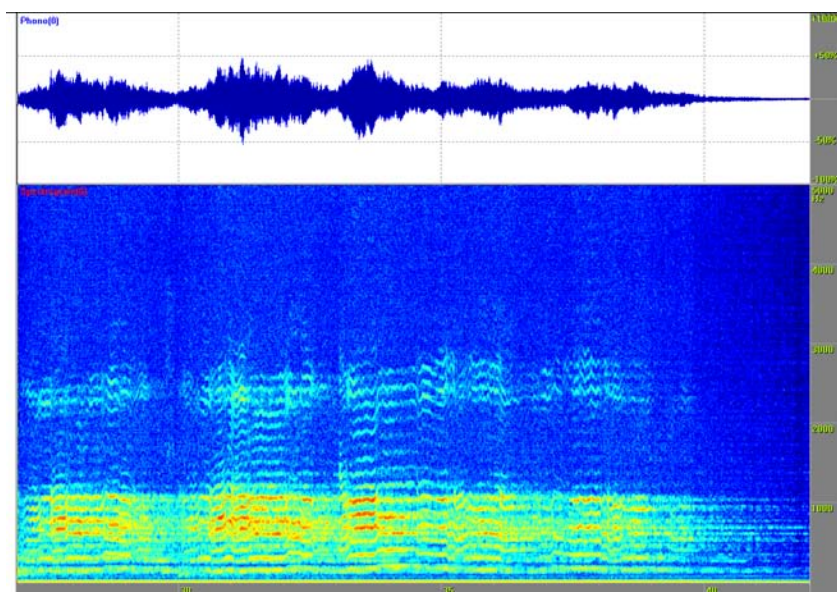


FIGURE 39 Sound spectrum of the melismatic "alleluia" formula Fa (A1:a1) in *Alleluia: l'Esprit souffle* (0:27-0:42, 5000 Hz).

¹¹ The F(d)a formula means that the formula begins with a short mixed formula Fd, and continues with a melismatic formula Fa, which is the main formula content.

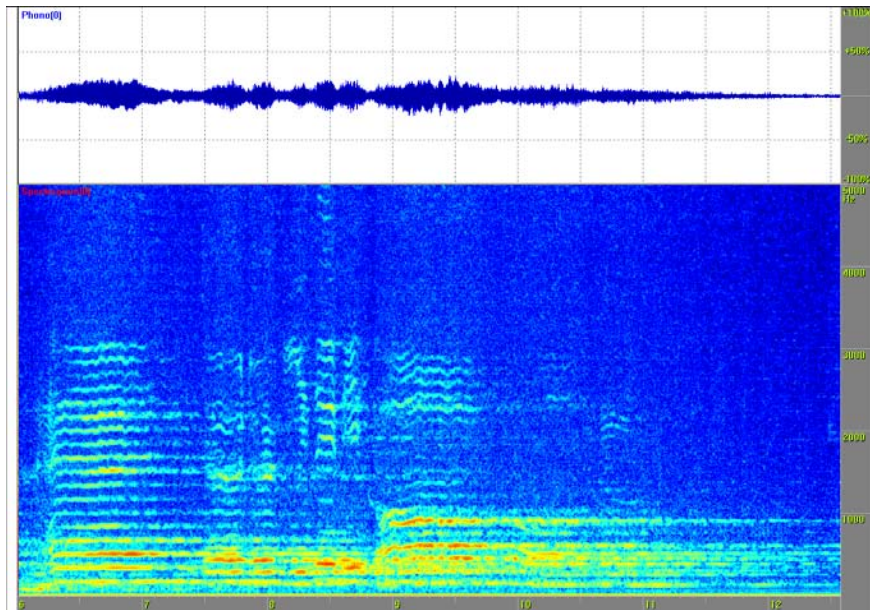


FIGURE 40 Sound spectrum of the neumatic formula Fb (A:a1), “Reine de Misericorde”, *Salve* (0:06 - 0:12.6, 5000 Hz).

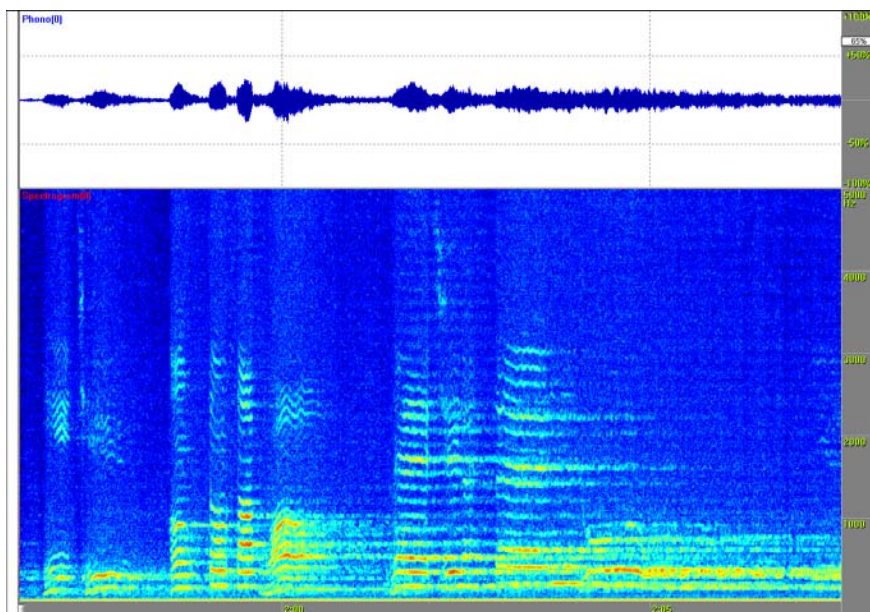


FIGURE 41 Sound spectrum of the syllable formula Fc (C2:c1), “Et tu entends sa voix”, *Alleluia: l'Esprit souffle* (1:56.4 - 2:07.6, 5000 Hz).

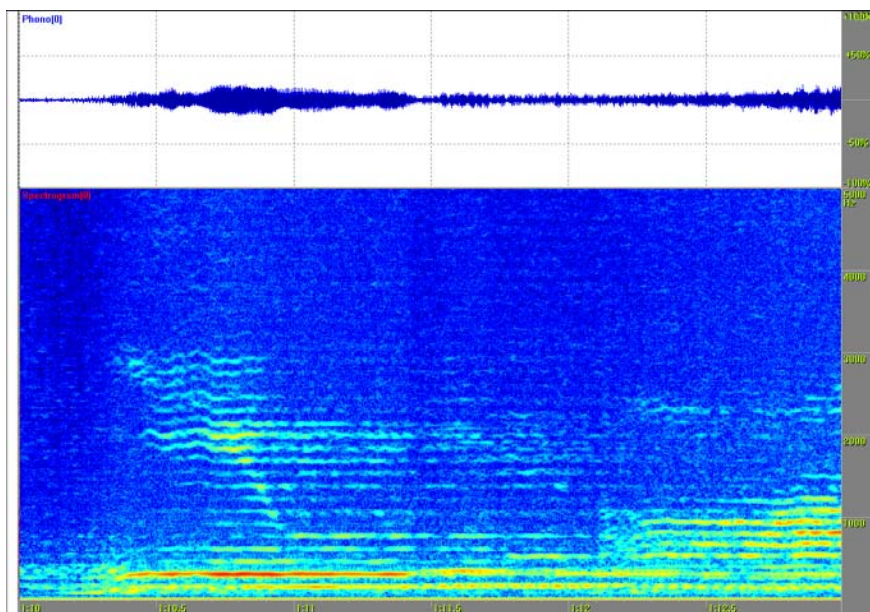


FIGURE 42 Sound spectrum of the mixed formula Fd (C1:c3), "niu", *Alleluia: l'Esprit souffle* (1:10 - 1:13, 5000 Hz).

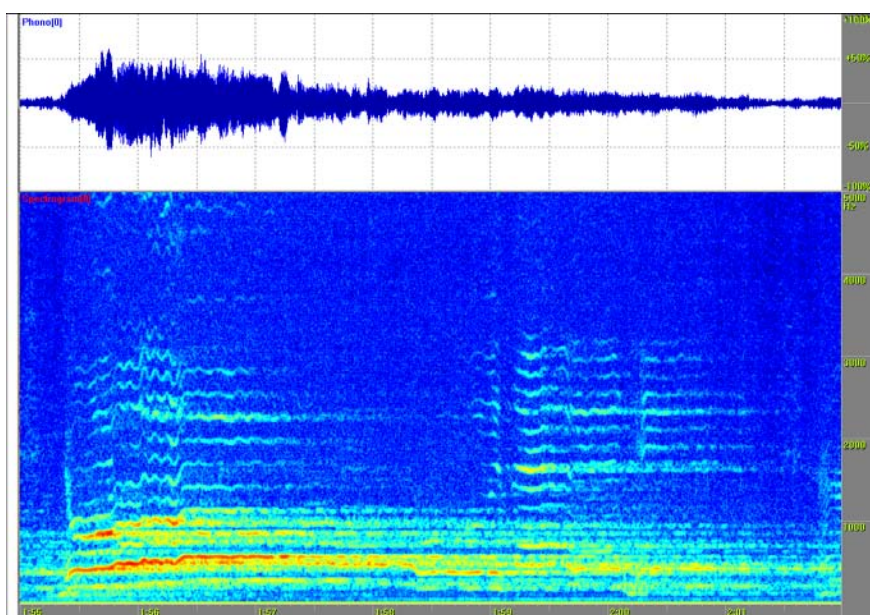


FIGURE 43 Sound spectrum of the unexpected formula Fe (B2:b3), "Nous et ne", *Une lumière a resplendi* (1:55 - 2:02, 5000 Hz).

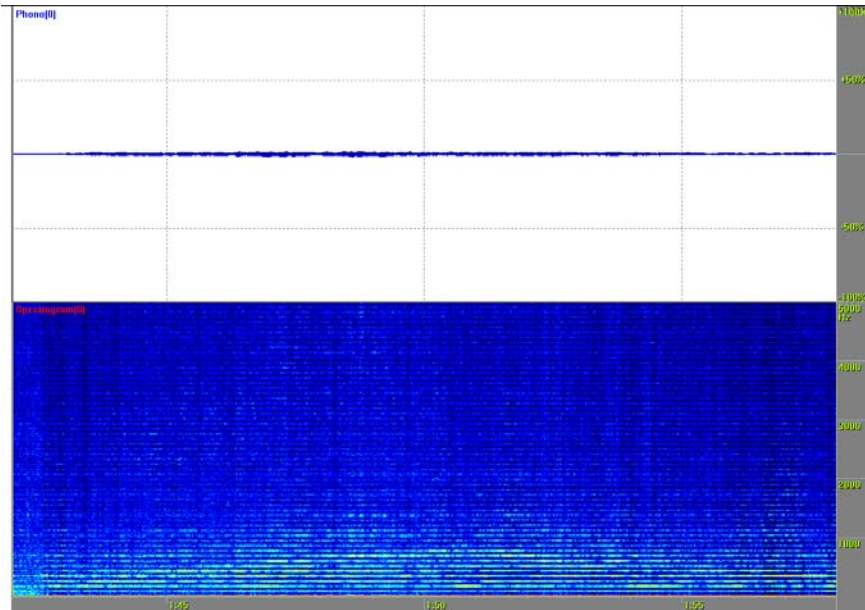


FIGURE 44 Sound spectrum of the vowel / ou / of the unconscious formula Ff (A:a¹), *Liturgie Fondamentale* (1:42 - 1:58, 5000 Hz).

Next, we place formulas according to their content onto a musical content grid or schema, which is divided into the formula content levels on the y-axis, and formulas on the x-axis (Figs. 45 and 46). We may illustrate the formula content schema in different ways, for example, with the content centre (cc) schema, in which the (x) represents the average value of the formula content. Alternatively, we may choose to illustrate the schema of the content patterns. Both kinds of representation are used in this study.

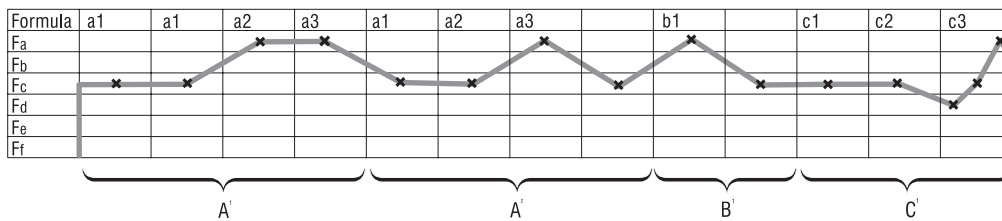


FIGURE 45 Formula content schema with content center (x).

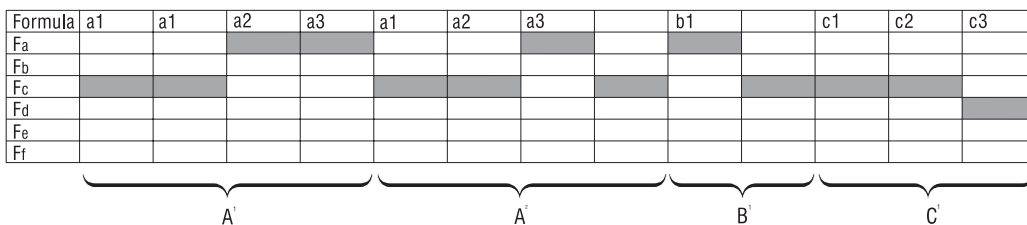


FIGURE 46 Formula content schema with content patterns.

3.3.8 Formula Levels of Consciousness

I have defined the formula content structure Fa to Ff in the GMA according to levels of content based on three philosophical states of consciousness: conscious, super-conscious, and unconscious. These correspond to psychological states or levels of mind: *Ego, Super-Ego and Id* (e.g. Freud 1923b). I hypothesize in the GMA that formulas Fb, Fc, and Fd represent *conscious formulas*; Fe and Ff represent *unconscious formulas*; and Fa represents a *super-conscious formula*. These conscious states are based on Damasio's (2000) theory of consciousness and kinds of self (see Fig. 7), and also on Dennett's (2.1.6) Multiple Draft model (1993), the author of which states that "different conscious levels are spatially and temporally distributed content-fixations in the brain, and are precisely locatable in space and time in parallel, multitrack processes of sensory inputs". In addition, I have used Sloboda's (2000), Heinonen's (1995, 1998), and Utriainen's (2001a) theories and models of the composition process as concerning both unconscious and conscious aspects. The work of Block (2001) has influenced my thinking, as has the following statement by Hopkins (2001): "mental states and processes, as well as a range of motives are often unconscious, or unaware states of mind". I accept Rauhala's view in my formula of the super-conscious: "cosmic consciousness, or united consciousness, or mystic experience, or ecstasy belongs above the clear state of consciousness, or super consciousness" (1992: 33-34).

At the core of the formula content levels (Fig. 47) is situated the unconscious formula level of consciousness of a proto-self. I hypothesize the formula Ff and Fe as representing the unconscious formula level in the GMA. Above the unconscious level is the conscious formula level of the core-self, represented by the formulas Fb, Fc, and Fd. Core consciousness borders these two levels. Therefore, in the schema the formula Fd can represent either an unconscious or a conscious formula, depending on its context and content. Damasio states (2000) that the autobiographical self is the highest level of self in consciousness. To this I add the super-conscious formula level: an Fa formula, having its own content and schema.

SUPER-CONSCIOUS FORMULA LEVEL

Fa Melismatic formula

- extended consciousness, autobiographical self

CONSCIOUS FORMULA LEVEL

Fb Neumatic formula

Fc Syllabic formula

Fd Mixed formula

- core consciousness / core self

UNCONSCIOUS FORMULA LEVEL

Fe Unexpected formula

Ff Unconscious formula

- proto self

FIGURE 47 Formula levels of consciousness (unconscious, conscious, super-conscious), types of self (proto self, core self, autobiographical self), and musical content.

3.3.9 Formula Circle

The formula circle in the GMA represents a “cognitive model of the (musical) mind” comparable to Dennett’s Multiple Draft model (see Ch. 2.1.6). The formula circle represents also a spatial dimension of time in the composition, a parameter that is currently used in computer music. In addition, the circle has been a typical structure in music, or its performance practice, or its association to music with plurality of “spaces”: for example, the musical notation of renaissance canons, or even the English “rounds”, and other cyclic forms (Trochmczyk 2001: 39-44). And in his unique work on music cognition, Manfred Clynes (1989) has formulated what he calls a “sentic cycle” to represent emotional states such as love, hate, anger, joy.

Historically, the circle has had a variety of general symbolic connotations. According to Tresidder (1999: 45-46), the circle signifies totality, perfection, unity, eternity, and completeness. In Jungian archetypal symbology, the circle represents the psyche or self (in relation to the body as a square). Similarly, in Gestalt theory the circle typifies unity, symmetry, regularity, reduction, and pictures a unified and harmonic totality. Good Gestalt (shape, form) has also a dynamic central point, according to some theorists (e.g., Katz 1948: 42-46; Karma 1986: 22-42).

In the GMA I have generated the musical formula circle (or spatial image of music) with the following steps. First, we have analysed the formula structure, and given the formulas a meaning or content. Then we transform the formula content structure into a content schema, in which time is represented on the x-axis, and frequency on the y-axis; this whole forms a two dimensional grid. Thereafter we transform the content schema into a circle in which the formulas are represented as follows: The super conscious formula Fa is in the outer circle. Conscious formulas Fb, Fc, and Fd are situated in the middle of the circle. Unconscious formulas Fe and Ff are located in the core of the circle. In addition, the state of compositional balance or equipoise is in the outer circle; whereas tension appears in the core of the circle.

I have defined different formula circles as *temporal* and *non-temporal representations*. Temporal representation denote phenomena involving time, and these formula circles are called content-centre formula circle and pattern formula circle. The content-centre formula circle is illustrated with the symbol (x), in a circle designating conscious formula levels of (musical) mind. The pattern formula circle is represented with formula patterns in a circle with conscious formula levels of (musical) mind. In the representation of the temporal formula circle, the musical forms and formulas generate time segments in the circle. In the present study, I use temporal formula circles.

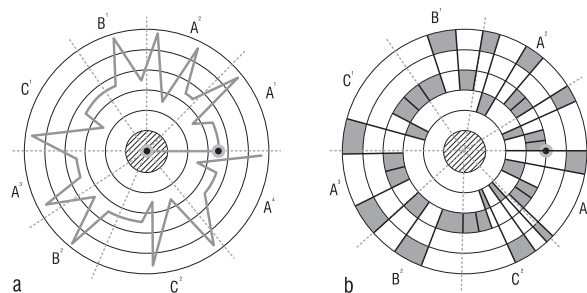


FIGURE 48 Temporal formula circles: (a) content-centre formula circle, in which the symbol (x) in a circle designates conscious formula levels of the (musical) mind; (b) pattern formula circle, in which the formula pattern in the circle represents conscious formula levels of the (musical) mind.

By non-temporal representation I mean that the formula circle representation does not consist of a time axis. I have defined non-temporal formula circles as the *circulation formula circle* and the *stable-point formula circle*. The former is my own hypothesis or adaptation of the modern neural representation of conscious (musical) mind. A circulation formula circle is represented such that one formula is illustrated with a whole circle in its conscious formula level. A stable-point formula circle consists of musical formulas and their representations as stable points in the formula circle (adapted from Leman 1995: 64).

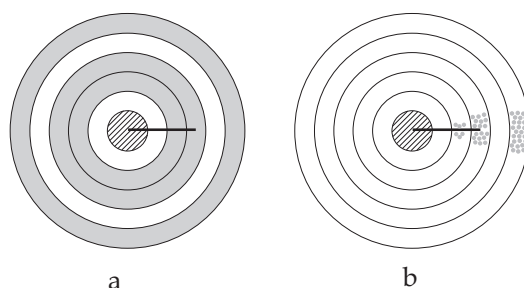


FIGURE 49 Non-temporal formula circles: (a) circulation formula circle, in which one formula is illustrated with a whole circle in its conscious formula level; (b) stable-point formula circle, in which one formula represents as a stable point in the formula circle.

The formula circle reveals formula positions in the circle; accordingly, it is hypothesized as a cognitive model of mind. By this I mean that we can analyse what segments and what conscious levels prevail, as well as what kinds of relations the formulas generate. In addition, we may interpret to what extent the compositions are either conscious or unconscious (right-brain, creative).

3.3.10 Formula Circles and Their Unity

Formula circle analysis shows how compositions have created different kinds of formula circles with the content of conscious levels. In the GMA, I have placed formula circles and their unity into three categories according to their main or prevailing formula content (Fig. 50): *super-conscious formula circle*, *conscious formula circle*, and *unconscious formula circle*. The definitions and terminology used here are my own. They are based, however, on prevalent Western and non-Western conceptions of how music is created. For example, Louhivuori echoes the traditional notion that “folk music is more based on spontaneous improvisations than [on] conscious considerations of musical results, in which the symbolic level and its meaning is insignificant or unsubstantial” (Louhivuori *et al.* 1999: 170).

The super-conscious formula circle, in this study, consists mostly of melismatic vocals. Musical features in the formula content level Fa are, for example, meditative, harmonic, “cool”, or sacral. This formula content level of a composition may also represent a mood that belongs to background emotions, according to Damasio (2000: 51-55). The super-conscious formula circle level is situated far from the core centre, or creative energy of the circle.

The conscious formula circle is situated in the mid-level, with formula content levels Fb, Fc and Fd, and its musical content consist of words or entire verbal phrases combined with Gregorian chant traditions. We may notice in the conscious formula circle musical features such as balance, be it formal, linguistic, or even physical/bodily.

The unconscious formula circle is situated at the core of the circle, which represents the symbolic transformation (creative) process in the GMA. Formulas

Ff and Fe we may also define as low-level formulas, and their movements are toward the core, toward the unconscious, toward the state of mental unawareness. These formulas also move immediately toward the outer formula circles in the creation process of music. We may notice in the unconscious formula circle musical features such as intensity, rhythmic busy-ness, and even “warmth”.

In the formula circle, we may evaluate the unity of consciousness with the percentages of different formula content Fa to Ff in their proportion to the whole. To exemplify different formula circles, I have interpreted the chant *Alleluia: l'Esprit souffle* according to this method as a conscious chant (the whole chant consists of 68.8 percent Fb-Fd formulas) and as a super-conscious one (consisting of 31.2 percent Fa formulas). Figure 50 exhibits different kinds of formula circles, in which the parameters are the author's own definitions or adaptations of terminology used by other writers.

SUPER-CONSCIOUS FORMULA CIRCLE	CONSCIOUS FORMULA CIRCLE	UNCONSCIOUS FORMULA CIRCLE
Outer-related	Balanced	Inner-related
Sacral	Western	Folk, primitive
Meditative	Symbolic	Creative
Echo	Words, meaning	Physical, intensive
Harmonic	Formal, learned	Rhythmic
Cool	Human	Warm

FIGURE 50 Formula circles classified according to their formula content: (a) super-conscious formula circle; (b) conscious formula circle; (c) unconscious formula circle.

3.3.11 Formula Relations

According to Gestalt theory, relations are important in different ways. In the GMA we analyse the relations among macro- and micro-structural levels of music in terms of forms, formulas, and formula paradigms. We can perceive and analyse these relations not just visibly, but audibly as well. We can hear audible relations from the tone pattern which causes transitions from one tone centre to another, in the process known as “modulation” (Leman 1995). Modulation is often characterized by an effect of hysteresis, which means a retardation in the transition from one point to the other because of a sense or effect of attraction. Leman (*ibid.*) also mentions that audible perception can be created in the perceiver's mind by different kinds of effects and images; for example, the more intense the transitions are in the formula content, the stronger the impact of the music is on the perceiver, as occurs, for instance, in modulation between different keys. Small fluctuations can also have a maximal perceptive impact, and may even cause a so-called “catastrophe” of perception, for example, in transitions between syllables, words, or phonemes (Leman 1995: 61-68). In this study, such transitional phenomena are analysed at the micro-structural level.

3.3.12 Formula Structure Relations

3.3.12.1 Acoustical Formula Relations

We can divide acoustical formula relations into spectral and amplitude ones in the macro- and micro-structural levels of music. By this we mean the relations

between time-frequency and time-amplitude representations. We may categorize these relations as stable, increasing, and decreasing ones in the fs_0 .

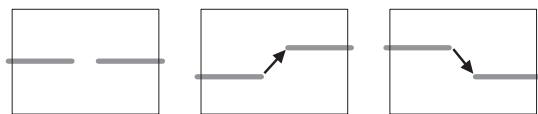


FIGURE 51 Formula relations: (a) stable, (b) increasing, (c) decreasing.

The analysis of form, formula, and formula paradigmatic relations consist of descriptions in time-frequency levels in the sound spectrum. The aim is to discover what kind of phenomena occur mainly between the fundamental frequency levels (fs_0), and in the transition of one formula unit to another, in which overtones also play a role. Figure 52 shows three different examples of spectral relations in *Alleluia: l'Esprit souffle*.

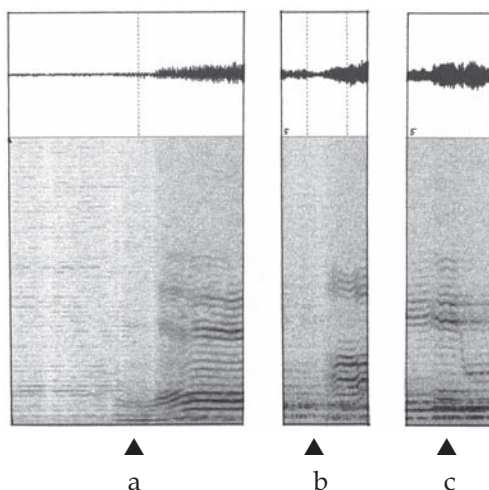


FIGURE 52 *Alleluia: l'Esprit souffle*: (a) form relations between A2 and B1; (b) formula relations between A1: a^1 - a^2 ; (c) paradigmatic formula relations between the syllables / le / - / lu / (A^1 : a^1 ; a^2 ; a^3)

In the acoustical relation analysis I have used the following FFT parameters of the Amore 5.1 program. All macro-relations are framed and analysed with these time-frequency and amplitude parameters.

The relations of the formulas	
Amplitude	30 percent of the frames
Spectra	Frequency 500-5000 Hz
Time ¹²	circa one second (0.5 + 0.5 seconds) / FFT frame
Colours ¹³	black and white or white and black, medium or high intensity

¹² In the sound spectrum, 0.5 seconds of the fs_0 in previous formula is shown on the left, and 0.5 seconds of the fs_0 in the following formula (right); between these are shown the relations of the formulas.

¹³ We may analyse the formulas with positive or negative representations. In the positive representation the ground area is white, on which the sound/voice is represented in black. Conversely, in the negative representation of the sound spectrum, the ground area is black, on which the sound/voice is represented in white. I have used in the analysis such a representation which gives more accurate information of the focused parameter in the sound spectrum. (I have verified the analysis results with coloured representation).

3.3.12.2 Amplitude Formula Relations

Time-domain representation may be used to analyse amplitude relations in the macro- and micro-structural levels of the sound spectrum. Macro-structural analysis employs different forms or formulas, along with their amplitude relations. Analysis of micro-structural amplitude relations compares the structure of two formula paradigms, such as relations between syllables or phonemes, or unexpected voices or expressions. The main focus in the GMA is on macro-structural amplitude relations. Further, and depending on the results of the formula analysis, some relations between smaller units of the formula will be discussed and illustrated with AM modulation.

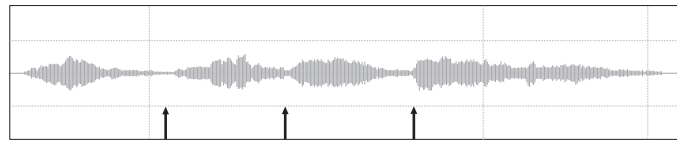


FIGURE 53 Amplitude representation and relations of the formula paradigms (shown with arrows) in *Alleluia: l'Esprit souffle*.

The amplitude relations may be divided into three categories: (1) stable amplitude relations, (2) increasing amplitude relations, and (3) decreasing amplitude relations (Fig. 51). In the stable representations, the previous amplitude and the following amplitude representations are almost at the same level of air pressure in time. In the increasing amplitude representation, the former amplitude is at a lower degree, and it increases to a higher level in the succeeding amplitude onset. In the decreasing amplitude representation, the preceding amplitude is at a higher level and decreases to a lower level of air pressure in time. In addition, we can use percentages in the amplitude relations to show how strong or weak the amplitude pressure is at the onset of transition.

3.3.13 Formula Content Relations

Acoustical formula relations can also be analyzed from the formula content schema, or from the formula circle, by evaluating the distances between formula content levels (0 +/-5). These relations we may analyse visually and aurally from the macro-structural level (Fig. 54). Figure 55 illustrates one example using the formula content schema.

Formula content levels and their distances:	
Level	Transitions and distances
Constant	formula level is the same
+/- 1	formula level increase or decrease with one level
+/- 2	formula level increase or decrease with two levels
+/- 3	formula level increase or decrease with three levels
+/- 4	formula level increase or decrease with four levels
+/- 5	formula level increase or decrease with five levels

FIGURE 54 Formula content levels and relations in the formula content schema.

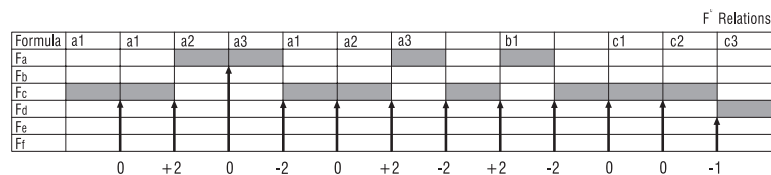


FIGURE 55 *Alleluia: l'Esprit souffle*: spectral formula content levels and relations in the formula schema.

In the GMA analysis we may assign meaning to the formula content levels and their distances, according to the following definition (adapted from Leman 1995):

Relations	Meaning
Constant	formula contents are in balance; their content are of the same style
0 - +/- 3	level of thoughts varies somewhat
0 - +/- 4	the effect of hysteresis
0 - +/- 5	the effect of catastrophe

3.3.14 Micro Analytical Formulas

Based on the results of the formula analysis, we may find different, interesting, or unexpected formulas on the micro-analytical level. For example, we may discover an emotional formula in the fundamental frequency fs_0 , or an expressive formula in performance analysis, or a creative formula in the composition process, or even a genetic formula applicable to the entire piece. These findings are discussed in Chapters 5, 6 and 7 and we may interpret these phenomena as foundational Gestalt qualities or meaningful moments in the GMA.

The relations between micro-structural formula paradigms, such as vowels, phonemes and voices, create what I shall call a “voice signature”¹⁴ in the amplitude representation or in the sound spectrum, in which we use the fs_0 with its first overtone as the main analysis parameter (Ch. 3.3.4). These fs_0 relations may have, for example, the following meanings: *stable relations* that mean balance in relations or a neutral state in emotions; *increasing relations* that mean activity or joy; or *decreasing relations* that indicate sorrow (see Fig. 18; also, Ch. 3.3.17).

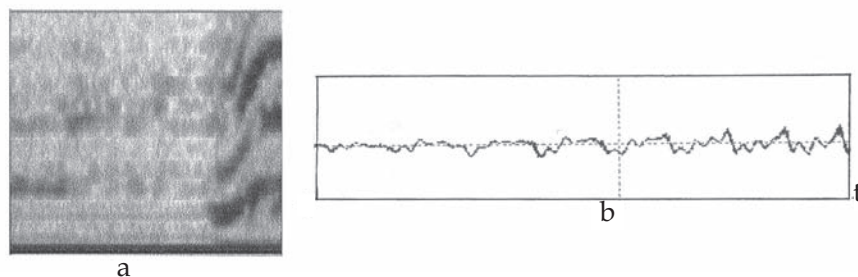


FIGURE 56 Micro-analytical representation of an hypothesized emotional formula in *Alleluia: l'Esprit souffle*: (a) sound spectrum (0:56.5 - 0:57.5, 500 Hz); (b) amplitude (0:57 - 0:57.1).

¹⁴ The sound spectrum also reveals the voice signature or “personal signature” (Clynes 1989: 78) of the performer, in which invisible vocal features become visible. These so called “still images of sound” (Roads 1999: 537), are of course approximation of the actual spectrum, and enable the viewer to see general features of sound, but a trained viewer can read the e.g. a speech sonogram (ibid.: 563). Interpretation of the analysis consists in some estimation, therefore we may criticize the results on the context of the analysis tool (here, the software program) and its limitations. But, when a musical phenomenon occurs similarly and repeatedly, we may draw empirical conclusions as to the interpretation of the “voice signature”. For example, in the present study Reznikoff’s chants evidence idiosyncratic voice movements (paradigmatic relations) that occur repeatedly in the fundamental frequency with its first overtone, while variations appear in the amplitude or sound spectrum.

In micro-relation analysis we may use the following spectral parameters of Amore 5.1:

Relations of the spectral formulas:

Amplitude		60 - 90 percent of the frames ¹⁵
Spectra	Frequency	max. 500 Hz, fundamental fs0 + 1st overtone
	Time	a few seconds to milliseconds / FFT frame
	Colours	black/white or white/black, medium or high intensity

Relations of the amplitude formulas:

Amplitude		60 - 90 percent of the frames
Spectra	Time	a few seconds to milliseconds / FFT frame

3.3.15 Formula and Phoneme Store

I have applied Louhivuori's formula analysis, so that formulas are categorized into formula or phoneme stores according to their similar linguistic properties and musical content, aside from the voice. The *formula store* consists, for example, of different variations or transformations of alleluias and their acoustical and audible representations; or the store may contain different kinds of representations in voices and phonemes. In this study the main focus is on those content formulas that appear in every composition, but other phenomena are discussed as well.

By *phoneme store* I mean formula paradigms that consist of vowels, nasal voices or vowels, consonances and fricatives. In this study the phoneme store consists mostly of melismatic, prolonged vocalisations.

3.3.16 Variation formula

The variation formula means a formula whose basic structure is similar to others of the same formula type; for example, formulas a1 in the forms A1, A2, A3, and A4. Variation occurs inside the formula. For instance, there is a variation in the form A2 in the *Alleluia: l'Esprit souffle*, which consists of variation formula F^v, and it can be denoted as an additional formula paradigm compared to the other, similar a formulas. Variations may consist of voice, chanting style, or of melodic, rhythmic, and/or linguistic formula content. These variations could be discussed, for example, in melodic formula analysis, but our focus is mainly on formula content analysis.

¹⁵ The spectral representation of the musical formula is divided into time-frequency frames with axis (x, y). The total height of the y-axis is 100 percent, and it is divided to the amplitude in the upper part of the frames, and sound spectrum below the amplitude representation. This 100 percent we can divide to a ratio of from 10 - 90 percent of the frame, according to what parameters are of analytic interest.

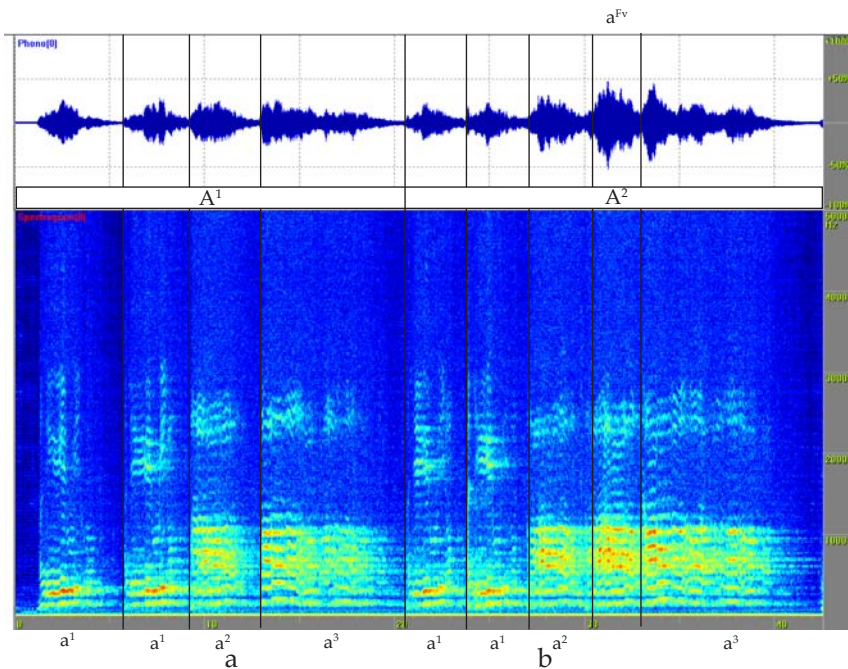


FIGURE 57 Alleluia variations in the GMA analysis of *Alleluia: l'Esprit souffle*: (a) basic formula structure in form A1; (b) variation formula Fv in form A2.

3.3.17 Emotional Formula

The emotional formula FE in the GMA is my own parameter. It refers to the audible or visual musical content of the formulas that may represent emotions or feelings in the music, and we may attempt to analyse it from the macro or micro-analytical level (see Ch. 2.5.3) with parameter FE. The focus in the study, to demonstrate and interpret the emotional content in the musical representation, is interesting, but it is very speculative and difficult to prove as an “accurate” result. Yet, in the GMA I have made theoretical and methodological, as well as music analytical discoveries and had results that may further the discussion concerning the representation of emotions in music. The macro-analytical FE may be revealed audibly, or visually in the sound spectrum of the music. Contrarily, we may reveal the micro-analytical FE in the acoustical representation of the music together with audible perception. The micro-analytical FE can be a short, but meaningful moment, and it can be confirmed by time-domain representation of the amplitude.

The emotional formula analysis consists of three parameters and their interpretation or effect on the whole. The first parameter is mode or mood of the voice, and its appearance in the listener’s consciousness with experiences or associations of feelings and emotions. The second parameter is the unexpected formula Fe and the features of which that formula consists. The third parameter is emotional formula content as evidenced in the sound spectrum with neutral, intensive or sad emotional formula content relations of the fs0 with its first overtone, or in the avs levels in the sound spectrum, or in the amplitude representations and their interrelations.

To be more specific, the *neutral emotional formula* means that the relations are stable, and in the fundamental frequency (fs0) the former fs0 and the following fs0 are stable. In addition, we may find in the fs0 that the voice consists of slow changes and no sharp contrasts. The harmonic avs in the sound spectrum remains in the main avs2 level, and the amplitude does not show sharp or intensive onsets; moreover, the voice remains stable, without sharp intensity.

In the *intensive emotional formula* we may interpret the voice phenomenon as consisting of anger or fear or other emotional states, depending on the strength of the voice (amplitude) and movements in the spectra (fs0). The formula relations in anger mean that the former fs0 is at a lower level and increases to an upper level in the following fs0. Fear can be manifested in many ways, according to Sundberg (1987: 149), with fast increases and decreases, as well as with sharp contrasts. In the intensive emotional formula we may find that the harmonic avs reaches the highest level (avs3), and the voice may consist of bursts or peaks that generate darkness or amplitude peaks ("pinning out") in the sound spectrum.

The *sad emotional formula* consist of low phonation frequency (fs0) with little variations. Formula relations in the sound spectrum occur in the fundamental frequency so that the former fs0 is at a higher level and decreases to the lower level of fs0, and the harmonic avs is at its lowest level (avs1). Amplitude onsets of the voice are quite flat or even. In addition, Sundberg's view (1987) that the overtones in anger are most powerful above 1 kHz, and weakest in sorrow, has an impact on the interpretation of emotion, mainly in the avs analysis (Ch. 3.3.3).

3.3.18 Genetic Formula

With the genetic features in music I hypothesize indigenous, aboriginal, or cultural-genetic features of sound, with which we may explain the origin and development of a person's musical activities. Hereditary, or genetic, information is stored in DNA and in its Gestalt with the chain A, G, T, C. This is called a genetic code, and it can be read and expressed with ternary code known as C A T (Haug *et al.* 1999: 63-68). In addition, Clynes (1989: 5-13) has used, in his theory of "sentics", a parameter of genetic code (in addition to molecular coding and genetic program) representing originary states of emotion. Basic genetic information is applied in this study to the analysis of micro-structural musical components of the voice. A genetic musical code may be found in ancestry and family history, genus, or gender. The focus of the genetic formula analysis is quite rare because of a lack of empirical, methodological and theoretical literature on the subject. Besides, I have used the parameter Genetic Formula in this study as a metaphor. With this study, we may gain more critical views and results on the focus, together with the field of genetic music analysis in general. For example Irma Järvelä (2003) and her research team have started a pioneering, three-year project that focuses on the genetic features of musicality; she starts with the hypothesize that musicality is a genetic feature. Kai Karma, too, is studying genetic musicality, for which he has generated a basic model. His experiments in determining musicality in a given family as yet remain inconclusive (Karma 1986: 81-88).

The focus in the GMA is to detect musical-genetic formulas (musical codes) from the sound spectrum. Intra-opus, a "genetic formula" designates micro-structural musical unit, or formula paradigm, that exists in every composition of delimited oeuvre. Extra-opus, the genetic formula may also consist in a creative impulse x, or tension, or vice versa. The genetic formula may be determined by aural and visual analysis, and its content can be a linguistic, melodic, rhythmic, or any other kind of phenomenon in a composition. In addition, the emotional formula (unexpected formula Fe) and the formula circle may express or reveal genetic features of music as well. Consequently, the genetic formula is an audible or visual phenomenon in the music, which I have hypothesized as creating or aiding in constructing the musical Gestalt, and therefore the composer's entire musical output.

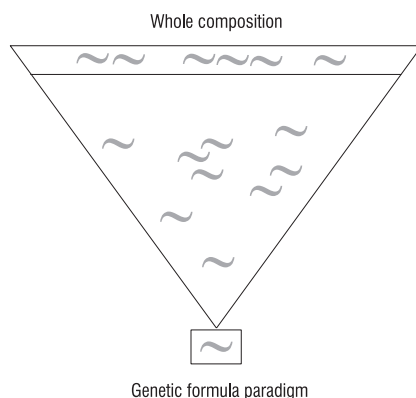


FIGURE 58 Hypothesis of the genetic formula that designates micro-structural musical unit, or formula paradigm, that exists in every composition of delimited oeuvre in *Alleluia: l'Esprit souffle*.

3.4 Perception Gestalt Analysis PGA

What Gestalt does music create in the listeners mind?

Music is a communication process in which a composer transforms his musical self-expression, thoughts, or meaning to a receiver (the listener). Our aim here is to discuss the phenomenological frames of perception analysis, and the model with which the perception Gestalt can be analysed.

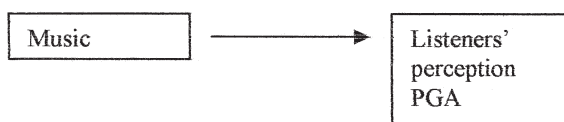


FIGURE 59 Basic perception process in the GMA.

3.4.1 Global and Analytical Listening

The GMA uses globally analytic and qualitative listening methods, based on the acceptance of Leman's view (1995: 61): "What is first heard globally, can later be heard analytically and vice versa, and listeners can concentrate on one of these aspects and control perception actively." The aim of the GMA is to bring insight into musical phenomena involved in the macro- and micro-perception of music. First, every composition is listened to as a whole¹⁶, without analysis; thereafter the compositions are listened to analytically (aurally and visually) in a detailed way, with a micro-perspective of the music given by the author.

3.4.2 Global Listening

The global listening in this study consisted of two parts, *Free association analysis* and *Standard Polarity Profile analysis*. The analysis used individual listeners or groups of listeners of different ages, some of whom were professional musicians and/or competent music listeners. The listeners were selected sporadically, and were sent a cassette that consisted of one composition together with a letter, as

¹⁶ The PGA was transcribed by the author in spring 2001 and is in the author's possession (see the references PGA1-4).

well as an envelope with which they could send their listening perceptions to the author. The aim of the first part, the Free association analysis, was to get listeners' immediate, phenomenological, "inside" (first-person) experiences and associations of the music, which they listened to at their convenience. With this method, the music is brought to the listener, and it creates phenomenal experiences. The analysis intended to reveal not just the feelings and emotions of the listeners, but also their physical sensations when listening to the music. We also asked for "outside", linguistic or symbolic expressions that they associated with the music. Here is our directive:

Write freely all the images, associations and experiences that come to your mind while listening to the musical piece. Write also your possible physical perceptions of the music. Do not correct your writings, because the right images are spontaneous.

This "inside-outside" perception process is a sub-symbolic and symbolic way of describing (Fig. 27) their experience of the music - sub-symbolic with the immediate images of the music, and symbolic with the words applied to their musical perception. This process is also a conscious mental process (Guttenplan 2001: 10), in which the feelings arise from the perceivers' mind in a "stream of consciousness" engendered by the music. The experiences are structured so that first the experiences or narrative fragments are in spontaneous linguistic order; then the author puts them in alphabetical order. Thereafter, the results of the free association analysis are grouped into linguistic patterns or sentence structures of *verbs, nouns, and others*. The nouns represent consciousness, and verbs represent acting/actions. When the words are in sequences of their content, they are compared with the Creation Gestalt Analysis (Ch. 3.5).

The Standard Polarity Profile consists of three different dimensions of the music that are expressed with pairs of nouns, and they are marked with an (x) on the questionnaire. The method is based and adapted by Rauhala's (Ertel) theory of analysing musical perception (Rauhala 1973: 91). With the method the perception of the music is measured with the following dimensions and their fifteen sub-parameters: *potency or strength, stimulation or disposition-surprising, and valence or aesthetic-pleasure*. These three dimensions evaluate the similarity or difference in perception, as well as the criteria reflected from the listeners themselves (ibid.)

Put the (x) in the grid where you feel the musical perception correlates with the nouns.

STANDARD POLARITY PROFILE									
VALENCE									
		-3	-2	-1	0	1	2	3	
Darkness									Lightness
Dissonance									Harmoniousness
Opacity									Clarity
Displeasure									Pleasure
Joylessness									Joy
STIMULATION									
Rest									Movement
Slowness									Rapidity
Leisureliness									Liveliness
Calmness									Excitement
Silence									Noise
POTENCY									
Softness									Hardness
Compliance									Purposefulness
Reservedness									Vigorousness
Weakness									Strength
Tenderness									Harshness

FIGURE 60 The Standard Polarity Profile grid with its dimensions and parameters (Rauhala 1973).

3.4.3 Analytical Listening

Analytic listening is a musicological perspective taken in the GMA, which means the music is analysed in a more detailed way after the global listening perception. This analysis was done by the author according to the GMA method introduced above, in Chapter 3.2, in which we first analyse the whole composition in macro-structural perspective, and thereafter analyse the micro-structure of the music according to the macro-structural findings, or “what is interesting or meaningful in the music”.

3.5 Creation Gestalt Analysis CGA

Does CGA reveal the composer’s musical Gestalt and its formation?

The CGA method deals with how the composer’s inner creative Gestalt and its formation can be analysed and interpreted. These findings may also reveal emotional, expressive, or even genetic formula content in the micro-structural level of music analysis. The CGA method consist of two parts. One represents “soft methods” of analysis such as interviews with the composer and performance analysis. By contrast, the formula circle represents the “hard science method” in the GMA.

Sloboda (2000: 112) claims that the composition process can be divided into “sketching with conscious compositional effort”, but also “what the composers say about their own compositional processes”. Leman (1999: 286) states that musical creativity is a process, which he divides into descriptive models of musical creation and computational models of processing. In the GMA, the formula circle represents the computational model of the creative process, whereas the CGA uses the descriptive model of musical creation.

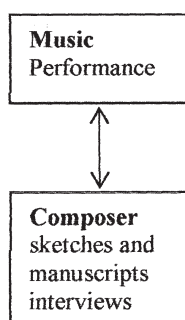


FIGURE 61 Basic composition process in the GMA.

3.5.1 Interviews

The composer is a person who often knows the meaning of the composition and the content of his music, because composing is mainly conscious musical thinking. Yet, it consists also of unconscious processes, which are unknown to the composer (Sloboda 2000; Heinonen 1995; Utriainen 2001a). The unconscious processes belong to Freud’s psychoanalytical view for example to the creative process in which the

unconscious was first in a purely descriptive term, and where “in the ego there is an unconscious, which behaves dynamically like the repressed unconscious” (Strachey 1989, xxviii). To determine how conscious or unconscious the composing process is, we may analyse and interpret it from the formula analysis circle in connection with percentages of the conscious levels in the GMA (Ch. 3.3.10). According to Louhivuori (1999: 170), music in the developed countries is created more consciously than is folk music, which is based more on spontaneous improvisation than on consciously decided solutions; in folk music, the meaning of the symbolic level is low. This view is also reasonable for this study, because “composing” ancient Christian chants, Gregorian chants based on Christian liturgical traditions, detailed instructions in modes, melody, rhythm and style - none of these may consist of improvisation or even of emotional expression (Grout *et al.* 1996).

The interviews in this study were done with a qualitative method, and the questions were structured as follows in the GMA: (1) information about the composition process of different chants; (2) the content of the compositions; (3) information about the composer’s own development as a chanter and composer. In parts 1 and 2 the questions were given on a questionnaire sheet, and part 3 was recorded on cassette tape. All interviews (In1-In5) were transcribed by the author. Here are some typical questions from the interview:

What is the main aim of the chant? How and when was it created? Does the musical piece mean something particular? Is there some important phrase, moment, or text that is emphasized in the chant?

3.5.2 Composition Process Analysis

According to Leman (1999), musical creativity is the production and realization of new and valuable musical output, for example, compositions, performances, and improvisations. In addition, he states that musical creativity is not only of musical products, but also of persons that are involved with musical information-processing. Moreover, a composer or a performer is creative when he or she does not only repeat what has been learned or what has been done before; on the contrary he or she emphasizes *unexpected phenomena* or *spontaneity* in compositions. Musical creativity is associated, for example, with novelty, originality, divine intuition, passion, and the courage to express personal emotions (Leman 1999: 285-286). This kind of creativity can be interpreted in the GMA with the unexpected formula Fe, or by movements in the formula circle. Ian Bent (1998: 117) states that Gestalt in music refers to the musical idea that consists of the main material of the composition, or the first creative thought from which everything in the piece can be derived. Yet, how is this musical idea created so as to form a musical whole, and how does it relate to the formulas in this study?

Studies have shown that in Gestalt formation, and following the law of Prägnanz, or “good continuation” (Katz 1948), the organism tries to behave in certain qualitative way. This law is based on sensory and senso-motoric phenomena, psychophysical vibrations of the organism, or the inner pressure of Gestalt. This can be exemplified concisely by the following process, which is adapted in models A and B in Figure 62: (1) First the Pre-Gestalt exists in the mental field; it begins with irregular figures that become more and more regular, for example, as in the closing of a circle or a triangle. (2) Second, we can perceive a strong Prägnanz, whose features are only slightly visible. (3) Third, the Pre-Gestalt receives its Gestalt.

(4) In the end, the tendency of the Prägnanz formation evens out, becoming a “Trace Gestalt” that can be followed to fulfilment (Katz 1948: 42-44).

Damasio (2000) argues similarly, that the kind of phenomenon such as the law of Prägnanz that is a self-conscious process, “a simple, and wordless story where there are people, and it develops in time; it consists of the beginning, middle and end. This kind of consciousness is defined as extended consciousness with many levels and grades, and it provides the organism with an elaborate sense of self. It is also a complex biological phenomenon, and it evolves across the lifetime of the organism” (Damasio 2000, Chapter 2.1.7). In Figure 62 I have hypothesized examples of a temporal or non-temporal Gestalt formation process with a circle. In the analysis, the final results will show what segments or formula levels in the circle have prevailed, and in what order they did so.

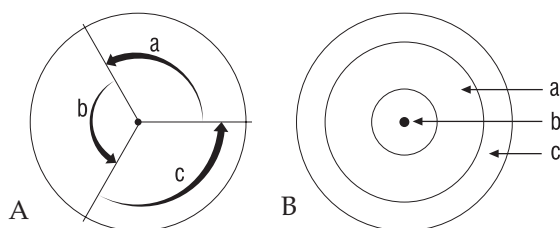


FIGURE 62 A Temporal Gestalt Process according to the author’s illustration: (a) Pre-Gestalt, (b) Gestalt, and (c) Trace Gestalt. B: Non-Temporal Gestalt Process. In A and B: first the Pre-Gestalt exists in the mental field, and we can perceive a strong Prägnanz; thereafter the Pre-Gestalt receives its Gestalt, and in the end the tendency of the Prägnanz formation tapers off, becoming a “Trace Gestalt” that can be observed to fulfilment.

3.5.3 A Model of the Composition Process

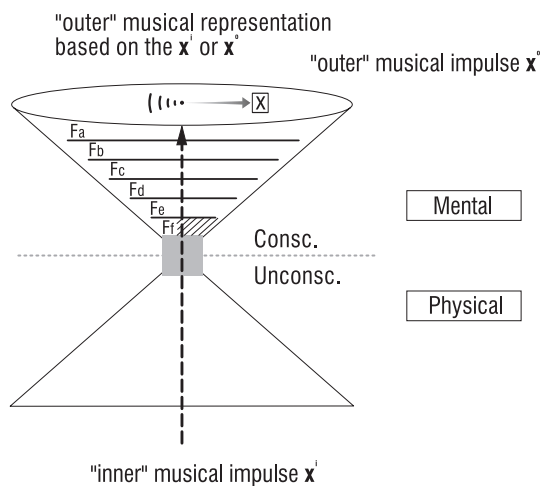


FIGURE 63 A composer’s creation process in the (musical) mind, in which the core consciousness is situated on the border of the mental and the physical; the core self is situated above the border; and the proto-self is situated below the border (the author’s figure).

In the model of the composition or creation process (Fig. 63) I have combined the law of Prägnanz with the formula circle theory and Damasio’s theory of the processes of consciousness (Ch. 2.1.7). It shows the core consciousness as situated

on the border of the mental and the physical; the core self is situated above the border; and the proto-self is situated below the border. In addition, I have adapted Dennett's Multiple Draft theory (Ch. 2.1.6) so that the formula content levels Fa to Ff represent the levels of musical mind with three hypothesized levels of consciousness: super conscious, conscious, and unconscious (see also Fig. 47). The model is a synthesis of these theories, so that the creation process is finally represented with the formula circle in the upper triangle, in which the x represents the initial act of creation or inner musical impulse. In the model I have also adapted Jackendoff's theories of the mind-body problem (Ch. 2.1.3), such that the crossing point of the triangles represents the black box in which musical thoughts condense or transform into symbols; in other words, it is the point at which the "inside-outside" process of symbolic transformation occurs.

The upper, top-down triangle in the model means the "outer" field of mental creation and the representation of consciousness in the (musical) mind, in which the formula circle is a result of the creation process according to the GMA. The lower triangle is the "inner" unconscious creation "field", and it represents a physical view of creation in which the creative impulse (xi) or (xo) is generated by the composer and transformed into symbolic musical representation. The creative impulse (xo) is created from "outer" space, but in the final creation process it is always processed via the unconscious "field" by a looping of the space.

3.5.4 Performance analysis

Performance is very important to Reznikoff's creative work. The chants are based on words and neumes, yet the final chant is created in the performance, so that the compositions consist of some variations. The interaction between space, listeners, and performance are described by Reznikoff himself (In1): "The concert went well, the acoustics and the contact with the audience was perfect".

In the present study, performance analysis is based on a videotape¹⁷ and descriptions of performance (field analysis); hence spatial orientation and movements in that space, as well as the bodily gestures of the performer (chanter) play a role in the analysis. The spatial characteristics and movements in it provide an architectonic illustration of the performance. Bodily movements consist of hand motions, in addition to motions such as walking and dancing in the given space. Gestural analysis dwells on facial and eye movements. The final aim was to reveal the emotional expressions in the performance, such as happiness, hope, melancholy, peacefulness, or apathy, all based on the emotional space in performance analysis according to Camurri's grid (Fig. 25).

¹⁷ Reznikoff's one performance (P1: *Tuuli puhaltaa [Alleluia. l'Esprit souffle]*) was videotaped in Viittakivi, Finland on 16.-20.6.2002. The video recording, its analysis and transcription are in the author's possession (see Ch. 5.1.4.9).

3.6 Comparison Gestalt Analysis CcGA

How to discern the composer's individual musical Gestalt through all the traditions?

How can one find the composer's own musical Gestalt when the compositions are firmly bound with musical traditions and style? By "traditional Gestalt" I mean musical style that is generally known in Western and other traditional music theories. For example, Igor Reznikoff uses the musical resources of St Gall (Switzerland) and their transcriptions and neumes. He uses modes from the Classical period, as well as ethnic singing methods, for example, Japanese and Mongolian styles. A model is needed that can account for both the composer's Gestalt and the traditional musical Gestalten.

The composer's own musical Gestalt represents his creative musical mind, which mirrors his personal self-expression in the music. Reznikoff explains that his music represents mainly ancient Christian chants, in addition to Gregorian

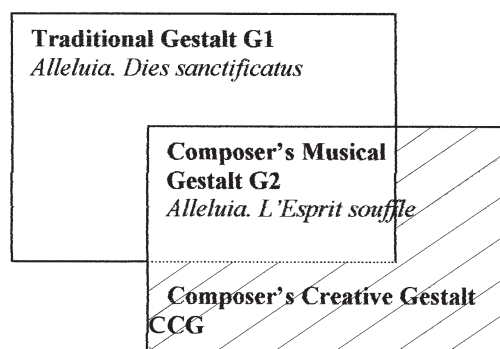


FIGURE 64 Model of analysis for comparing the compositions of St Gall (G1) and Reznikoff (G2) so as to reveal the composer's creative Gestalt (CcG).

singing style. Therefore, his personal musical Gestalt is hidden behind traditions. We can hear his style, but how to analyse it methodologically? This is especially difficult when the musical scores are texts, neumes, traditional chanting-phrases or formulas, and allusions to acoustical and performance clichés.

Model of the Analysis

The main aim of the analysis is to compare the traditional Gestalt (G1) to the composer's musical Gestalt (G2) with the symbolic, sub-symbolic, and acoustical representations of music. In Figure 64 the traditional Gestalt is illustrated behind the composer's own musical Gestalt; Reznikoff's own creative Gestalt (CcG) is represented with the ruled space. The focus of our analysis is this space.

The Comparison Gestalt Analysis consists of three parts: context analysis, content analysis, and comparison analysis. The context and content analysis are carried out according to the GMA, in which the context of the G1 chant is analysed first and then the context of the G2 chant, with all its traditional inflections. The results are then analysed on the micro- and macro-structural levels. Finally, the results of G1 are compared with those of G2, in order to reveal the CcG (Chapter 5.5).

3.7 Gestalt Quality

Does the Gestalt Quality, or “third dimension”, of a composition really exist?

The final aim of the GMA is to reveal the Gestalt quality of the composer’s music, as it is perceived in the listener’s conscious mind. Is this quality a feature that the composer intended to create? And what are the results? We shall answer these questions by comparing the results of the Perception Gestalt Analysis (PGA) with its phenomenal experiences in listeners’ minds, adding the Creation Gestalt Analysis (CGA) to the outcome of that analysis, and finally relating the Comparison Gestalt Analysis (CcGA) with the composer’s individual creative Gestalt. One of the most interesting questions we ask is, How does the final creation come into being - from the low level or from the high level of the musical Gestalt?

The dove was sitting on Gregory the Great's shoulder (ca. 540-604) revealing chants to him, and he dictated them to a scribe. According to the legend this was the beginning of the Gregorian chant tradition.

Grout *et al.* 1996: 40

4 IEGOR REZNIKOFF

Do composing and chanting create a mental Gestalt?

This chapter introduces the composer-chanter Iegor Reznikoff and describes his musical background, development, and professional activities. Our concern is also with the style and aesthetics of his music, which draws upon an eclectic mix of sources, for example, sacred musical traditions, the ancient Christian chant, the so called Gregorian chant, and chanting-singing styles of non-Western cultures.

4.1 Composer and Chanter Reznikoff

Iegor Reznikoff is a composer and chanter of music related to Christian antiquity, and he represents a peaceful and quiet voice in this hectic world. A seeker “of musical wellsprings” (Heikinheimo 1985), he is not widely known in the field of music, secular or sacred. In addition to his musical activities in Finland, France, and Russia, he is a professor of philosophy at the University of Paris, where his specialities are the art and music of antiquity, as well as the foundations of sacred art and philosophy in ancient Classic singing. The anthropology of sound and sound therapy also number among his specialities. In addition to his professional duties, he has created music from his youth as a “sideline” – or perhaps vice versa.

Born on May 13, 1938, Reznikoff received a “freely spiritual, but Christian education” (In1). He has lived all his life in Paris, but his ancestry is Russian. His father Daniil Reznikoff (1905-1970) was born in Moscow, and his mother Natalia Tchernova (1902-1992) was Russian, as well as one older brother. The Reznikoff Family came to France during the Russian Revolution. Reznikoff’s father worked as the foreman of a printing house, and at the same time wrote poems. His mother was a painter and fashion designer at Lanvin’s, then later worked as a translator. Iegor is married to Clara-Jorinde Richter with whom he has three children. His first marriage, to Maike Wildvang, produced four children.

“Music Comes First in My Life”

I remember noticing vocal sounds when I was two years old. I was always chanting, or should I say, murmuring like a throat singer ... and I was known as a “murmurer” or a singer. (In1)

Reznikoff's parents supported his childhood musical activities and interests. Father Daniil rarely sang Russian songs at home, yet Iegor began very young to sing, or “murmur”, in his own unique way. He started to play piano when he was just eight years old, and at the age of 11 began to study music and to compose. In 1952, at the age of 14, he won first prize in a competition at Dartington-Hall, in Great Britain. Music and composing began to occupy a serious position in his life, and when he was 14, Yvette Grimaud, one of the first ethnomusicologists in France, began to teach him harmony and coached him in ear training (listening skills). Reznikoff mentions hearing recordings of Tibetan songs as early as 1952, and soon after began listening to all kinds of traditional musics, from Japan, India, Turkey, Ethiopia, South-American aborigines, and pygmies, all this under the guidance of his teacher Grimaud, a Dutch composer, Berth Geuer and, indirectly, the internationally known teacher, Nadia Boulanger. At the University of Paris, Reznikoff studied classical music and ethnomusicology, along with his major subjects of mathematics, physics and philosophy, until he began teaching in 1961, at the age of 23 years (In1 & In3).

4.2 The Musical Decades of Reznikoff

1970 – 1979

In the 1970's Reznikoff pursued studies at university, as well as musical activities. He was appointed a professor of philosophy at the University of Nanterre in Paris. In 1971-1972 he began ancient Christian chanting, and since 1973 has worked on the interpretation of ancient scales and pure intervals. Reznikoff describes those times (In1):

I visited the small and beautiful church of Vezelay in Bourgogne. It is a well known Romanesque church from the twelfth century situated on a hill. There I heard a Catholic Mass, which was not good. There was none of the contemplative or sacred dimension that I had expected. This was the beginning of my concentration on music as a sacral art.

Reznikoff was aware of Gregorian chant at that time, but the experience at Vezelay is what prompted his research in ancient Christian chant. These studies led him to try to understand what sacred art and music are, “in the strong sense of the word ‘sacred’”:

First I had to lose my classical dogma, since it was like a curtain separating me from the sacred, invisible world. I gained an inner experience of the music, instead of an outer or remote relation to it. For nine months I stopped playing piano, singing in choirs, and listening to Western tempered music. Then my ears were opened to the

natural, pure intervals, and the curtains parted, so that I could understand the inner meaning of the intervals – it is everything or nothing in this music! Sacred art involves relations between the invisible and the visible world, in other words, the [invisible] world of God. The sacred is first, then comes the chant, or music. (In1 & In3)

In 1975 Reznikoff began to promote ancient Christian chanting in Europe, and also began to give concerts. He wrote his first paper on the interpretation of chants (“Le chant grégorien et les traditions de chant sacré”), and in 1979 made his first recordings: *Alleluia et offertoires des Gaules*, followed by *Le chant du Thoronet*.

1980-1989

In 1980 Reznikoff wrote his second article (“Le chant grégorien et le chant de Gaules”), and began research into the therapeutics of harmonic chanting, because many students who took his courses claimed to receive therapeutic experiences in them. In 1984, in Finland, he started giving courses on sound, hearing, and chant, and in 1985 gave his first concert there, in Helsinki.

Reznikoff’s musical career was well underway in 1985, when his first Finnish article (“Aikasiirto askeesin vuosisadoille”) was published in the Helsingin Sanomat – this was the beginning of many writings by and about him in Finland. After that year his meditative music began to receive publicity. Almost yearly he, or the editors of various newspapers and professional journals, published articles in Finland or France concerning sacral art, chant, music therapy (la therapie par le son), and resonance (especially the production and effects of overtones).

The years 1986 to 1989 were productive ones for Reznikoff. He wrote four articles about his chant research, and in Finland published three articles on music as therapy. In 1989 Reznikoff recorded his third CD, *Le chant de Fontenay*, and *Le chant du Thoronet* was reissued. In the same year, the first academic study of his work appeared in Finland (Vuori 1995).

1990 – 1999

In 1992 Reznikoff’s fourth CD appeared, *Le Chant de Vézelay: Le vase de parfum*, followed by his fifth CD, *Le chant de Vézelay: Marie Madeleine au tombeau*. Between 1990-1995 he produced three more scholarly articles, some writings in the field of voice therapy, as well as ancient Christian chants and other sacral chants. In Finland, Reznikoff started to become better-known than ever before, because of his regular visits to the country, his organizing of Finnish chanting groups, and his research on the acoustics and other sound qualities of pre-historic painted caves and rocks (Reznikoff 1995). Finnish chant pedagogues, singers, and music therapists became interested in the effects of Reznikoff’s voice on the human body and the mind. As a result, they began to teach and organize singing groups for purposes in the fields of therapy, religion, and education, among other subjects.

2000 –

At the start of the twenty-first century, Iegor Reznikoff is by all measure a “musical success”. He continues his professorship at the University of Nanterre in France, but ancient Christian chant, sound and chant therapy, concerts and research have become just as (or even more) important to him. His full schedule has made it necessary for him to turn down offers to give concerts and teach courses – he is

indeed someone whom it is hard to keep up with. The “real” Reznikoff could be described as the “person hidden behind his music”.

At the beginning of the twenty-first century there appeared three academic studies of Reznikoff’s chants, in the fields of musicology and pedagogy (Utriainen 2000a, 2000b; Hänninen 2002). Since 1985 Reznikoff has visited Finland yearly, where, in addition to concertizing, he gives voice-therapy and harmonic chanting courses to beginners and to advanced singers. The chanters he has taught have in turn made recordings and given concerts affected by Iegor Reznikoff’s music. In 2001 Reznikoff’s sixth recording appeared, *Le chant du Mont St. Michel*, and in 2002 he wrote an article about his therapeutic research in vocal harmonics (“Fondements de la thérapie par le son”).

4.3 The Philosophy and Aesthetics of Reznikoff’s Music

I pray with my chants. Praying is calming down, concentrating and wakening the soul (Reznikoff 1989).

Christianity, as a spiritual framework, is important in Reznikoff’s compositions and chanting, and it penetrates to the core of all his creative activities. In addition to Eastern Orthodox Christianity, Reznikoff admires Lutheran traditions, which he has studied in relation to liturgy, and he respects other religions as well, such as Islam, Hinduism, and Buddhism. He will, for example, use mantras in his chanting courses. Still, he emphasizes that the ancient Christian traditions of universal dimension are the main religious resources of his music (In3). “Universal”, in this context, refers to the unity of Classical art and music with other intellectual pursuits. The universal, even cosmological, import of music was evident even before music took its place in the Quadrivium, alongside philosophy, mathematics, and astronomy.

Ancient Christian chant is monophonic. In the Western church, centered practically in Rome, this style of chanting became known as “Gregorian” though it had existed several centuries before the reign of Pope Gregory. Eastern traditions refer to it as “Byzantine” chant, even before the split from Rome. Reznikoff estimates (In3; Vuori 1995) that Gregorian chants date from the fourth century AD, when Western liturgies began to become more or less standardized, becoming almost fully shaped by the end of the fifth century. Most scholars agree that the earliest Christian chants were perpetuated by oral tradition, and cannot be attributed to particular composers. The chants use Biblical texts, especially from the New Testament and the Psalms, but also draw from episodes in the lives of the saints (Vuori 1995: 45-50; In3), as well as poetic texts penned by such figures as Hildegard von Bingen, and later by Martin Luther and others. Reznikoff uses mainly the neumatic documents of St Gall, dating from the 9th–11th centuries, which are divided into basic neumes (virga, gravis, punctum, brevis, pes, clivis); diacritical signs (episeme, tenere, celeriter); decorative signs (ascending and descending quilismas, horizontal quilismas), as well as signs of intonation and other interpretative formulas (intonation, frequency, dynamics, repercussio, and so on). As mentioned above, Reznikoff finds cheironomy important to interpreting the neumes, such that signals determine the movement of sound in the body, and this generates the neumes which follow the movements of the voice (Vuori 1995;

In3). Cheironomy, or the use of hand signals, lent unity to the chant. Says Reznikoff: "If you want to chant as was done in Christian antiquity, then one chants according to the hand signals" (Vuori 1995: 51-56; In3). When this style was new, there was no doubt much uncertainty and variety in interpreting the movements of the hands.

Reznikoff's philosophy of chant is based on the view that human beings and the whole world share a natural resonance, which is the pure intonation created by the balance between the visible and invisible world, between "The invisible and its relation to the real world..." (CGA2, *Salve*). One can sense this intonation in Reznikoff's courses, in which the use of silence and muted voices add a new dimension to music (Utriainen 2000a, 2000b). Vuori (1995: 60) states that Reznikoff's chanting style refers more to a particular "way of thinking" rather than to a certain time period. Reznikoff's musical philosophy and theory is affected by Pythagorean and Platonic thought, as well as the Orphic views, which are based on the same traditions. According to Dahlhaus (1999) and others, Pythagoras examined the relationship of the cosmos ("heavenly spheres") in terms of sounds, and defined musical beauty on the basis of unity and rational-mathematical divisions. Pythagoras's "musical universe", according to James (1995:30-31), was one in which "music was number, and the cosmos was music", with harmonious resonance mediating between body and soul (*musica humana*). The "perfect" intervals 4, 5, 8, 1, the church modes, as well as the sounds of the monochord greatly influence Reznikoff's music (Utriainen 2000a: 8). Plato continued Pythagorean reasoning with the notion of the World of the Soul as being numerical and musical, and that music was the key to that soul (James 1995: 46-59). The Orphic view is that the voice, laws of harmony, and clear intonation conjoin different levels of the universe – and these are possible to reach by means of vocal chanting. The soul is regarded as a "voiced being", and Reznikoff supports the view that the world is a representation of the soul, whereas time represents the movement of the soul's journey. To Reznikoff, the soul means consciousness, and the ultimate aim of his chanting is to awaken and free the soul, which acts as a song of praise (Vuori 1995: 60-64). The realization of this philosophical view guides his chanting courses, which involve the practise of silence, use of quiet vocal sounds, and contemplation of the vocal characteristics of the chanters.

Mode in Reznikoff's chants designates the way in which psycho-physiological space is represented (Vuori 1995). The body is an instrument that can be tuned in different ways, and this bodily tuning or resonance corresponds to the intonation produced by the colour or sonority of the voice. Emotions such as fear, courage, joy, sorrow, and pain are reflected through the voice. Reznikoff stresses three intervals as creating the heart of the mode. They are the cells that consist of the main information from which we can create the modal scale. The mode and its impression is objective, which means according to Reznikoff that when someone cries or laughs, they need not explain these expressions with words. For example, the mode of crying can only be generated by crying itself, so that the chanter must "go through" the mode and its sonic expressions. The chanter aims to transport the listener into the same affect of the music by the use of intervals and voice colours (Vuori 1995: 76). We should recall here that musical aesthetics includes an account of the effects of music in creating feelings and moods (Dahlhaus 1999: 16-24).

Reznikoff use the four authentic "church" modes (D, E, F, and G) in his compositions and chanting. The F mode is the one of praise, and consists of the Pythagorean third and tritone; its intervals are to be chanted outwards. The D

mode is sensitive and consoling in nature, consisting of a natural third and neutral minor third, and it too is chanted outwards. The G mode is gentle and warm, and it is the most common one in Reznikoff's chants. It consists of a natural fourth and natural major third, and it is chanted inwardly. Fourth is the E mode, which gives the impression of mystery, heroism, heroic, and profound kindness; it is rarely used in Reznikoff's chants (Vuori 1995: 118-120). The present study examines one chant in the D mode, one in the F mode, and two chants in the G mode.

4.3.1 Voice and Chanting

Vocal resonance in the body and in space is important in Reznikoff's chants. The intervals in his music are as important as the vowels or vocalisations / a, o, u, m/, which he calls "physiological mantras". His singing technique stresses certain effects of the voice on the body, when the voices are chanted in the correct way. He also stresses vocal intensity, wave-form, certain frequencies, clarity and purity of intervals, as well as voice colour, all with respect to the harmonic series (Vuori 1995: 17, 131; In3). Ethnographic research (Utriainen 2000a) has revealed that both chanters and listeners experience the voice strongly in their bodies, especially in their hearts, where emotion and thought combine into an inner place of conviction and affect. Reznikoff describes his composing (CGA4):

I chant the body and the temple of the world, and their relation and resonance in the chant.... I praise nature with joy and beauty, especially affecting birds (In1). There are high overtones, and the technique is my own version of Mongolian throat singing style ... it is praise and resonance using the natural scale. (CGA4, Grand Magnificat: Liturgie fondamentale)

The nasal aspects of Reznikoff's is typical of Mongolian and Tuva chanters; by contrast, he uses a personalized form of Mongolian throat singing (In1), which he has developed on own (In3). Throat singing generates overtones, and typically Reznikoff will transfer one overtone into another with a special vocal technique. Vuori (1995) explains that Reznikoff's singing style is similar to Sundberg's (1987) model of overtone chanting, in which one overtone or partial becomes stronger than the others. This occurs mainly by the manipulation of the tongue and glottis. The top of the tongue is held up, and the body of the tongue is pushed forward or pulled backwards. The overtone chanting is done such that the fundamental voice is kept quite stable, and at a rather high frequency of about 300 Hz. (Sundberg 1987; Vuori 1995: 20-21). Reznikoff (In3) also remarks that he has used different pitches in his overtone chanting, from very low to very high frequencies, and that he has mastered the sacred technique of chanting with closed mouth. He alters the articulation by changing the shape and positioning of the tongue and position, as well by opening the lips gradually and rhythmically from the vowels / u / to / i / (Vuori 1995: 20-21).

Intonation of the vowels is important in Reznikoff's chanting. For example, the vowels / a, e, i, o, u, y / can be chanted on the same fundamental frequency, but at the same time the overtones, and hence sound colors, may vary. These vowels can be chanted brightly or darkly, resulting in six vowels being chanted in 12 different

ways (Vuori 1995: 28.) Reznikoff produces these vowels with the following parts of the human body: / a / is chanted from the heart; / o / is chanted from the throat; and / u / is chanted from the cheeks and mouth; in addition, the nasal sound / m / is chanted from the upper part or “crown” of the head (Utriainen 2000a: 22).

The main purpose is the song of praise, in which the words and the beauty of the chant are important.... The words “l’Esprit” and “souffle” are especially lovely. [And] in French the vowel /a/ sounds beautiful ... I hope that people listening to the chant are moved to meditate or contemplate. (CGA1, Alleluia: l’Esprit souffle)

4.3.2 Compositions

Igor Reznikoff creates or composes three kinds of music: concert music, and recordable compositions, and group chants. In this study I use the word “composition” when Reznikoff employs it, but also when the music consists of clearly individualized or idiosyncratic features; for example, variations, overtones, and other personalized features. Concert music and recorded compositions are his main production, from which the group chants are adapted partly or totally. The concert chants use Latin texts, but some are in French or Latin-French; the group chants are composed in Latin, Finnish, and Dutch. Chants are composed in Latin because they use the words of the Vulgate; in contrast, the French chants are “of his own creation, and are for French people” (In1). The present study analyses French and French-Latin chants, and one Finnish chant.

Reznikoff’s concert and recorded compositions are based mainly on Biblical texts. The themes come to his mind, and may be realized immediately as a musical whole; in other cases, several years may pass before a theme is fully realized enough to be performed or recorded. In addition, the recordings of his compositions make use of the resonance of particular acoustical spaces. Figure 65 represents one sketch of his composition process (In1), and the following statement gives insight into his creative procedures:

Some chants are created in a moment and some require many years.... The composition process organizes the musical thoughts in different orders. The theme can be illogically ordered while I am composing – but in the end, all the components appear in the right musical order.

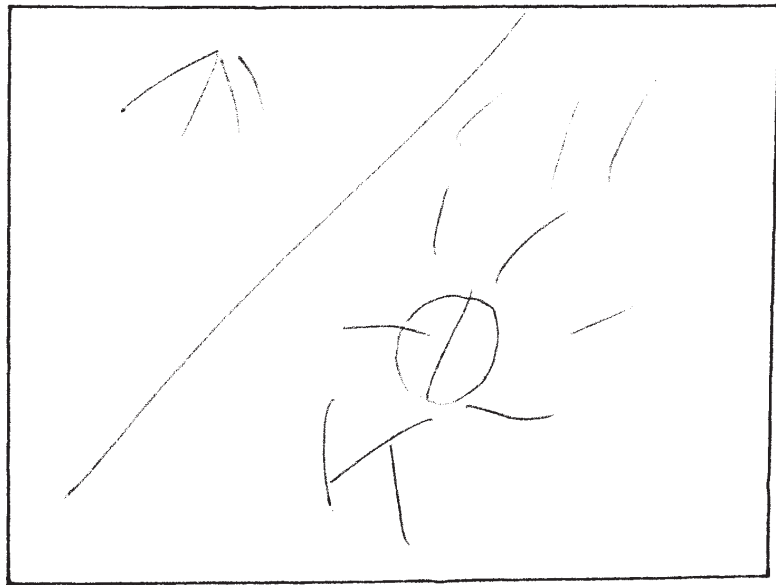


FIGURE 65 Sketch of Reznikoff's composition process, 15 January 2001.

Reznikoff composes from one to three new group chants yearly for small singing groups in Finland and France. The chants are meditative in nature, and when people are singing the same pitch in unison, the vowel, word, or formula may be repeated, say, ten times or ten minutes, in a quiet and concentrated manner (Utriainen 2000a). In this meditative style it is important that the singers and listeners feel and experience the voice both collectively and individually.

5 THE GESTALT MUSIC ANALYSIS

In this chapter, the GMA is used to analyse four of Iegor Reznikoff's compositions and their musical Gestalt, as well as one Gregorian chant of St Gall. Every sub-chapter is structured so that first the composition is analysed according to the GMA. Then follow some remarks about creation (CGA) and perception (PGA). Finally the results of the analysis are correlated with each other. I have used linguistic associations and experiences when they correlate positively with music analysis, voice analysis, perception and creation analysis, and in some sections have used other means of correlation.¹

I have analysed one composition *Alleluia: l'Esprit souffle* in greatest detail, with symbolic, acoustical and sub-symbolic representations, and the others with acoustical and sub-symbolic representations. Transcriptions were made of the chant *Alleluia: l'Esprit souffle*² and *Alleluia: Dies sanctificatus*³ of St Gall. The analyses are based on the following recordings (CD's) made by Iegor Reznikoff:

Le Chant du Thoronet

Le Chant du Thoronet consists of three French compositions that are analysed in this study: *Alleluia: l'Esprit souffle* (2'58), *Salve* (2'14), and *Une lumière a resplendi* (3'49). The first recording of these pieces appeared in 1979, and the second in 1989 in Paris.

Le chant de Fontenay

Le chant de Fontenay consists of one French/Latin composition, *Liturgie Fondamentale: Grand Magnificat* (31'02) that is analysed in this study. It was first recorded in 1989 in the abbey Fontenay in Paris, France.

¹ In addition I have interpreted the harmonic, melodic, and rhythmic formula correlations so that harmony with its partials correlates with the feelings and emotions of music (unconscious aspects); melody or fundamental frequency level f_{s0} relates the thoughts and physiology of music (mind/body); and rhythm (time sequences) correlates the heartbeats, breathing, and circulation (unconsciously or aware) (Utriainen 2000a: 20; Ahonen 1997: 41-43.)

² Iegor Reznikoff 9.4.2002 original (G-clef).

³ Gradual Triplex (Solesmes 1998: 49) ; Aija-Leena Ranta 9.10.2002 (modern neumes).

5.1 Alleluia: l'Esprit souffle

5.1.1 Context and Content Analysis

Alleluia: l'Esprit souffle (2'58) (*Hallelujah. The Spirit Is Blowing*) is one of the first harmonic compositions by Igor Reznikoff, and is a rather small one in his total repertoire. Reznikoff performs it in concerts and teaches it to singing groups, which use it for meditation or relaxation. In addition, music and voice therapists have used the chant in different situations as “medicinal music”⁴ (Utriainen 2000a, 2000b).

The acoustical space and movements of the chant are important to Reznikoff, with the most suitable place to perform it being in a church. *Alleluia: l'Esprit souffle* was created in, chanted in, and named after the abbey of Thoronet⁵ in France, in which the voice fills the entire acoustical space with a constant resonance (CD liner notes: *Le Chant du Thoronet*).

Reznikoff has composed the chant in three languages: French, Danish, and Finnish. This study focuses on the original French version, and the performance analysis of it is of the Finnish version. Reznikoff uses the G mode in *Alleluia*, as it is based on the manuscripts of St Gall. Figure 66 gives the French transcription of the chant.

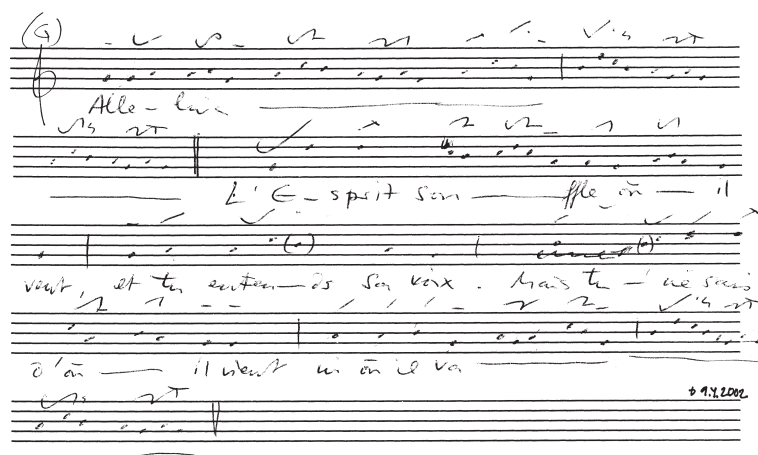


FIGURE 66 French transcription of the *Alleluia: l'Esprit souffle* (Igor Reznikoff 9.4.2002 [sic]⁶).

According to Reznikoff (2002), *Alleluia: l'Esprit souffle* is based on a Biblical text, mainly serving as a song of praise in which the words play the major role. The chant is a Whitsunday chant, or a Christening chant. Reznikoff composed the French version in 1976/77 in France, the Danish version in 1989, and the Finnish versions in 1987 and 1999. The chant was created almost instantly, but the model and structure of it had been in Reznikoff's mind long before it was composed.

⁴ “Medicinal music”, in this context, refers to musical situations where different vocal pedagogues or music therapists use Reznikoff's chants in, for example, religious rituals, phonetics, teaching methods, drama, and/or training in vocal maturity.

⁵ Thoronet was built in 1150 after Notre Dame de Floreia, and is a Roman style Cistercian abbey (CD liner notes: *Le Chant du Thoronet*).

⁶ The transcription consists of variations on the first Alleluia phrase, as they appear in the sound spectrum.

It is an expansive chant. The words l'Esprit and souffle are especially beautiful. In the French version the vowel /a/ sounds lovely, as does the vowel /e/. I hope that the chant induces people who listen to it to meditate or contemplate. (Reznikoff In2.)

5.1.2 Linguistic Analysis

Gregorian melodies/tunes belong to oral traditions and are transmitted until ca. 1170 mainly from memory. According to Jeffery (1992), major cities or regions developed their own local repertoires of Gregorian texts and melodies. Some common material was circulated widely with variations, and a few of the texts were known almost everywhere, for example, in Christian communities of Europe, North Africa, and the Middle East (Jeffery 1992: 6). "Dialects", in analogy with language, refer to the various ways of singing sacred texts in regional styles in Europe (Grout *et al.* 1996). These include Gallican chant in Gaul, Benevetan chant in southern Italy, Old Roman chant in Rome (Gregorian), Visigothic or Mozarabic chant in Spain, and Sarum chant in England. Gregorian chant is based on the eight medieval church modes, each of which centers around the basic tone or finalis (Grout *et al.* 1996: 22-57).

The cultural context of Reznikoff's chant is mainly European, although the spiritual context is more generally Christian and has some features of various world music. Alleluia texts are used by Christians in sacred liturgy, which is based strongly on Holy Writings. Reznikoff's Biblical texts often come from ancient and/or original documents, for example, from St Gall, which houses some of the oldest and most venerable manuscripts of Gregorian chant. Reznikoff uses the texts to praise God and other sacred objects, and they may be summarized as follows.

Alleluias⁷ consist of a *refrain*, the single word "alleluia"; a Psalm verse is followed by a repetition of the *refrain* in which the final "-ia" is chanted with an effusive melisma called a *jubilus*. Many alleluias are carefully planned and composed rather than improvised. Alleluias continued to be written until the end of the Middle Ages, while spawning important new forms (Grout *et al.* 1996: 32-47).

Alleluia.
l'Esprit souffle où il veut
et tu entends Sa voix,
mais tu ne sais ni d'où il vient,
ni où il va.
Alleluia.

Hallelujah.
The spirit is blowing where it wants
and you hear Its voice
but you neither know where it comes from
nor where it is going.

FIGURE 67 Words of the chant *Alleluia: l'Esprit souffle*.⁸

⁷ See different Alleluias in the Gradual Triplex (Solesmes 1998: 825-827).

⁸ All English texts of Iegor Reznikoff's chants have been translated from French and Latin in the Language Centre of the University of Helsinki.

According to Reznikoff (In2), *Alleluia: l'Esprit souffle* is directed first to the Holy, and then to the chant itself, which stresses the beauty of the words. The chant consist of repetitions of phrases and words, as well as syllables and phonemes (Fig.68).

Alleluia. Alleluia – a.
Alleluia. Alleluia – a.
l'Esprit souffle où il veut.
Et tu entends Sa voix,
mais tu ne sais ni d'où il vient,
ni où il va.

Alleluia. Alleluia – a.
l'Esprit souffle où il veut.
Et tu entends Sa voix,
mais tu ne sais ni d'où il vient,
ni où il va.

Alleluia. Alleluia – a.

FIGURE 68 Words and linguistic formulas in the *Alleluia: l'Esprit souffle*.

This Alleluia consist of poetical texts in which Christian thoughts are symbolized by such words as the “spirit is blowing” and personalized reference to “Its voice”. These words we may interpret, according to Niiniluoto (1999: 90-117), as both cues to the meaning and as standing for referents. Cued meaning of the words correspond to the main meaning, such that the main words “spirit is blowing” represent God’s holy spirit and its movement. Consequently, these words we may interpret as referents, or the Gestalt to which they refer. The Gestalt of the composition we may interpret as representing the Christian belief that God’s spirit is expressed with words, sounds, or voices. In his dictionary of symbols (1999: 227), Tresidder notes that the word wind (spirit, pneuma) is “a poetic image of the animating spirit whose effects can be seen and heard, but which remains invisible.... [the book of] Genesis begins with the Spirit of God moving like wind on the face of the deep.”

5.1.3 Voice Analysis

In the aural analysis of the *Alleluia: l'Esprit souffle* we notice the following general features: The phrases and the articulation are clear, so that each syllable for example / al / le / lu / ia / is stressed. Vowels are chanted mainly with melismas / a – /, / e – – /, / u – / . The chant is both syllabic and melismatic. Reznikoff’s vocal source lies between heart and throat. His singing style may interpreted as more akin to that of Western folksong (Asplund & Hako 1981: 11) than to Gregorian style. At times his voice resembles Lappish joik style (Järvinen 1999: 92), in which the sound is produced from a lower source such as breast, chest, or stomach.

Reznikoff’s voice sounds also resemble those of Arctic-Asian singing (Asplund *et al.* 1981: 10-11), which may feature, for example, nasal sounds, repetitions of text, and tremolo in the glottis. Reznikoff’s voice is warm in color, consisting of some vibrato, mainly in melismatic formulas. Listeners describe his voice as producing experiences of “light, balance, softness, clarity, beauty,

harmony”, as well as “meditation, stasis, togetherness and eternity” (PGA1).

The audible and spectral analysis show that the fundamental frequency of his voice is quite low, varying from 37 Hz (D)⁹ to 240 Hz (h), and producing an average voice frequency level of about 170 Hz (f).

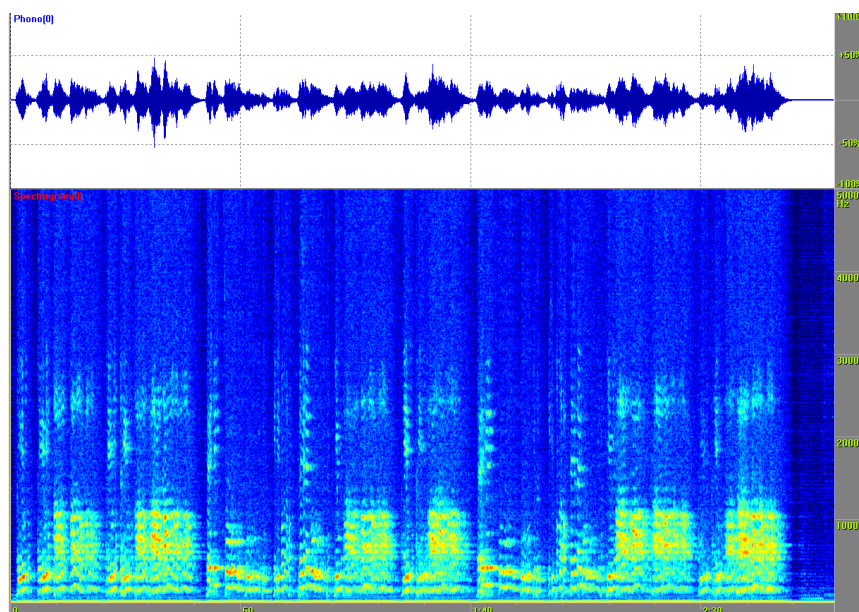


FIGURE 69 Sound spectrum of the chant *Alleluia: l'Esprit souffle* (0:00 - 2:58, 5000 Hz).

5.1.3.1 Vowels, Consonances and Nasal Sounds

Alleluia: l'Esprit souffle consists of 49 percent (82 seconds) of the vowel / a / and 9 percent (15 seconds) of the vowel / u /. These percentages are measured from melismatic or prolonged vowels that last more than two seconds. Nasal sounds (m, n) and nasalized vowels (a, e, i, o, u) occur in the words “entends”, “mais”, “tune”, “vient”, but they are not stressed. In summary, the chant consists of melismas that create images, for example, of an “echo from the past”, as strengthened by the quiet primitivism of prolonged vowels. It also created feelings and associations such as “mystic, prayer, cave, and miraculous” (PGA1).

5.1.3.2 Special Features of the Voice

This chant by Reznikoff consists of repetitive phrases or formulas, which produce the following special features of the voice:

The voice in the word “l'Esprit” consists of a widely increasing fundamental frequency level (fs0) in the characters / Le – e /. Vowels / a / and / u / are typical voice phenomena in this chant, as in several other compositions, as well. Especially typical is the vowel / a / with its variations, such as the melismatic tremolo / a-a-a-a /. In the Alleluia we notice a looping phenomenon, by which I mean that the main fs0 of voice creates a sudden loop or hook below the fs0 in several parts of the chant (phrases, words, syllables). This phenomenon we can hear as a breath, silence, or a swallow, confirmed by the sound spectra analysis.

⁹ The notes indicated are the closest tempered notes to the indicated frequencies.

The voice phenomenon / niu / (Fig. 70) represents a mixed formula Fd according to GMA, which means the formula consists of variations in voice or vowels. The character / n / is a nasal sound, and the characters / i u / are phonetically nasalized, “middle” vowels. Thus, the voicing of the word / niu / sounds tense; typical of Reznikoff’s chanting style, it is also similar to throat singing. Nasality, according to Rusko (1997: 351-359), is also one of the first sound phenomena in vocal communication between human beings; from the aesthetic viewpoint, nasalization in speech is associated with a funny voice.

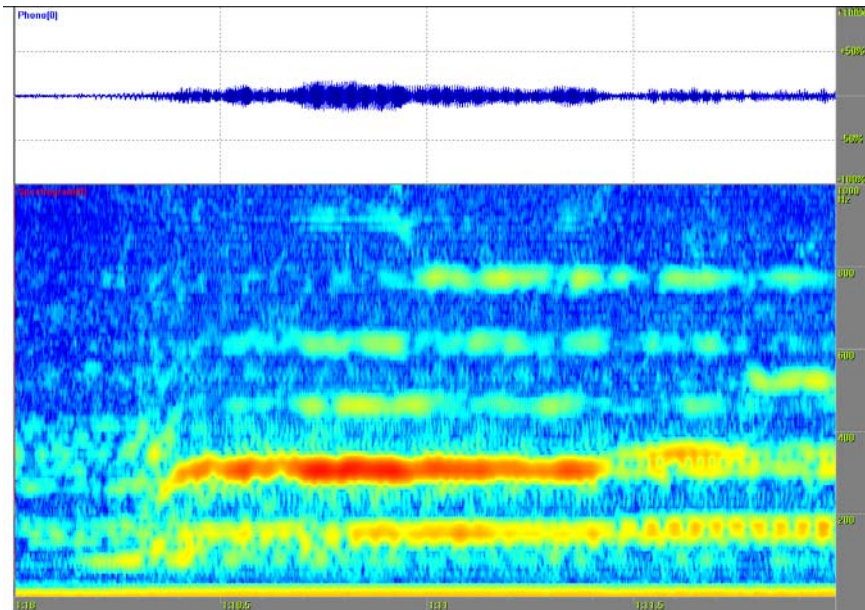


FIGURE 70 Sound spectrum of the word / niu / in *Alleluia: l'Esprit souffle* (1:10 - 1:12, 1000 Hz).

5.1.4 Formula Analysis

5.1.4.1 Formula Structure and Linguistic Content

According to the audible and visual (spectral) analysis *Alleluia: l'Esprit souffle* forms a musical unity which we can structure into the basic forms A, B, C. This structure we may divide according to repetitions and variations into the following segments and Figure 71 shows the structure of the forms with linguistic content.

A¹, A², B¹, C¹, A³, B², C², A⁴.

A¹ - A⁴

Alleluia. Alleluia – a.

B¹ - B²

l'Esprit souffle où il veut.

C¹ - C²

Et tu entends Sa voix,

mais tu ne sais ni d'où il vient,

ni où il va.

FIGURE 71 Forms and their linguistic content in *Alleluia: l'Esprit souffle*.

We may further divide *Alleluia; l'Esprit souffle* into a formula based on linguistic analysis (Fig. 72).

Form	Formulas
A ¹ :	a ¹ , a ¹ , a ² , a ³
A ² :	a ¹ , a ¹ , a ² , F ^v , a ³
B ¹ :	b ¹ , b ² , b ³
C ¹ :	c ¹ , c ² , c ³
A ³ :	a ¹ , a ¹ , a ³
B ² :	b ¹ , b ² , b ³
C ² :	c ¹ , c ² , c ³ , F ^v , c ⁴
A ⁴ :	a ¹ , a ¹ , a ² , a ³

FIGURE 72 Formula structure in the chant *Alleluia; l'Esprit souffle*.

Forms A¹, A², A³ and A⁴ consists of alleluia formulas with *refrain* and *jubilus*. The form A begins and ends the composition, and consists of many melodic variations. We may notice this from the formula structure with its interrelated repetitions and variations (F^v).

Forms B¹ and B² “l'Esprit souffle...” consists of syllabic voice movement at the beginning, and melismatic voice movements with vowels / ou / in the middle. Form C¹ and C² consist of syllabic structure / et / tu / en / tends / sa / voix / etc. which add a clear rhythmic profile to the form (Fig. 73).

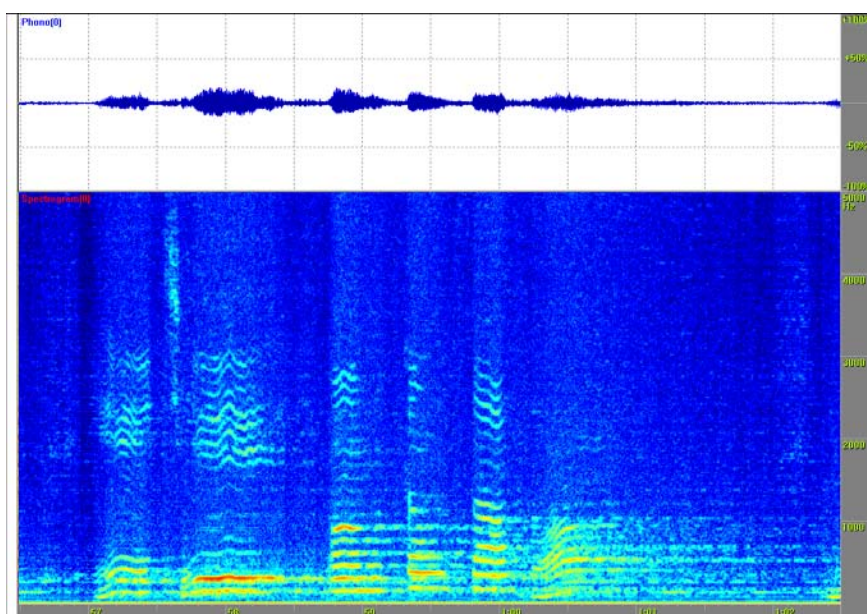


FIGURE 73 Sound spectrum of syllabic voice structure in the formula C¹:c¹ “Et tu entends sa voix” in the *Alleluia; l'Esprit souffle* (0:56.5 - 1:02.5, 5000 Hz).

In the piece, the forms generate a looping structure in which the chant begins from form A¹, and advances in the ascending direction to the form A⁴ (Fig. 74). From the structure we may interpret the repeating movement with a “loop” from form C to form A. This similar phenomenon we may notice also in looping or repetitive formulas; for example, a¹, a¹, a², a³.

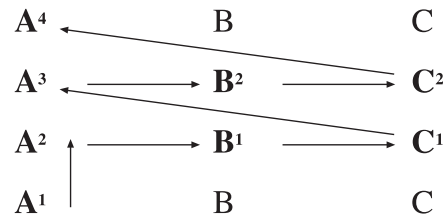


FIGURE 74 Looping progress of forms in *Alleluia: l'Esprit souffle*.

5.1.4.2 Rhythmic Formula Analysis

The rhythmic formulas of the *Alleluia: l'Esprit souffle* consist of eight forms that last from 14.7 seconds to 32.5 seconds, with their 30 formulas that last from 1.2 seconds to 14.5 seconds. We may interpret the piece as a streaming composition that does not consist of silence, but only moments of catching the breath. The tempo of the chant is about 90 M.M. The rhythmic formula analysis is drawn from an audible rendering of the music given in spectral representation (Fig. 75).

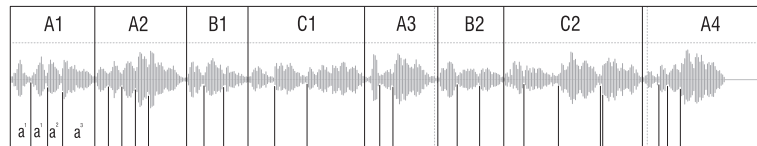


FIGURE 75 Rhythmic amplitude structure of forms and formulas in *Alleluia: l'Esprit souffle*.

Forms A¹ to A⁴ vary from 15.7 seconds to 20.8 seconds, and the variation ratio¹⁰ is 5.1 seconds (24.8 percent). Forms B¹ and B² vary from 14.7 seconds to 15.8 seconds, and the variation ratio is 1.1 seconds (7.5 percent). Forms C¹ and C² vary from 28 seconds to 32.5 seconds, and the variation ratio is 4.5 seconds (16 percent). As a result the variation ratio of the durations of forms A, B and C varies from 1.1 second to 5.1 seconds, or from 7.5 to 24.8 percent

Formulas a¹ to a⁴ in the forms A¹ to A⁴ are structured so that formulas a¹ last 2.5 seconds to 4.7 seconds, and the variation ratio is 2.2 seconds (46.9 percent). Formulas a² last from 2.9 seconds to 3.7 seconds, and the variation ratio is 0.8 second (21.6 percent). Formulas a³ last from 7.6 seconds to 10 seconds, and the variation ratio is 2.4 seconds (31.6 percent), whereas formula F^v in form A² last 3 seconds.

Formulas b¹ in forms B¹ and B² last from 4 seconds to 4.9 seconds, and the variation ratio is 0.9 seconds (22.5 percent). Formulas b² last from 7.5 seconds to 8.0 seconds, and the variation ratio is 0.5 seconds (6.3 percent). Formulas b³ last from 2.7 seconds to 3.2 seconds, and the variation ratio is 0.5 seconds (18.5 percent).

Formulas c¹ in forms C¹ and C² last from 4.6 seconds to 5 seconds, and the variation ratio is 0.4 seconds (8 percent). Formulas c² last 8 seconds, and the variation ratio is 0 seconds. Formulas c³ last from 9.7 seconds to 14.5 seconds, and the variation ratio is 4.8 seconds (33.1 percent), whereas formula F^v in form C² lasts 1.2 seconds.

As a result, the variation ratio of the rhythmic formula structure between formulas a¹ to c³ varies from 0 to 8 seconds, or from 0 to 46.9 percent, and the widest variations occur in the alleluia formulas A¹ to A⁴.

¹⁰ The variation ratio is compared to the first form and its duration.

This conceptual framework illustrates that the linguistic rhythm of the composition is structured so that almost all the formulas in the beginning of the form are syllabic, and those at the end are melismatic. This phenomenon we can hear and see in the forms A¹, A², C¹, A³, C², and A⁴. In contrast, forms B¹ and B² consist of structures in which the formula in the middle of the form lasts longer (is more melismatic) than the formulas beside them. As noted above, the rhythmic structure of the composition can be represented with the following rhythmic time-unit formula table in which the s symbolizes short formula (less than 7.5 seconds), and L symbolize long formulas (7.5 seconds or more). Long formulas are melismatic, and short formulas are mainly syllabic.

s s s L s s s s L s L s s L L s s L s L s s L L s L s s s L

To sum up, Reznikoff begins his formulas with short and intense rhythmical motions, followed by melismatic vowels. According to Mocquereau (1989) Gregorian chants are a succession of harmoniously ordered, short and long sounds, high and low sounds, as well as every kind of voice timbre. "A perfect order is [one] that gives a form that spiritualizes them in a certain sense and gives them movement, beauty and life" ... and the final aim of the chant is the musical unity of various elements" (Mocquereau 1989: 43-53). In addition, Chambers (1972: 28) quotes Steiner: "You will feel if you pronounce a vowel sound, that you are giving expression to something coming from the innermost depths of our own being", and "Every vowel ... is bound up with an experience of the soul."

5.1.4.3 Melodic Formula Analysis

In the GMA the fundamental frequency level (fs0) of the voice in the *Alleluia: l'Esprit souffle* is focused on the melody or fs0 of the unity, and melody or fs0 in the formulas. The melodic features in the formula paradigms are discussed at the micro-analytical level.

The whole musical unity is generated with voice movements in the fs0, so that it ranges above and below the average fs0 level of 170 Hz (f) in the sound spectrum. The composition begins from the fs0 of 83 Hz (E), and the highest fs0 level ascends to 240 Hz (h) in the form B²:b¹ "l'Esprit", and the lowest fs0 level descends to 37 Hz (D¹) in the same form B²:b¹ "l'Esprit". The composition ends on the fs0 of 134 Hz (c). The average fs0 width in the frequency axis is 203 Hz (D¹ to h) (Figs. 76, 77).

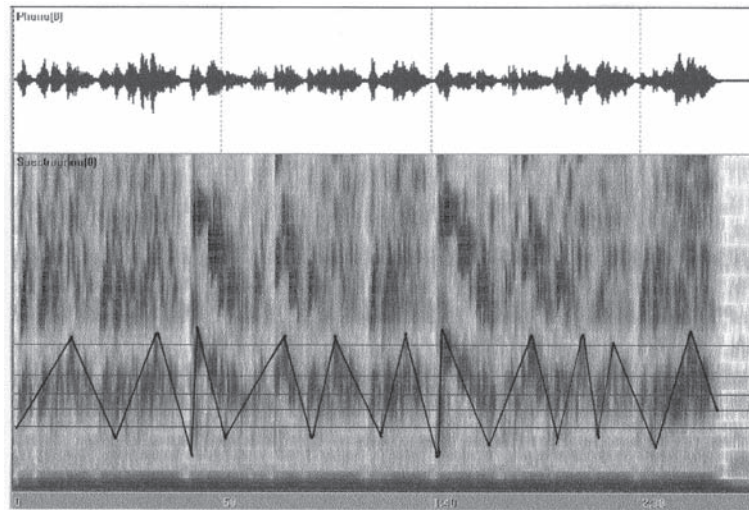


FIGURE 76 Voice movements in the fs0 in *Alleluia: l'Esprit souffle* (simplified version; see Ch. 3.3.4).

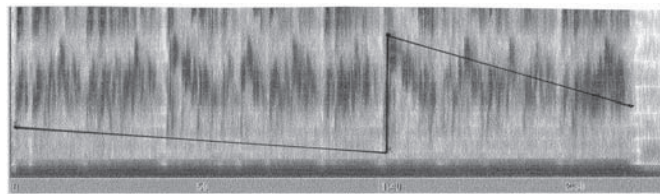


FIGURE 77 Variation ratio¹¹ of the fundamental frequency in *Alleluia: l'Esprit souffle* (simplified version; see Ch. 3.3.4).

Neumes, Signs and Notation

The analysis of the neume notation of *Alleluia: l'Esprit souffle* is summarized in Figure 78, which shows the basic occurrences of neumatic notes in the whole composition. The basic structure (A, B, C) of the chant consists of the following neume notes: 25 units (28 percent) of note g¹, 29 units (32.6 percent) of note a¹, 16 units (18 percent) of note h¹, 13 units (14.6 percent) of note c², and 6 units (6.7 percent) of note d². The basic structure of the chant consists of 89 units of neumatic notes with graphical signs. In this study I have analysed only the basic neume notation structure, whereas the compact-disc version of the chant consists of repetitions and variations related to the transcription of the chant in f clef.

neumes	g ¹	a ¹	h ¹	c ²	d ²
units	25	29	16	13	6

FIGURE 78 Neumes and their occurrence in the transcription of the chant *Alleluia: l'Esprit souffle*.

¹¹ The musical whole is generated with voice movements in the fs0; these range above and below the average fs0 level of 170 Hz (f) in the sound spectrum. The composition begins from the fs0 of 83 Hz (E), and the highest fs0 level ascends to 240 Hz (h) in the form B2:b1 "l'Esprit", and the lowest fs0 level descends to 37 Hz (D1) in the same form B2:b1 "l'Esprit". The composition ends on the fs0 of 134 Hz (c). The average fs0 width in the frequency axis is 203 Hz (D1 to h) (Figs. 76, 77; see Ch. 3.3.4, and Fig. 35).

Reznikoff's chants, as well as Latin chant in general, require interpretation in performing or chanting the neume notes and signs, because these are only signs of allusion and suggestion to the singer. Spectral analysis together with audible analysis are required for a complete analytical view of the chants. We should recall that audible and spectral analysis, not symbolic or notational analysis, are the primary operations of this study.

According to Mocquereau (1989) neumes are partly based on grammatical signs of ancient times, and they use directions that mark the rise and fall of individual words. In other words, higher and lower pitches, along with the various syllables, give the composer full liberty to develop the melody of the phrase or formula without attempting to indicate the precise degree of elevation or fall of the melody. Neumatic sign/symbol serves (ibid.) only to guide and refresh the performer's memory. Language has a melody of its own; thus its intervals of rise and fall do not follow the accurate pitch of any musical scale, and elude accurate graphic representation (Mocquereau 1989: 44.)

- ↗ Actus, virga
- Gravis, grave/punctum
- ⤿ Circumflex accent, clivis
- ↘ Anticircumflex accent, podatus

FIGURE 79 Some main Gregorian signs and their interpretation (Mocquereau 1989: 146).

The basic structure (A, B, C) of the *Alleluia: l'Esprit souffle* consists of the following main Gregorian signs: punctum (9 units), virga (7 units), and pes or podatus (5 units). Appearances of other signs (for example, clivis, virga with episema, and porrectus; cf. Fig. 79) vary between one to four units.

Form A

Melody or fs0 movements in the sound spectrum of the form A^1 and all its formulas a^1 to a^3 increase and decrease so that the formula begins from the average level of 100 Hz (G), increases to the fs0 level of 200 Hz (g), and decreases to the average fs0 level of 100 Hz. The lowest fs0 level is in the formula $A^1:a^2$, 73 Hz (D), and the highest fs0 is in the form $A^1:a^3$ 230 Hz (ais); thus the variation width of the fs0 level is 157 Hz. Formulas in the forms A^2 , A^3 and A^4 are nearly similar, consisting only of some rhythmic, melodic, harmonic and temporal variations, so that the formulas of the A^1 can be said to represent all the forms of A^{1-4} .

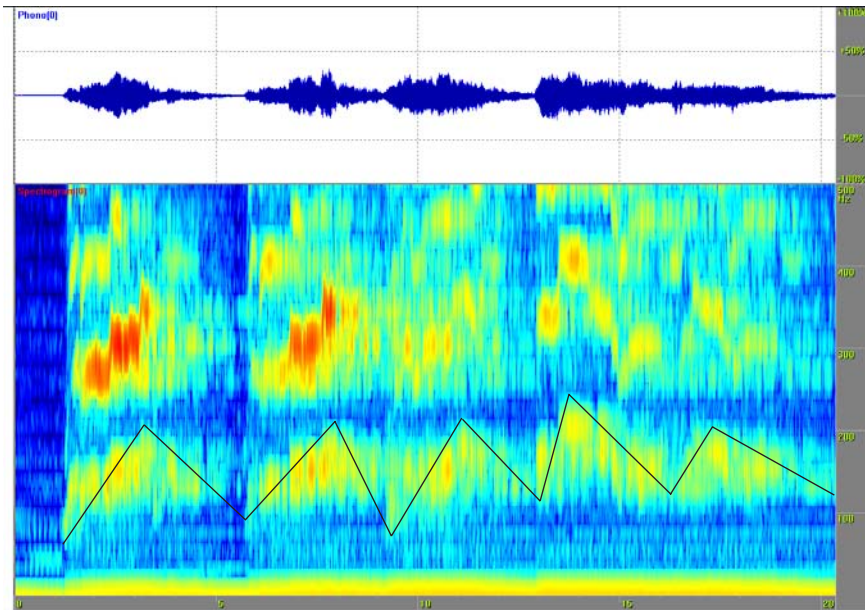


FIGURE 80 Form A¹ with fs0 movements in the *Alleluia: l'Esprit souffle* (0:00 - 0:20:3, 500 Hz); highly simplified.

Form B

Fs0 movements in the sound spectrum of the form B¹, with its formulas b^1 , b^2 and b^3 , increase from the low fs0 of 78 Hz (Dis) to the highest fs0 level of 232 Hz (ais), and decrease evenly to the fs0 of 108 Hz. In the formula relations, the fs0 generates a loop to the level of 78 - 83 Hz four times, as also happens in the middle of form B¹: b^2 . The lowest fs0 of form B¹ is 78 Hz, and the highest fs0 is 232 Hz; the variation width in the frequency axis is 154 Hz. Formula B² is similar to B¹, and consists only in some rhythmic, melodic, harmonic and temporal variations, so that the following figure of B¹ with its formulas also represents form B² (Fig. 81).

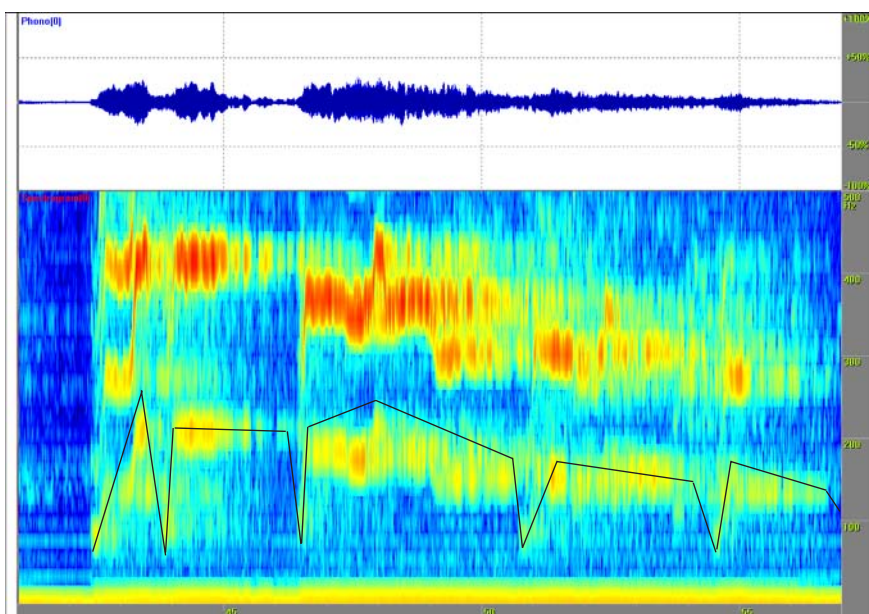


FIGURE 81 Form B1 and its fs0 in *Alleluia: l'Esprit souffle* (0:41 - 0:57, 500 Hz).

The word *l'Esprit*, particularly the first two characters / l'E / and their relation in form B1 and B2, consists of wide fs0 movement phenomena in the chant (Fig. 81). We can interpret the whole chant, for example, as creating among listeners (PGA1) some experiences in "dynamic variations in melismas", "grand echo", "expressive target", "contradiction in image and contradiction between music and text", as well as nouns such as "echo, monastery, monks, Italy, mountains, hillsides, vibration, heart, cave, and mountain lake". A wide fs0 movement with the neume *pes* and its interval (G to d) may explain these experienced fragments. Reznikoff (In2) states that in this composition the intervals are mostly "right now", that is to say, of a mostly immediate nature.

Form C

fs0 movements in the form C vary so that its formulas c^1 , c^2 and c^3 begin from the fs0 level of 64 Hz (C), increase to the highest level of 232 Hz (ais) in the formula c^3 , and end on the fs0 level of 125 Hz; thus the variation width in the fs0 is 168 Hz. The formulas in the form C^2 are similar to those of formula C^1 , with only slight rhythmic, melodic, harmonic and temporal variations, so that Figure 82 of form C^1 also represents form C^2 .

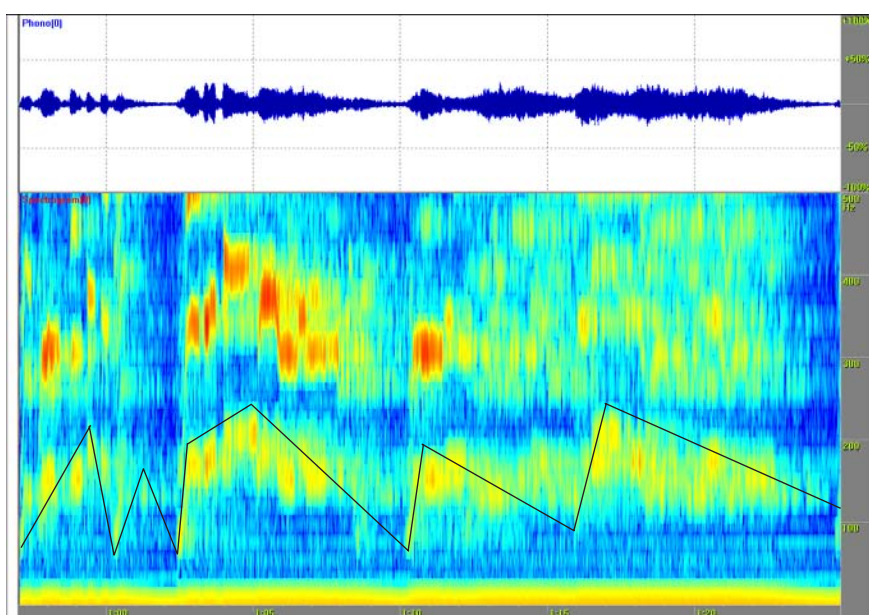


FIGURE 82 Form C^1 and its fs0 movements in *Alleluia: l'Esprit souffle* (highly simplified; 0:57 - 1:25, 500 Hz).

As a result, *Alleluia: l'Esprit souffle* and its voice movements in the fs0 varies evenly between the lowest and highest fs0 levels. By this we may interpret the chant as expressive of intensive (musical) thoughts, or even emotional movements, which follow the upward and downward intensity of the composer or chanter.

5.1.4.4 Harmonic Formula Analysis

Harmonic formula analysis of the *Alleluia: l'Esprit souffle* reveals that the main aural voice space (avs2) is about 1.1 kHz, whereas the highest avs3 reaches to 3.1 kHz.

In forms A^1 to A^4 the avs1-2 varies from 400 to 1100 Hz, and the highest avs3 varies from 2600 to 3100 Hz. In form B^1 to B^2 the avs varies from 460 Hz to the

highest avs3 level of 3000 Hz. In form C^1 to C^2 the main avs2 is about 1100 Hz, and the highest avs3 reaches to 3100 Hz (Fig. 69). We may also notice that the harmonic structure of this chant consists of the following: the avs level of 500 Hz means the syllabic chanting style of the *refrain* formula, and the avs level of 1100 Hz consists of melismatic chanting of the *jubilus* (ia-a). The sound spectrum in *jubilus* is dark, which means that the harmonic spectra consists of noise, or impure qualities of sound, because of the resonance of the vocal production (Fig. 83; $A^2:a^2$).

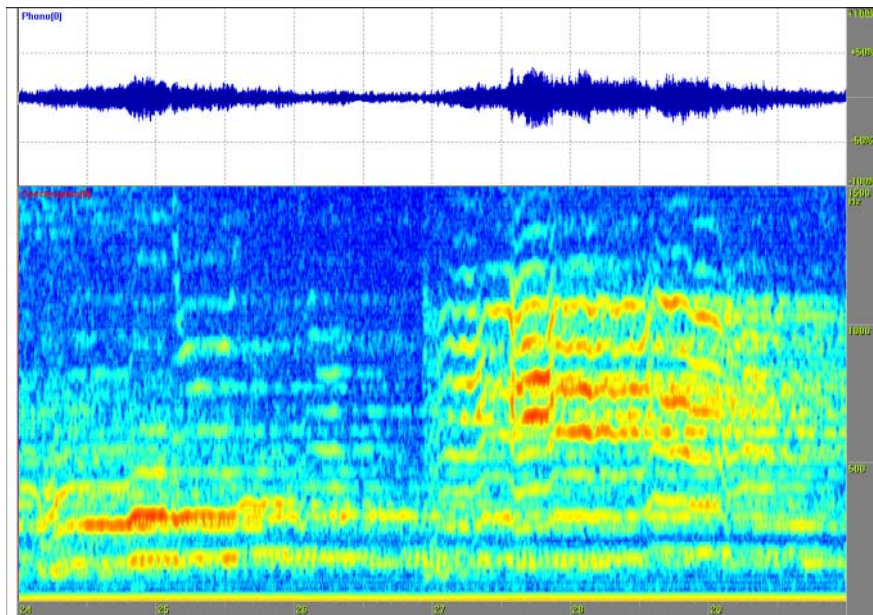


FIGURE 83 Harmonic spectra of *Alleluia: l'Esprit souffle*, formulas A2:a1, a2 (0:24 - 0:30, 1500 Hz).

As a result of the harmonic formula analysis we may illustrate of the avs of the whole *Alleluia: l'Esprit souffle* with a figure in which the avs levels ascend from the lowest avs1 level and become denser and higher at the end of the forms, repeating these harmonic formulas (Fig. 84).

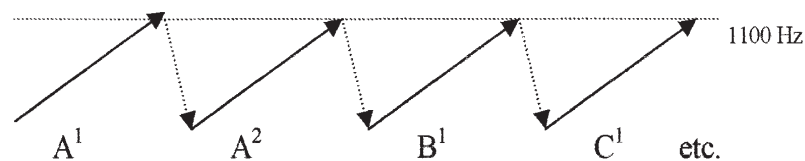


FIGURE 84 Avs movements in *Alleluia: l'Esprit souffle* (greatly simplified).

5.1.4.5 Formula Content

Alleluia: l'Esprit souffle is mainly a syllabic chant with 50 percent syllabic Fc formulas. It consists also of 31.2 percent melismatic Fa formulas, as well as 18.8 percent of mixed formulas Fd. We can illustrate this formula content structure with Figure 85, and with the schema or grid of the formula content center (Fig. 86).

Formula content
 A¹: Fc / Fc / Fd / Fa
 A²: Fc / Fc / Fa / Fd / Fa
 B¹: Fc / Fa / Fc
 C¹: Fc / Fc / F (d)^{12a}
 A³: Fc / Fc / Fa
 B²: Fc / Fa / Fc
 C²: Fc / Fc / F (d)a / Fd / Fa
 A⁴: Fc / Fc / Fd / Fa

FIGURE 85 Formula content of *Alleluia: l'Esprit souffle*.

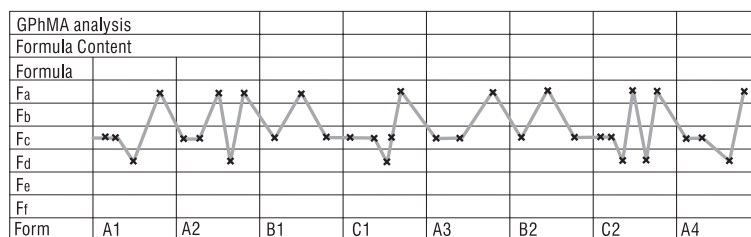


FIGURE 86 Formula content with content center (x) of the chant *Alleluia: l'Esprit souffle*.

5.1.4.6 Formula Circle and Levels of Consciousness

I have transformed the formula content schema into a temporal representation of a circle, which is hypothesized to represent in the GMA a cognitive model of mind. Figure 87 represents the temporal formula pattern circle of *Alleluia: l'Esprit souffle*, in which the balance of the composition is in the outer circle, and the tension in the core of the circle. In addition, the super-conscious formula level is hypothesized to lie in the outer circle, the conscious formula level in the middle of the circle, and the unconscious formula level in the middle (core) of the circle.

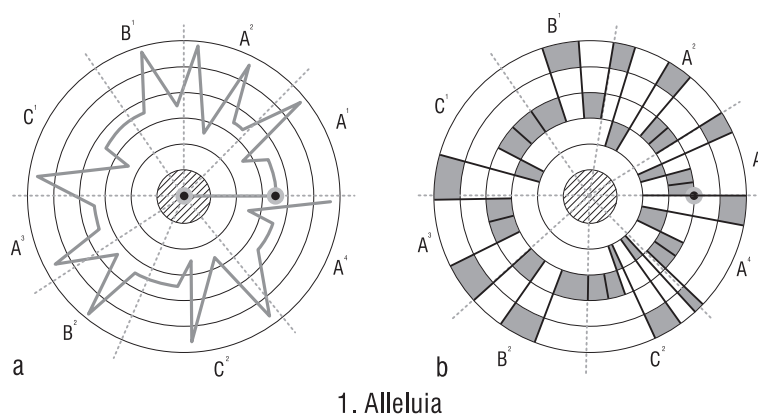


FIGURE 87 Formula circle of the chant *Alleluia: l'Esprit souffle* (see Fig. 48).

According to the formula circle analysis, *Alleluia: l'Esprit souffle* is a conscious composition with 68.8 percent of Fb, Fc, and Fd formulas, and a super-conscious composition with 31.2 percent of Fa formulas. The formula circle with its formula content patterns are quite in balance with each other, by which I mean the formula

¹² F(d)a formula means that the formula begins with a short mixed formula Fd, and continues with a melismatic formula Fa, which is the main formula content.

content varies only somewhat in the circle: the relation level of the content formulas varies between 0 to +/-3. Mixed formulas Fd are the most intensive formulas in the composition, and the analysis reveals that when the formula Fd appears in the formula circle in the middle of the formulas C¹:c³, C²:c³, or between the formulas A¹, A², A⁴, C², then the tension ascends from the formula Fd to the formula Fa in all findings. This phenomenon we can interpret as a balancing musical movement in the composition, in which some musical feature (Fd formula) of the voice is “drawn” to the melismatic formula content Fa. According to the conscious levels of the formula circle, we may interpret this phenomenon such that after the formula is nears the unconscious musical formula level Ff, the successive movement is toward the balancing, super-conscious musical formula Fa.

5.1.4.7 Formula Relations

Decreasing spectral relations of the fs0 in the forms of the present chant vary between 51 Hz to 75 Hz, and the ratio of the amplitude relations varies decreasingly between 11 and 38 percent.

The relations of the forms are structured so that all new forms compared to the previous forms create an fs0 movement in which the previous fs0 of the form decreases in all cases compared to the new form; but then the fs0 of the new form increases immediately back to the same level of the previous fs0 level. This movement I have defined as a loop, a phenomenon that we can hear audibly, and may interpret, for example, as a breathing technique with which Reznikoff begins a new phrase, formula, or syllable. In this study we can interpret the loop also a feature of emotional formula F^E (Ch. 6.8), or even a feature of genetic formula F^G (Ch. 6.9).

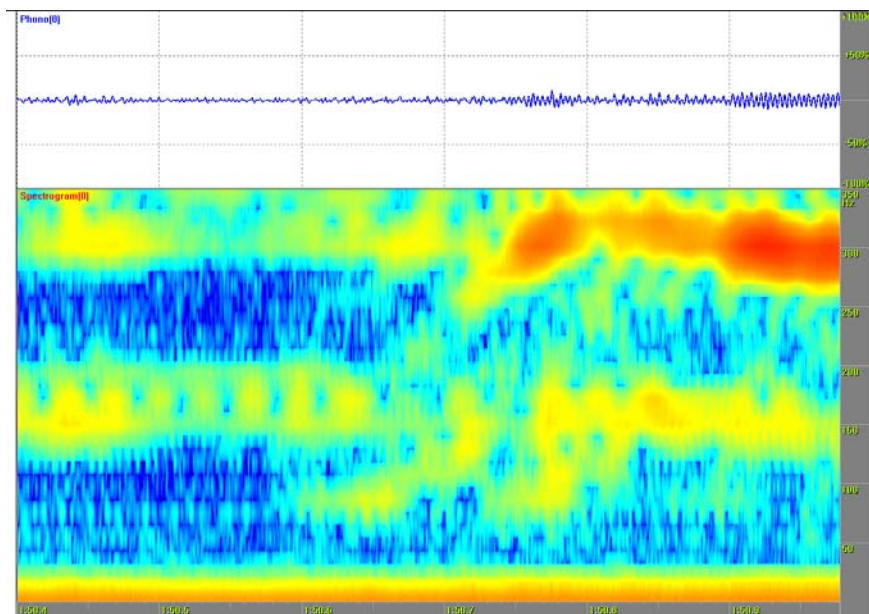


FIGURE 88 Looping phenomenon in formula relations B²:b² (1:50.4 - 1:51, 350 Hz) in *Alleluia: l'Esprit souffle*.

The main fs0 movement of the formulas in this Alleluia consist of increasing and decreasing relations between them, which means that 68.2 percent of new formulas decrease from 27 to 121 Hz. Yet, 9.1 percent of new formulas begin with increasing relations, and 22.7 percent of the new formulas begin with a balanced relation compared to the previous formula. Looping phenomena occur in 36.4 percent of the formula relations in forms A¹, A², C¹ and C².

Amplitude relations of the formulas begin 95.5 percent of the time with an increasing air pressure of +1 to +48 percent, and we can notice neutral +/- air pressure occurring one time (4.5 percent). The highest increasing air pressure occurs between the relations of A²:a² - F^v with a melismatic variation of the vowel / a /, and the neutral relation occurs between the relations of B²:b² - b³ "uu-ilvieut".

In addition, *Alleluia: l'Esprit souffle* consists of 8 units of constant formula content relations, and 23 units of formula content relations in which the musical thoughts vary slightly (+/- 0-3).

I would interpret *Alleluia: l'Esprit souffle* affectively as an emotionally sad or sorrowful composition, because it consists of 100 percent decreasing relations at the fs0 level of the forms, and 68.2 percent decreasing fs0 relations between the formulas. The intensive movements in amplitude and fundamental frequency inside the formulas create tension in the chant.

5.1.4.8 Micro-Structural Formula Analysis

I have focused in the micro-structural analysis on musical phenomena that are audibly or visually interesting. These are, for example, the nasal sounds / niu /; formulas with the phrase "l'Esprit souffle"; the neumatic sign pes, with its spectral representations; looping relations in forms and formulas; melismatic vowels / a / and / u /; as well as variations in voice and fs0 movements in the vowel / a /, for example, a-a-a-a (A²:F^v). Some of these micro-structural phenomena have already been described in the voice analysis (Chapter 5.1.3) and in the relation analysis (Chapter 5.1.4.7).

The formulas for "l'Esprit" (B¹:b¹, B²:b¹) are interesting vocal phenomena in different ways; for example, they consist of a widely increasing onset in the fs0 (or voice interval). The B²:b¹ formula consist also of the lowest and highest fs0 of the composition, while its words represent the cue meaning of the chant (Wind or God's spirit). In Figure 89 is a spectral representation of the B¹:b¹ formula with ascending fs0 from 37 Hz to 240 Hz (203 Hz). This movement is notated with neumes (G - d)¹³, and with a pes sign. On the syllable / l'E / (Fig. 90) we hear a widely expanding voice movement, but the sound spectrum reveals phenomena that are only wider than the neumes, because the neumes and signs are allusions of the chant.

¹³ (G-d) in the CD recording, although in the transcription it is g¹ - d².

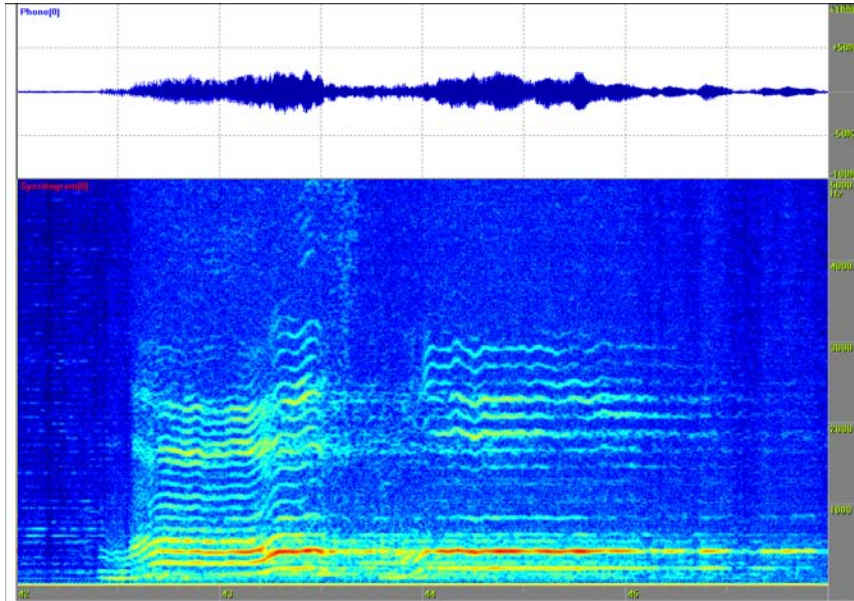


FIGURE 89 Sound spectrum of the formula (B1:b1) “l’Esprit” in *Alleluia: l’Esprit souffle* (0:42 - 0:46, 5000 Hz).

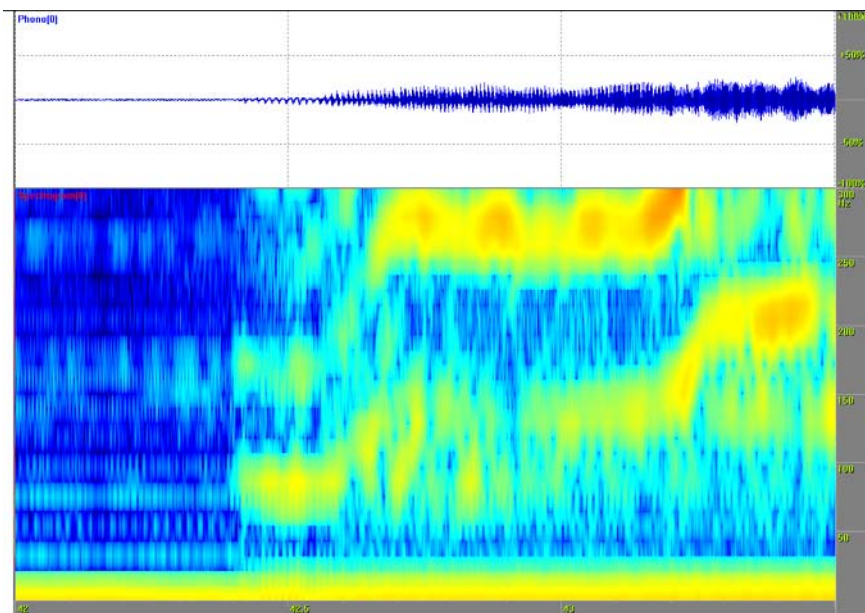


FIGURE 90 Formula paradigm / l’E / B²:b¹ (0:42 - 0:44, 300Hz)

Formulas A²:F^v and A¹:a¹ exemplify micro-structural analysis of the vowel / a / and its variations. 49 percent of *Alleluia: l’Esprit souffle* consists of the vowel / a /. In the composition / a / was chanted in different ways, but the basic formula is A¹:a¹, consisting of one vowel and only subtle movements in the fundamental frequency fs0. In other words, the vocal chords were either stable (a—) or vibrating (a-a-a-a). The variations of this vowel consist of fs0 movement in the spectra with three vowels of / a-a-a /, to four or more vowels / a-a-a-a... /, and we can hear and see these several variations in the chant. Figure 91 illustrates the amplitude and sound spectrum of basic vowel / a /, and its variations / a-a-a-a / are given in Figure 92.

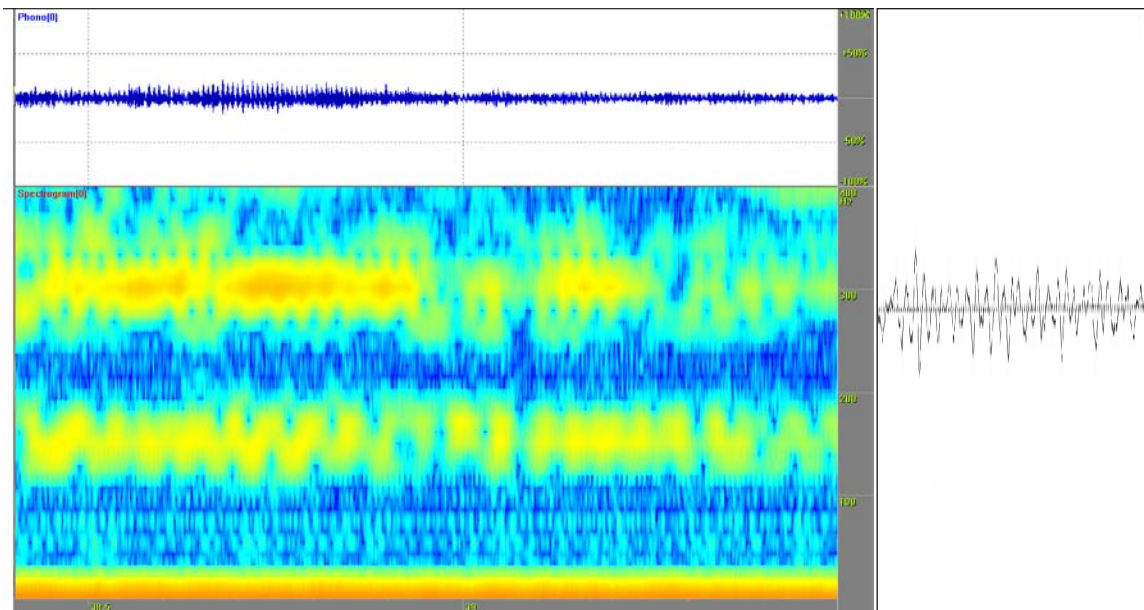


FIGURE 91 Sound spectrum of the formula $A^1:a^1$ with the basic vowel / a / (0:38.4 - 0:39.5, 400 Hz) with microstructural amplitude.

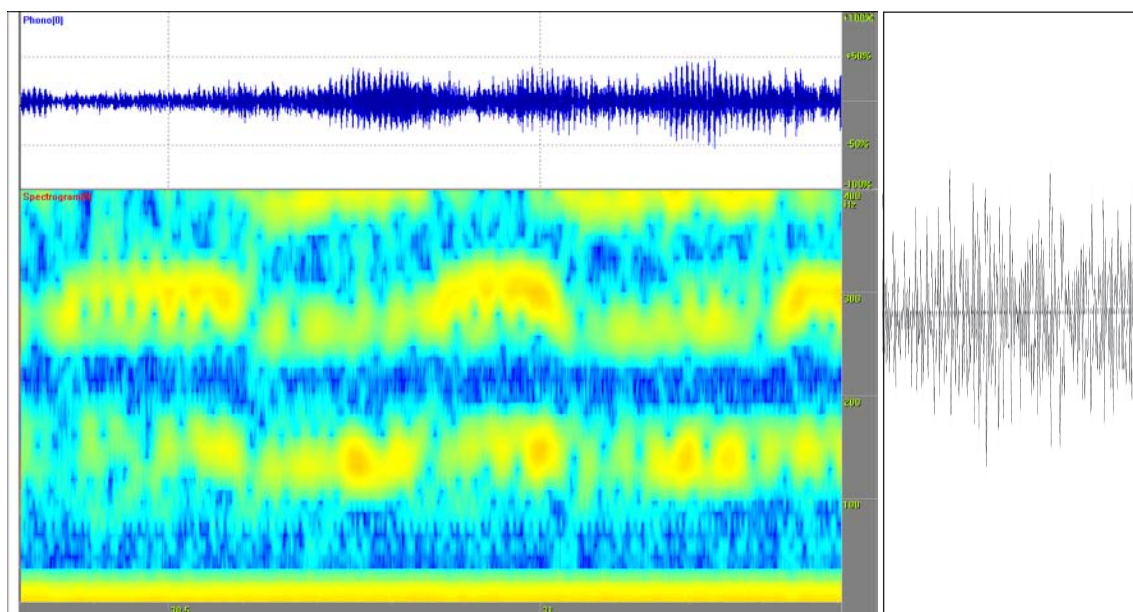


FIGURE 92 Sound spectrum of the formula $A^1:F^v$, and variations in the voice of the vowel / a / (0:30.3 - 0:31.4, 400 Hz) with micro-structural amplitude.

5.1.4.9 A Performance Analysis

The aim of this sub-chapter is to analyze and discuss one performance of Iegor Reznikoff's composition, because his music is created partly when it is chanted or performed. Also the aim is to discuss the emotional expression of the performance.

The analysis method consists of two parts: descriptions of the performance and analysis of the emotional space or grid (Fig. 25). The material in this study is based on a video recording of Reznikoff's Finnish chant *Tuuli puhalttaa* (*Alleluia: l'Esprit souffle*). The video was recorded in Viittakivi, Finland in summer 2002 (P1), during a course the composer was teaching harmonic chanting.

The composition is chanted in Finnish and is similar to the original French version, though the vowels are naturally somewhat different. The Finnish version of the chant consists of alleluia phrases or formulas at the end; on the contrary, in the French chant they are situated at the beginning (Fig. 66). Body movements of the chant are also similar when sung in both languages. *Tuuli puhalttaa* consists of 11 performance formulas,¹⁴ and all these are described in this sub-chapter. I have used a somewhat different formula structure as compared to Reznikoff's transcriptions, because of the spectral representation and its interpretation.

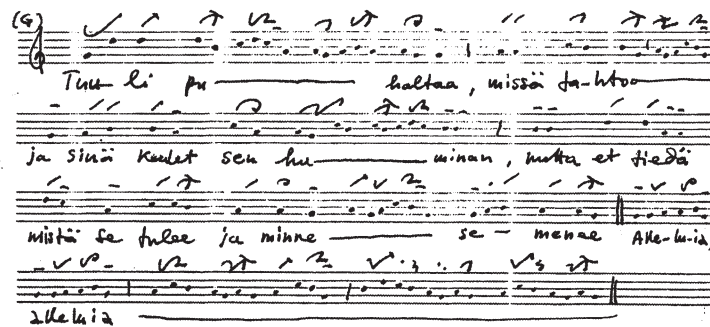


FIGURE 93 Transcription of the chant *Tuuli puhalttaa* (Iegor Reznikoff 2001).

5.1.4.10 Descriptions of the Composition

Iegor Reznikoff is sitting at the front of a large hall. On the right side of the room a lake can be seen through a large window; on the other side are classrooms. Reznikoff has a guitar on his knees. A group of about 30 singers sit opposite him, and he is chanting *Tuuli puhalttaa* with them.

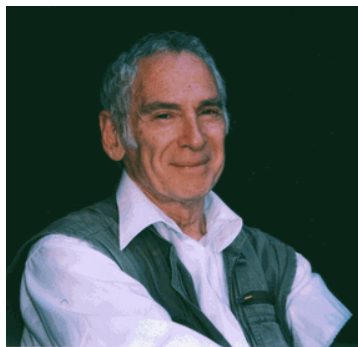


FIGURE 94 Composer and chanter, Iegor Reznikoff.

¹⁴ In the performance, Reznikoff performs more alleluia formulas than appear in the transcription.

“Tuuli” or “the spirit”

Reznikoff chants the first syllable such that his head, face, glance, and left hand with joined fingers are moving to the right, and then to the left, and both hands are creating a circle with open palms upwards. Head and glance are upward, toward the sky, in the direction where the “tuuli” is reaching. The eyes are open, but squinting. His face is peaceful, though his mouth is quite tense, as in a whistling formation, and he is smiling gently. In the performance formula, I have put the symbol B, when Reznikoff joins his hands together.

This formula consists of the interval *podatus* (*pes*) and *virga* with *episema*. According to the GMA this formula is the most important one in the chant (5.1.4.8).

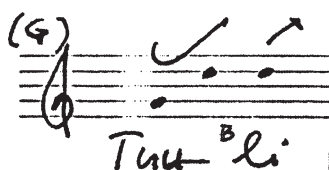


FIGURE 95 “Tuuli” formula of the chant *Tuuli puhaltaa*.

“Puhaltaa” or “is blowing”

In this formula the left hand is ascending and descending, as is the head, as if it were following the hands and signs, in addition to the melodic intervals. In performing the formula, the idea is that the hands alternate so that when the sign or interval is upwards, then a single hand is also moving up. Conversely, when the sign or interval is pointing downwards, a single hand is moving downwards. The performance formula begins and ends with a stable movement.

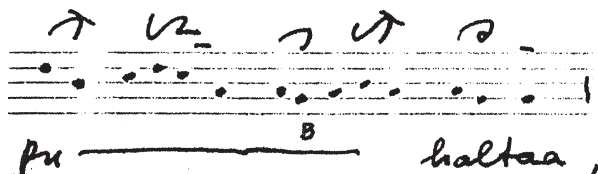


FIGURE 96 “Puhaltaa” formula of the chant *Tuuli puhaltaa*.

“Missä tahtoo” or “where it wants”

The composer looks forward at the beginning of this formula, and the left hand is on the chest. The look moves to the right, the right hand moves from up to down, then both hands are united. In the melismatic formula paradigm / o / the hands are alternating, and the head is following the movements of the hands. The eyes are open, and at the end of the formula the look is downwards, with the eyes almost closed. The face is gentle and friendly; the hands are animated in the middle of the formulas, but stable in the end.

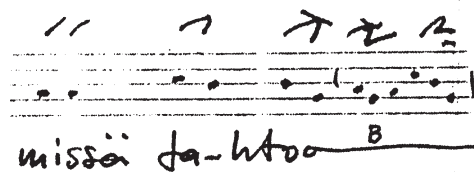


FIGURE 97 “Missä tahtoo” formula of the chant *Tuuli puhalttaa*.

“Ja sinä kuulet sen huminan” or “and you hear Its voice”

At the beginning of the formula, Reznikoff faces forward, and then looks to the right. The left hand shows the upper intervals. He then looks to the right, towards the light of the window, and the right hand goes to the ear on the word “kuulet”. Then the look moves downward, eyes open but squinting as before. In the latter part of the performance formula the hands are alternating according to the intervals, and the eyes are following the hands. At the end of the formula, the look turns downward, the eyes close, and the hands are put down.

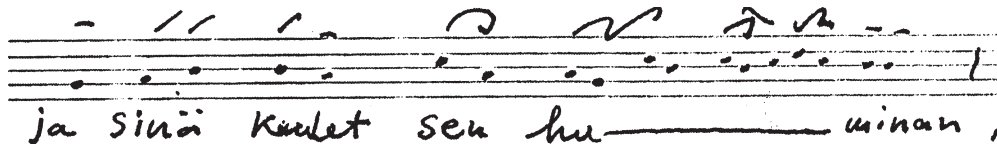


FIGURE 98 “Ja sinä kuulet sen huminan” formula of the chant *Tuuli puhalttaa*.

“Mutta et tiedä mistä se tulee ja minne se menee” or “but you neither know where it comes from nor where it is going”

This performance formula, which has four formula paradigms, begins with the face toward the singers, and hand movements are following the signs. The face and eyes are following the movements of the hands. On the word “et” the fingers of the left hand are moving back and forth (a motion of refusal). The formula ends with a peaceful face and body, and the hands are lowered. In this formula, during certain very small intervals, such as a brief punctum, the hands point to the chest.

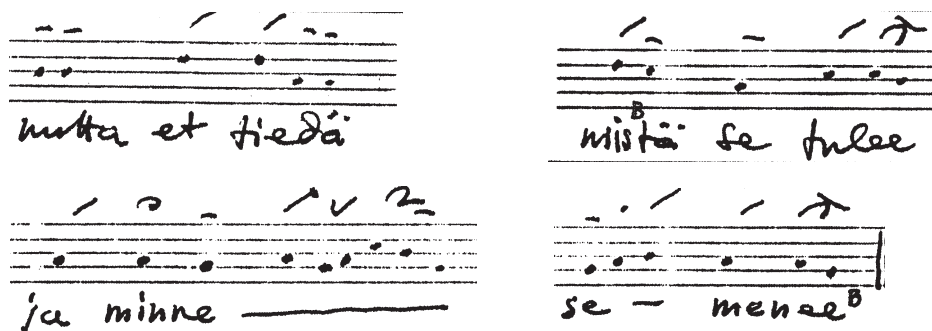


FIGURE 99 “Mutta et tiedä mistä se tulee ja minne se menee” formula of the chant *Tuuli puhalttaa*.

“Alleluia, alleluia” or “Hallelujah”

The chant consists of five alleluia performance formulas, chanted rapidly (about 120 M.M.), and in a syllabic style. The face is toward the other singers, hands are motioning slightly, and the head is moving back and forth constantly. The voice dynamic is *piano forte*, becoming softer and arriving at *ppp* at the end. Alleluia formulas are created with voice and head movements going in a circle, as if expressing a prayer or a mantra.

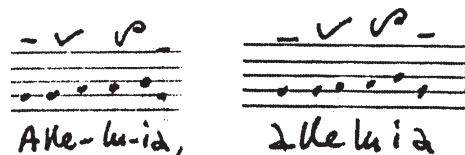


FIGURE 100 The refrain formulas “alleluia” of the chant *Tuuli puhaltaa*.

“a--a, a----a”

The *jubilus* formulas consist of a melismatic, prolonged vowel / a /, and these formula paradigms are performed so that when the interval or chirognomy sign is ascending, then both hands ascend, too, and the look is upwards. Conversely, when the interval is descending, the left hand follows the interval with melismatic movements (in small waves). In the upper voice or sign the eyes are closed; in the stable voice the look moves to the left, then forward, and the hand points to the heart on the note *g1* (G). Movements of the *jubilus* formulas flow in a supple manner; the face, hands, voice and eyes are animated, although the atmosphere is gentle and warm.

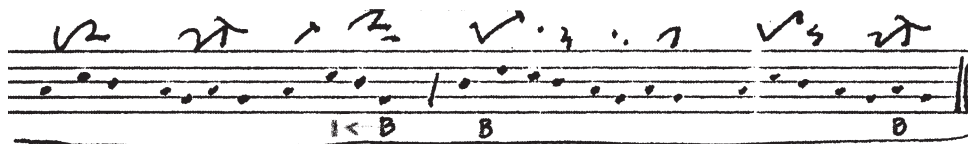


FIGURE 101 The *jubilus* formula “a--a, a--a” of the chant *Tuuli puhaltaa*.

5.1.4.11 Movements

The result is that the performance formulas create a unity, such that they begin and end in the same way. At the beginning Reznikoff is peaceful with hands down, and he is looking forward with open eyes. The formulas end also in similar ways, peacefully, with hands down. The main movements occur upwards and downwards in the middle of the formulas, so that the tension is high during upward motion, and fundamentally relaxed when downwards. The signs, hands, and movements follow the words vividly, in a personalized way, while adhering to the rules of ancient Christian cheironomy.

Reznikoff use his hands so that the palm is upwards (to the sky, heaven, or spirit), or forward from the performer’s self. He also use the hands so that the thumb and other fingers serve as pointers, (mainly to the chest, or heart), but they also stress some signs or neumes. The hands also create a circle or a semicircle, expressing creation and tension upwards. Hence they are directed mainly to the right side of the space.

Reznikoff's eyes are mostly open, but squinting. Only during a few upward looks are his eyes clearly open. His head follows his hands, musical intervals, or signs. As a result, the whole body produces a united movement.

5.1.4.12 Emotional Space, or Emotional Performance Formula

We can notice the emotions of the performer from the tense movements upwards and downwards, as displayed with the hands and gestures. Hence, according to Camurri's theory (Ch. 2.6; Fig. 25) I would locate *Tuuli puhaltaa* mainly in Happiness, Peacefulness, and a movement towards Rapture. Antonio Damasio (2000: 341) refers to some emotions as "wave-like patterns" and others as "burst patterns", features applicable to this study, too. According to Johan Sundberg (1987: 155) each emotion and attitude has its own typical pattern of movement which the entire body expresses, including the voice organs. For example, most muscle activity typically decreases during sadness and depression, and motion is minimized. In contrast, an angry person may express rapidly changing activity in many of muscles of the speech organ as well as in physical gestures. We can also notice these phenomena in this study, such that the upward motions express muscle activity correlating the musical signs (for example, *torculus*), as downward activity expresses minimized muscle movements correlating with musical signs (for example, *porrectus*). In Figure 102 I have applied the results of our performance analysis to Camurri's emotional grid, to which I have added the parameters of Spirit, God, Holy, and Reality, Earth, or Mundane. These parameters also represent Mental and Physical dualism (see Ch. 2.1.1). Symbol x represents the initial of the performance formula.

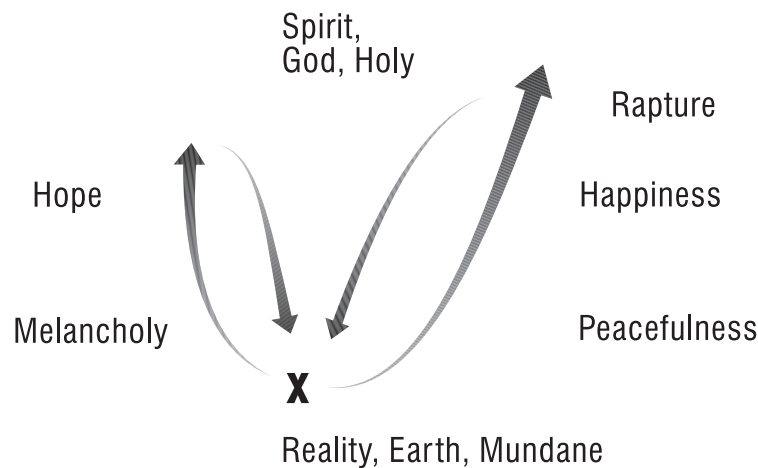


FIGURE 102 Main movements in the performance of *Tuuli puhaltaa* adapted to Camurri's emotional grid (Fig. 25).

5.1.5 Perception Gestalt Analysis PGA1

Global perception analysis (PGA1) of the *Alleluia: l'Esprit souffle* consists of two sections. One was done by a survey of two persons, who received a letter, with listening perception instructions (2 parts), an audiocassette, and a return envelope. In spring of 2001, listeners were given one month's time in which to listen to and return their experiences about the music. They were between the ages of about 45 and 60; one of them was a professional musician (music teacher), and the other was an ordinary music listener. A subsequent group of listeners consisted of five musicology students with their supervisor, who were between the ages of about 25-50. The listening session took about one hour. They listened to the composition twice in a classroom, then returned their experiences after listening. In addition, the results consisted also of the author's experiences of the composition. In sum, 9 persons gave their overall perceptions of *Alleluia: l'Esprit souffle*.

5.1.5.1 Global Listening: Free Associations

Listeners first wrote their free associations, or linguistic experiences, of the music with words that followed no particular order. The results consist also physical experiences of music. The following associations were perceived, which I have divided into nouns, verbs, adjectives, and adverbs.

Verbs and nouns represent consciousness, according to Guttenplan, and are thus stressed in this study. In the *collective consciousness* (PGA1¹⁵) the following verbs (to do, or undergo, acting/ actions) were perceived: singing, create, walking, is (being), and praying. The following nouns were perceived: Gestalt, voice, person, echo, sound, personality, sound structure, cave, wind, harmony, light, and thoughts.

In the *individual consciousness* there appeared the following verbs: raising, praying, fitting, create, look, aiming, planned, assume, think, receive, opening and chanting. The following nouns were perceived: echo, arch/monastery, monks, mountains, hillsides, peace, vibration, heart, head, song, eastern, cathedral, aphorism, Latin, Eastern, meditation, mood, atmosphere, mountain lake, evening, melismas, variations, target, structure, series, delight, human, music, Muslim chant, inside, performance, speech, water, hands and music and text.

In addition, the following adjectives and adverbs were perceived in the individual consciousness: deepness, devotion, pure, respect, power, grey/brown robe, orthodox, green, beauty, deep, holy, past time, peaceful, in, secular, natural, dynamic, grand, expressive, success, positive, balanced, almost and quite dark.

In the collective consciousness the following adjectives and adverbs were perceived: ritualistic, thick, diabolic, balanced, miraculous, pure, strong, soft, florid, mystic, joy, clearness, meditative, active, static, soft, gentle, alike, near, together, and light.

The following physical experiences were perceived in the PGA1: "vibration in the heart, but also in the head".

I have divided the nouns in the PGA1 into the following categories: people, places, and things, and have placed these in alphabetical order in the following table (Fig. 103):

¹⁵ Group perception I have defined as a "collective consciousness", which means listening and experiencing music together (even though the answers were written individually); individual perception as "individual consciousness" meant experiencing music alone (adapted from Randrup, A. 2002: 27-37).

Nouns as a representation of collective consciousness:

People	Place	Things
Gestalt	cave	echo
person		light
		sound
		sound structure
		thought
		voice

Nouns as a representation of individual consciousness:

People	Place	Things
human	cathedral	aphorism
monks	eastern	atmosphere
	evening	echo
	head	hands
	heart	melismas
	hillside	meditation
	inside	music and text
	Italy	mood
	Latin	peace
	mountain lake	series
	monastery	structure
	performance	speech
		song
		target
		variations
		water

FIGURE 103 Nouns of the PGA1, *Alleluia: l'Esprit souffle*.

5.1.5.2 Global Listening: Standard Polarity Profile

According to the Standard Polarity Profile analysis the chant was experienced as very clear and light, in addition to pleasurable. It was also a quite calm and quiet chant, though it consisted of clear and strong movements. It was also determined to be a neutral composition with some hardness and strength, but also some reserve and compliance. In Figure 104 I have illustrated the results of the Standard Polarity Profiles:

Standard Polarity Profile ALLELUIA. L'ESPRIT SOUFFLE								
VALENCE								
	-3	-2	-1	0	1	2	3	
Darkness	2	1	1			1	3	Lightness
Dissonance		2			1	3	2	Harmoniousness
Opacity	1	1	1		1	2	1	Clarity
Displeasure		1		1	3		3	Pleasure
Joylessness		2	3		1	2	1	Joy
STIMULATION								
Rest	1	2	1	1	1		2	Movement
Slowness		3		1	2	1	1	Rapidity
Leisuriness	1		3	1	1	1	1	Liveliness
Calmness	2	1		3		1	1	Excitement
Silence	2		2	2	1		1	Noise
POTENCY								
Softness	2	2	1	1	1	1	1	Hardness
Compliance			2	1	1	2	3	Purposefulness
Reservedness		1	2		3	1		Vigorousness
Weakness			2	1	1	4		Strength
Tenderness	2	2		1		3		Harshness

FIGURE 104 Standard Polarity Profile of the composition *Alleluia: l'Esprit souffle*.

5.1.6 Creation Gestalt Analysis CGA1

In an interview, Iegor Reznikoff described as follows the creation of the *Alleluia: l'Esprit souffle* (In2):

This chant is created as a song of praise, to the Holy in the invisible world. My chants are from the Bible, and they are directed first to the Holy, and then to the chant. The main purpose is the song of praise, in which the words and the beauty of the chant are important. The words are from the Christ, and it is a Whitsunday chant, or a christening chant ... The chant was created in a moment, but the model, or the structure and the impression to create the chant took a long to form.... I feel that I chant it much better now than before - the intervals are now more right than before. It is an expansive chant. Especially beautiful are the words "l'Esprit" and "souffle". In the French version the vowel / a / sounds beautiful ... I hope that [for] people who are listening to the chant [it] makes them meditate, or contemplate.

From the interview (In2) I collected nouns that I have divided into people, places and things in the table below (Fig. 105):

People	Places	Things
I	invisible world	Bible
people		beauty
		chants
		christening chant
		holy
		interval
		model
		moment
		structure
		vowels / a / [and / e /]
		Whitsunday chant
		word: l'Esprit

FIGURE 105 Nouns in the CGA1 *Alleluia: l'Esprit souffle*.

As a result of the perception analysis PGA1 and creation analysis CGA1 we may interpret *Alleluia: l'Esprit souffle* somewhat as follows: Iegor Reznikoff has composed Alleluia to express God or the Holy from the invisible world with the beauty of the words. Collective consciousness was experienced from the composition a Gestalt, or a person that was heard as a voice in a cave. Individual consciousness we can divide into two segments: *outer* and *inner experiences*. Outer experiences we can interpret so that a monk or a human is heard in Eastern Europe, or in Italy, or by a mountain lake or hillside one evening. Listeners experienced meditation and peace, via a performance of music, a song, speech, voice or text. Inner experiences we can interpret in the following way: a monk in a cathedral or in a mind, in heart and in head, inside of a human, hearing an echo of music, speech, voice, or song.

Comparing these experiences we can conclude that the listeners' and composer's associations of the chant *Alleluia: l'Esprit souffle* consisted of similar words or narrative fragments, such as praying, Holy, invisible world, heart, words, meditation. One question arose in the analysis: from where was the voice, or Gestalt, or music finally heard or created? from deep within a cave or from high mountain or hill? or was it just an (in)visible phenomenon in the mind? A musical phenomenon in the formula B²:b¹ may give us one answer: the formula consisted of both the lowest frequency of 37 Hz and the highest frequency of 240 Hz in the same formula paradigm, from low to high, in the word " l'Esprit" or "spirit", situated almost in the very center of the chant *Alleluia: l'Esprit souffle*.

5.2 Salve

5.2.1 Context and Content Analysis

Salve (2'14"), "hail!" or "salute!" in English, is one of the French chants on the recording *Le Chant du Thoronet*, and represents another small part of Reznikoff's repertoire. Composed in the D mode, it was and is most authentically chanted in monasteries, but Reznikoff performs it in churches (as concerts). It was created and titled at the abbey of Thoronet in France in 1977. According to Reznikoff (In2), the chant is in Latin in origin, and is based on original Cistercian writings. He has translated it into French because of his desire to perform it for French people.

The aim of the composition is to pray to the Mother of God. Salve Regina is a Mater Misericordiae, and it is a traditional chant from the tenth century. Salve is the song of praise, in which the invisible and its relation to the real world is emphasized (In2).

5.2.2 Linguistic Analysis

Salve is a recitative chant (antiphone), so that it is something like a musical discussion. To be more specific, it is a neumatic chant in which the melody arises from the words, and one syllable corresponds to two to four melodic units. The words begin with a prayer to the mother of the God, after which the Alleluia (praise to God) follows.

*Nous te saluons Reine de Miséricorde!
 Notre vie, notre douceur, et notre espoir, Salut!
 Vers toi nous crions, exilés enfants d’Eve,
 vers toi nous soupignons gémissants et pleurants
 dans cette vallée de larmes.
 De grâce, O notre avocate, tourne vers nous
 tes regards miséricordieux.
 Et Jésus, le fruit de tes entrailles,
 montre Le nous au terme de cet exil.
 O clément, O maternelle,
 O douce Vierge Marie.
 Alleluia.*

*Hail Queen Mother of Mercy!
 Our life, our sweetness, and our hope, Hail!
 To you we cry, exiled children of Eve
 To you we send up our sighs
 mourning and weeping
 in this vale of tears
 Come then our advocate
 turn towards us your merciful eyes
 And Jesus, the fruit of your womb,
 show Him to us at the end of this exile.
 Oh clement, oh motherly, oh sweet Virgin Mary.
 Hallelujah.*

FIGURE 106 Words of the *Salve*, in French and English.

Christian thoughts are symbolized in *Salve* with words and phrases such as “Queen, Mother of Mercy”, “[we] exiled children of Eve”, “our advocate”, and “show Him [Jesus] to us”. These words represent the cued meanings, and I would interpret them, based on Tresidder (1999: 165), that “Queen” and “Mother of Mercy” allude to the archetypal power of woman, together with which the King, or God, symbolizes the union of male and female duality in the spiritual life of the human being. The “exiled children of Eve” represent the secular lives of all fallen, hence sinful, human beings, and “our advocate” speaks of the privileged position of the Queen as one who can speak directly to the King on our behalf, in asking for the salvation of us sinful people. “Show Him [Jesus] to us” confirms the purity of Queen, whose very figure can represent Jesus to us. In short, the words of the composition represent the prayer and outcries of humans with their sins and suffering to the “Mother of Mercy”, who is a representative of salvation, mercy and purity, and who stands as a referent, or Gestalt, of the Holy God.

5.2.3 Voice Analysis

Aural analysis reveals the following general features: Every word is pronounced distinctly, with extremely clear articulation. The chant is neumatic at the beginning (praise to mother of the Mercy), but ends with alleluias consisting of melismatic formulas (*refrain* and *jubilus*). Melody and rhythm follow the gentleness and serene

flow of the words and formulas. The colour Reznikoff's voice is warm, and the tempo of the chant remains steady, about 90 M.M. Reznikoff's voice brought forth reactions such as these among listeners: "flowing from the heart, relaxed performance, warm, in balance, harmonic, positive, human goodness", and "God is smiling, good feeling"; to speak with Him is like having "a friendly discussion" (PGA2).

According to the spectral analysis, the fundamental frequency of the voice varies between 44 Hz (F_1) to 290 Hz (d^1), and the average fs_0 level of the voice is about 150 Hz (d). In amplitude we notice an intense crescendo (+53 percent) on the phrase "O clémente" (A:a⁸; 1:24).

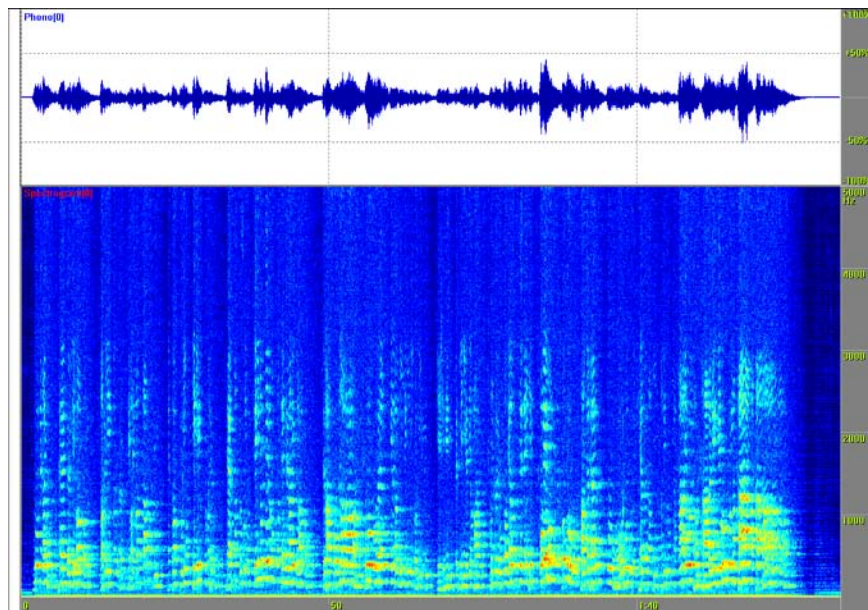


FIGURE 107 Sound spectrum of the chant *Salve* (0:00 - 2:14, 5000 Hz).

5.2.3.1 Vowels, Consonances and Nasal Sounds

Salve is mainly a recitative chant, but also consists of some melismatic phonemes; for example, on the vowels / a , e, i, o /. Nasal sounds (m, n) are typical in this composition, as are nasalized vowels (e, i, o, u); for example, in the words "nous", "reine", and "notre", which are prolonged throughout the whole composition. Performance of the *Salve* created associations such as "suitable length, conservative, clear structure, simple, unhurried tempo, natural chanting, and French chanson" (GPA2).

5.2.3.2 Special Features

This *Salve* exhibits some special vocal features. For example, the pronunciation in the phrase, "tes regards miséricordieux", consists of the nasalized and prolonged vowel / i / in the syllables / mi-sé-ri / (A:a⁵₃). This phenomenon is typical of Reznikoff's vocal and chanting style, in which he use the vocal folds so as to make the voice quite tense, similar to what happens in throat singing, while the melody or fundamental frequency remains quite stable. The fs_0 of the nasalized voice varies from between 109 Hz (A) and 219 Hz (a), with a variation ratio of 110 Hz.

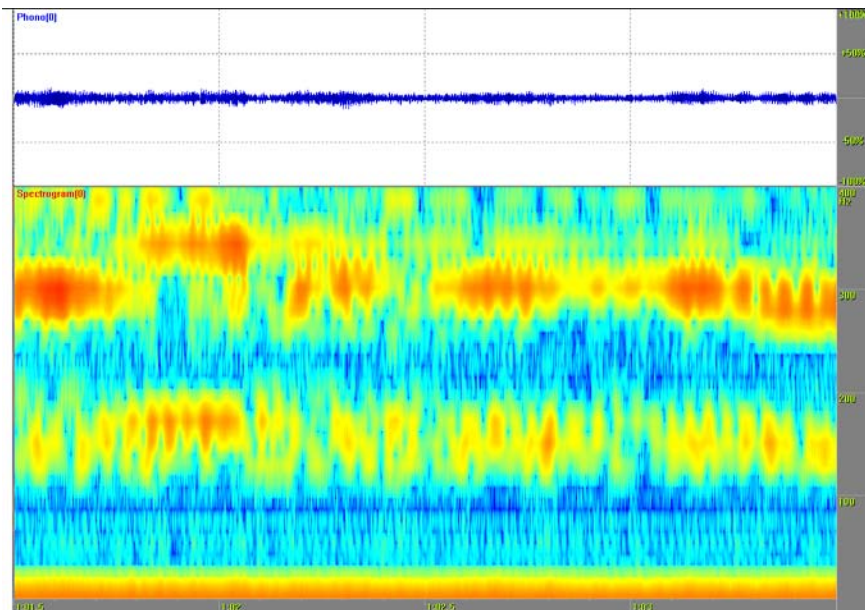


FIGURE 108 Sound spectrum of the syllables / mi-sé-ri / in the chant *Salve* (1:01.5 - 1:03.5, 400 Hz).

The phrases “Salut!” and “Et Jésus le fruit” are especially interesting vocally. In “Salut!” Reznikoff prolongs melismatically the vowel / a /, which also undergoes an intensive (122 Hz) fundamental frequency increase from 98 Hz (G) to 220 Hz (a), thereafter decreasing to the fs0 level of 129 Hz (c) on the syllable / lut /.

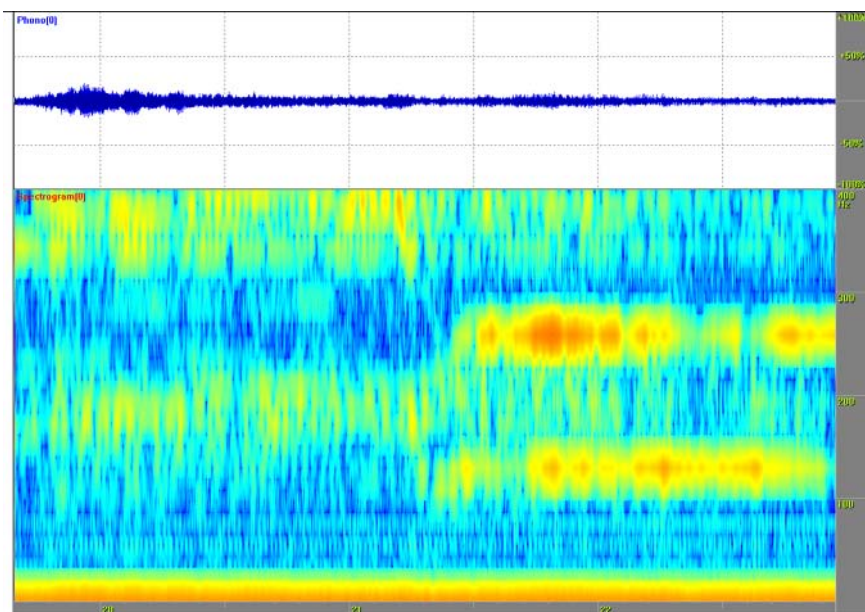


FIGURE 109 Sound spectrum of the phrase “Salut!” in the chant *Salve* (0:19.65 - 0:22.95, 400 Hz).

The voice in the formula “Et Jésus le fruit de” features interesting audible and visual voice movements in the fs0, in which the phrase “Et Jésus” increases from the fs0 level of 64 Hz (C) to that of 160 Hz (e). In the phrase “le fruit de”, the fs0 decreases suddenly to the level of 53 Hz (Gis₁), and increase immediately back to the fs0 level of 160 Hz. This phenomenon occurs in 0.8 seconds, and it is defined in the GMA as a looping phenomenon (Fig. 110).

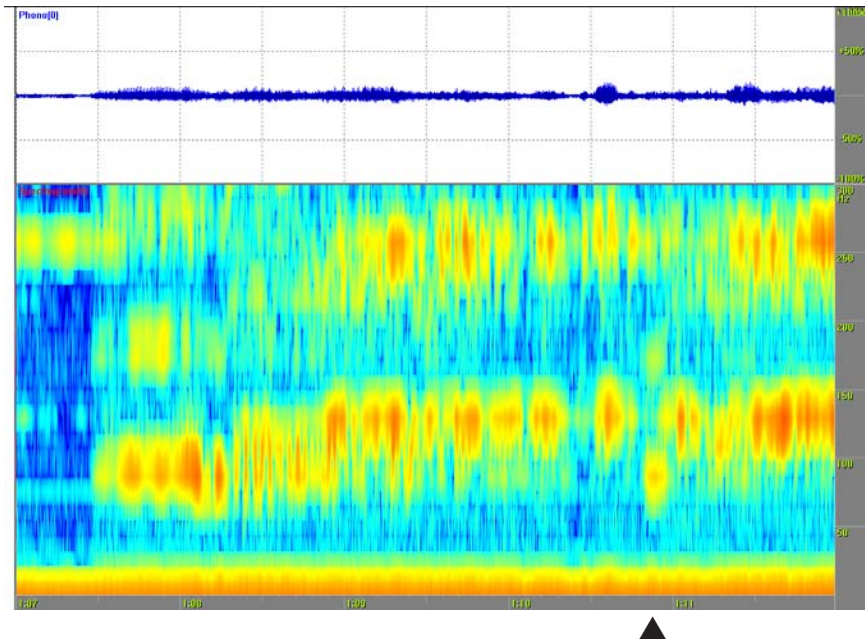


FIGURE 110 Sound spectrum of the phrase “Et Jésus le fruit de” in the chant *Salve* (1:07 - 1:12, 300 Hz).

5.2.4 Formula Analysis

5.2.4.1 Formula Structure and Linguistic Content

The *Salve* as an audible and visual musical unity is divisible into two forms, A and B. It is a progressive composition, in which the linguistic phrases in form A advance from formulas a^1 to a^9 with a recitative content (praise to the Mother of God). Form B consists of melismatic and repetitive Alleluia $b1$ formulas (praise to God) with a looping structure. The progress of the *Salve* in its formula structure and linguistic content is illustrated in Figure 111.

A	→	B
Form		Formulas
A:		$a^1, a^2, a^3, a^4, a^5, a^6, a^7, a^8, a^9$
B:		$b^1(F^v), b^1(F^v), b^1(F^v), b^2$

FIGURE 111 Progress of forms A and B, and formula content in the *Salve*.

5.2.4.2 Rhythmic Formula Analysis

The rhythmic structure of the *Salve* is divided such that form A lasts 100 seconds (80.4 percent of the total time) and form B lasts 22.8 seconds (18.3 percent of the total time). The chant does not feature clear articulations, but rather breathing moments in which the voice echoes over from the previous formulas. The tempo of the chant is mainly steady, but with some rhythmic alteration; for example, in the formula $A:a^5$. Thus, this phenomenon is figured into the content of the mixed formula (Fd). The basic rhythmic time-unit formula structure is illustrated in Figure 112.

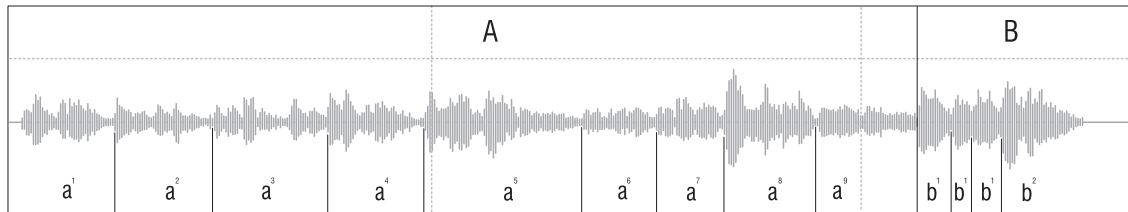


FIGURE 112 Rhythmic time-unit structure of formulas in the *Salve* represented with amplitude.

Form A consists of nine rhythmic formulas lasting from 8 - 18.3 seconds. The variation ratio¹⁶ is 10.3 seconds (95.4 percent). Form B consists of four rhythmic formulas that last from 2.8 seconds to 10.7 seconds, and the variation ratio is 7.9 seconds (282 percent). The rhythmic time-unit structure of the composition is shown in the following table, in which s symbolizes the short formula (less than 7.5 seconds), and L symbolizes long formulas (7.5 seconds or more).

L L L L L L L L L s s s L

To sum up: this *Salve* is rhythmically unambiguous, and consists mainly of neumatic or syllabic formulas in formal section A, and melismatic, neumatic, and mixed formulas in section B. The formulas a¹⁻⁹ in A we may interpret as a “friendly discussion”, given the balance of voice and tempo. The b formulas, however, we may interpret as imploring, with repetitive alleluias and melismas on the vowel / a /.

5.2.4.3 Melodic Formula Analysis

The fs0 movement of the voice in the *Salve* ranges above and below the average fs0 frequency of 150 Hz (d). The composition begins from the fs0 level of 83 Hz (E), and increases to its highest level of 290 Hz (d1) in the formula A:a⁸, on “O clémente”, where the vocal amplitude is widest (+53 percent). The lowest level is 44 Hz (F₁) and occurs in the formula A:a⁶ “Et Jesus”, which is situated in the middle of the composition. The composition ends with the fs0 of 134 Hz (c) (Figs. 113 & 114).

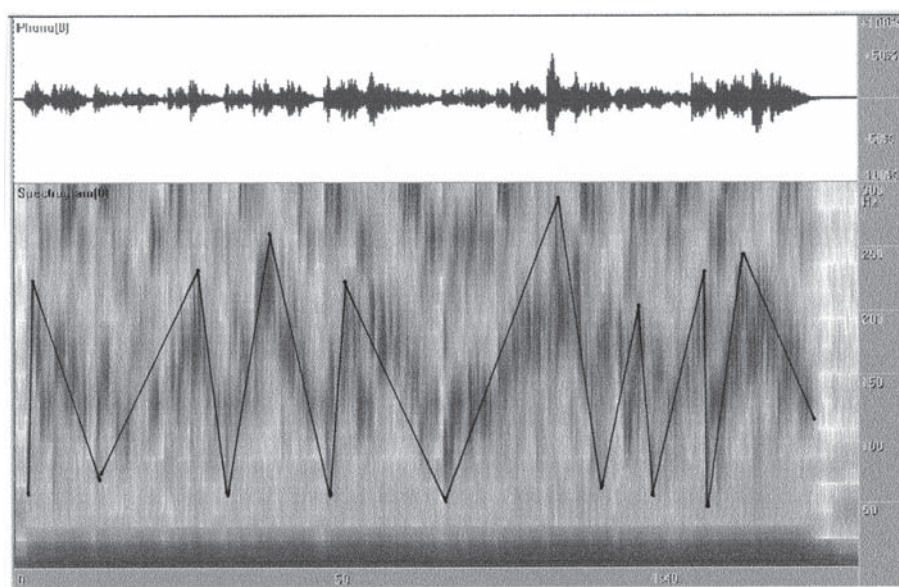


FIGURE 113 Sound spectrum of voice movements in the fs0 in *Salve* (simplified example).

¹⁶ This is compared to the first formula and its duration.

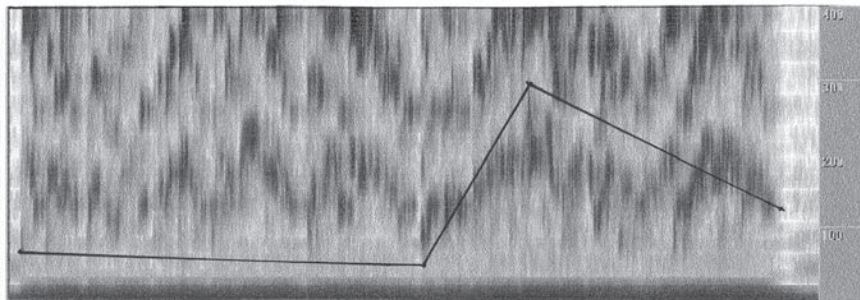


FIGURE 114 Variation ratio of fs0 movements in *Salve* (strongly simplified).

The fs0 movements of the voice created among listeners associations such as these: “unhurried tempo, clouds, trees, fair weather, high cliff surrounded by a desert, inner freedom, a flowing from the heart, memory trace, warm and orthodox” (PGA2). Comparing these experiences to the fs0 voice movements, we may conclude, for example, that the highest fs0 level in the intensive formula a⁸ with the phrase “O clémente” (Fig. 115), may create experiences of a “high cliff surrounded by the desert” or “inner freedom, world”. Conversely, the lowest fs0 level, in formula a⁶ with the phrase “Et Jesus”, (Fig. 116), may create the associations of “warm, flowing from the heart, human goodness, or care”.

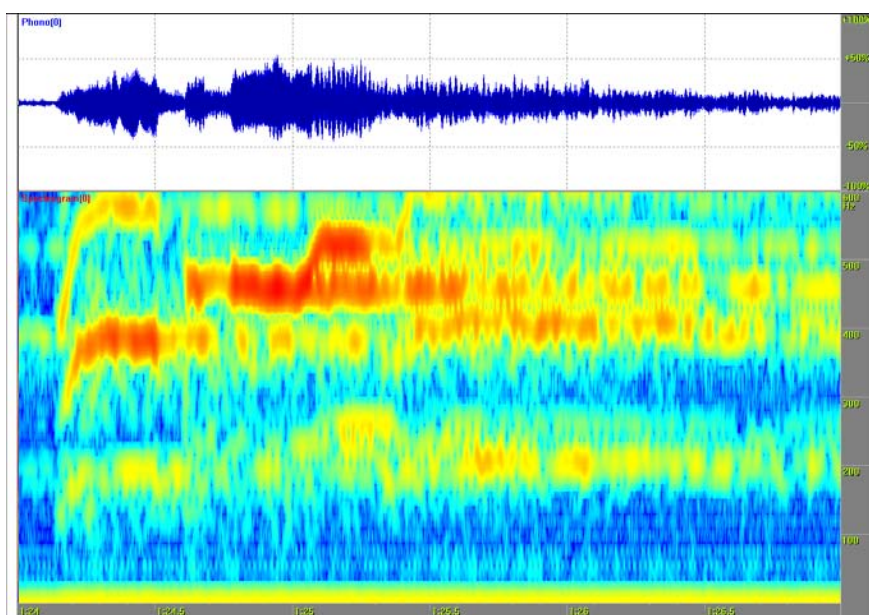


FIGURE 115 Formula A:a⁸ “O clémente” on the sound spectrum (1:24 - 1:27.20, 600 Hz).

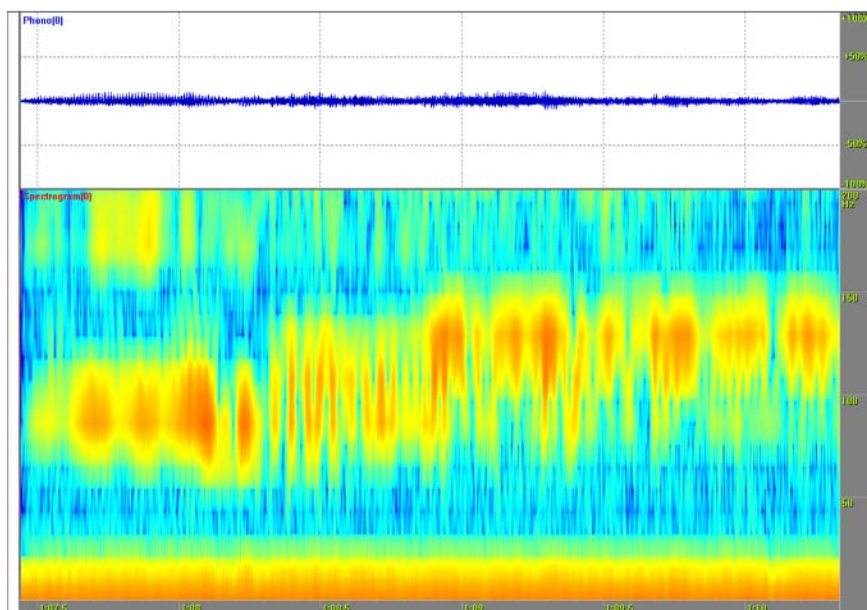


FIGURE 116 Formula a⁶ “Et Jesus” on the sound spectrum (1:07.44 - 1:10.33, 300 Hz).

5.2.4.4 Harmonic Formula Analysis

The avs movements in *Salve* vary between three avs levels (Fig. 107). The main avs2 level extends to the frequency level of 1200 Hz, the lowest avs1 is 520 Hz, and the highest avs3 level reaches the frequency of 3200 Hz. The structure of the avs levels are mainly constructed such that the formulas begin with the lowest avs1 level and increase to the main or highest one. The avs level of formulas A:a⁵ and a⁸, at 1200 Hz, are the most intensive in the composition. We may also notice a darkness in the sound spectrum, and wide and intensive amplitude movements. The alleluia formulas of section B are also intensive, showing darkness in the sound spectrum and wide amplitude movements; its avs level is about 3200 Hz.

According to Sundberg (1987: 148), voice levels below 1 kHz express sad emotions. Thus, we may interpret *Salve* as a sorrowful chant, but also one of joy or hope engendered by the increases in motion at the beginning of formulas. The perception analysis (PGA2) includes many associations or experiences of sorrow; the chant consists of low voices and low avs1 levels in the sound spectrum, as well as sad words such as “cry, tears, weeping”. At the same time, the *Salve* created positive associations of “warmth, gentleness, and balance”.

To sum up, we illustrate the harmonic formula analysis of the *Salve* with Figure 117, in which the formula A:a⁵ in the middle of the composition generated a decreasing tendency in the avs; alternatively, the formula A:a⁶ generated an increasing tendency in the avs. This section is chanted low and stable, in the fs0 of 44 Hz (F₁), and we may interpret it as creating experiences such as “unreal, simple, and flowing from the heart” among listeners (PGA2). I would define this section or moment as a harmonic gap (Fig. 118) consisting of a change in the musical mood from intensive rhythm to low and constant voice, as well as to an emphasis on the physicalism of the voice. The harmonic gap is created with a low, chest-voice, the inner space of the body that may account for the reaction that “heart and chest are in resonance” (PGA2).

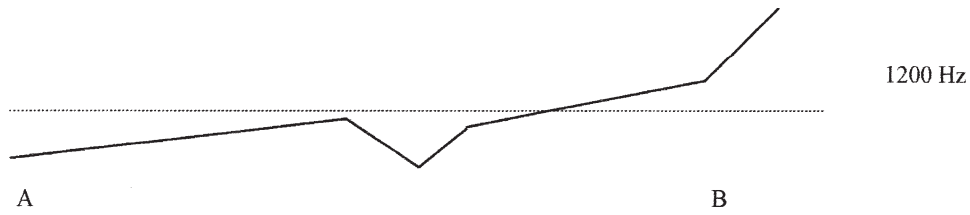


FIGURE 117 Harmonic (avs) movements in the chant *Salve* (simplified illustration).

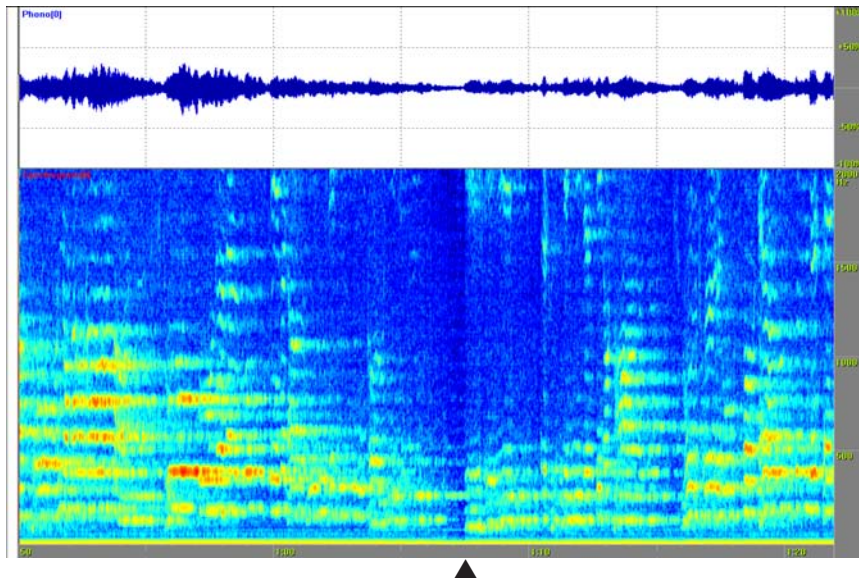


FIGURE 118 Sound spectrum of the “harmonic gap” in the *Salve* (0:50-1:22, 2000 Hz).

5.2.4.5 Formula Content

The *Salve* is mainly a neumatic chant with 45.1 percent Fb formulas, 29.0 percent syllabic formulas Fc, 12.9 percent melismatic formulas Fa, and 12.9 percent mixed formulas Fd. Figure 119 shows the structure of the formula content, and the schema of the composition is given in Figure 120.

Form	Formula content
A	Fc / Fb Fc / Fc / Fc / Fb Fc / Fc / Fc / Fb Fb / Fb / Fb Fd / Fb / Fd Fb / Fb Fb / Fc / Fb Fb / Fa / Fb Fa / Fc
B	Fb / Fd / Fd Fa / Fa

FIGURE 119 Formula content of the chant *Salve*.

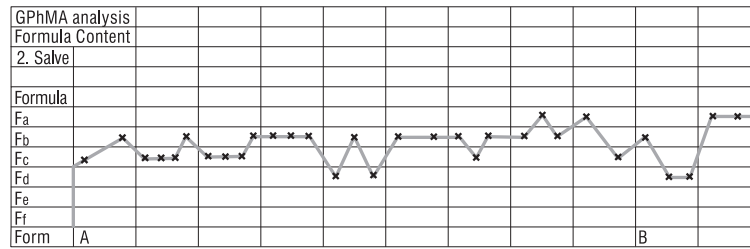


FIGURE 120 Formula-content schema with content center (x) of the chant *Salve*.

5.2.4.6 Formula Circle and Relations

In Figure 121 the formula content and its schema are transformed into a formula circle showing temporal formula patterns. From the figure we may interpret the *Salve* as mainly a conscious composition with 87 percent Fb, Fc and Fd formulas; its superconscious content is 13 percent of the Fa formulas. The formula circle with its content patterns are quite evenly balanced; the formula content and their relations vary little in the circle. In the relations of formulas A: $a^4 - a^5 - a^6$ we notice some intensity in the variation of the movement Fb - Fd - Fb - Fd - Fb. This phenomenon occurs because formulas Fd consists of such phenomena as the rhythmical changes in the phrase “de grâce O notre avocate”, and in the word “miséricordieux”. The B section/form also shows some intensity in the circle with the Fd - Fd - Fa - Fa formulas; phenomenon occurs because the *alleluia refrain* consists of variations in the melismatic voice movement with vowels / a-a-a / and / e-e-e /. In *Salve*, the tension of formulas Fd movement is toward the formula Fb or Fa, in other words, toward the outer formula circle.

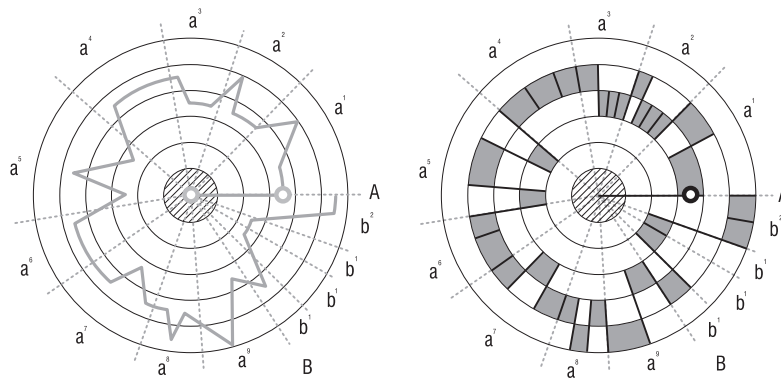


FIGURE 121 Formula circle of the chant *Salve*.

The spectral fs0 relations between the 13 formulas consisted of increasing, decreasing, and constant relations. The fs0 movements between forms A and B (formulas $a^9 - b^1$) decreased from 128 Hz to 80 Hz (48 Hz), but increased with a loop immediately back to the level of 128 Hz. In the meantime, the amplitude relations between A and B increased 8 percent. *Salve* consists of eleven units of decreasing formula relations and two constant relations; in addition there are 11 units of constant formula content relations and 18 units of content relations with (+/- 1-3) levels. The increased amplitude relations between formulas varied from 7 percent to 53 percent.

5.2.4.7 Micro-Structural Formula Analysis

Audibly and visually interesting musical phenomena in the *Salve* include the following formulas, voices, and meaningful moments, which I have analysed by going deeper into the micro-structural level.

The word “miséricordie” in the formula $A:a^5_3$, and its syllables / mi-sé-ri /, are interesting mainly because of the nasalized voices / mi / that belong to mixed formula content Fd (Fig. 122). It is chanted in a melismatic way, “miiii-se-riiiii”, and the vocal sound is quite tense. It is created so that the first voice / m / is in the fs0 level of 147 Hz (d), and / i / increases to the fs0 level of 193 Hz (g) in few milliseconds, then decreases immediately to the fs0 level of 145 Hz. Thereafter it vibrates/oscillates between the fs0 levels of 186 - 136 Hz (fis - cis), with the variation ratio of 50 Hz. This oscillating phenomenon is typical of Reznikoff’s music, and it is repeated with variations of the nasalized voices / m, n, i, u / in different parts of his compositions.

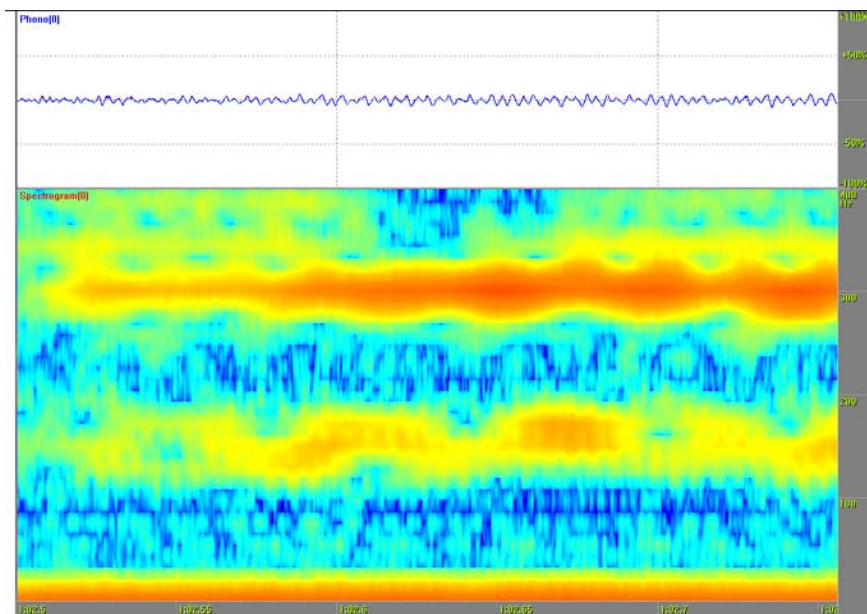


FIGURE 122 Sound spectrum of “miséri” with nasalized vowel / i / in the chant *Salve* (1:02.50 - 1:02.75, 400 Hz).

I have compared this phenomenon with the formula $(A:a^2_1)$ “Notre vie” in *Salve*, in which the nasal vowel / i /, as in the word / vie /, vibrates between the fs0 levels of 157 - 130 - 137 Hz, and the variation fs0 ratio is 27 Hz. Figure 123 illustrates this phenomenon with amplitude representation.

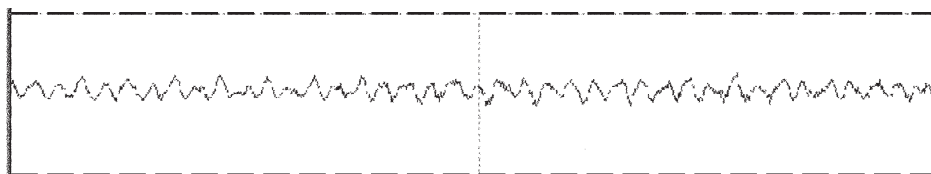


FIGURE 123 Amplitude representation of the formula “Notre vie” and its vowel / i / in the chant *Salve* (0:14.235-0:14.364).

Also interesting is the looping phenomenon in the formula $A:a^6$, on the phrase “Et Jésus le fruit de tes entrailles”. This looping is especially projected in the phrase “le fruit de”. The sound spectrum of the word with the syllable / le / is in the fs0 level of 132 Hz (c). It descends to the looping level of 86 Hz (F) with the word “fruit”, and ascends to the fs0 level of 130 Hz (c) with the syllable “de”, such that the looping gap centers around 45 Hz.

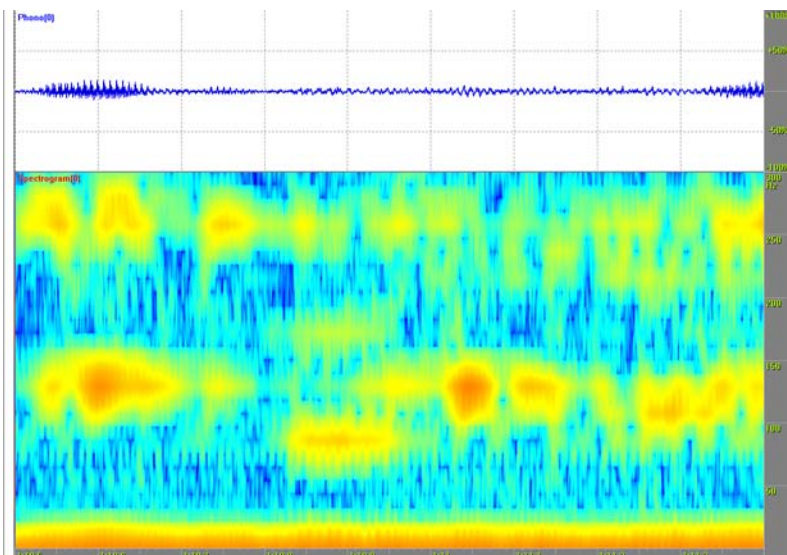


FIGURE 124 Sound spectrum of the words “le fruit de” in the *Salve* (1:10.5-1:11.4, 300 Hz).

The mixed formula $A:a^5_3$ consists of different rhythmical pronunciations. These are created such that the phrase “o notre avocate” is pronounced quite rapidly in comparison to the average style of the rest of the chant. The pronunciation occurs at a rapid syllabic tempo on the same fundamental frequency level: “o-not-re-avo(-caaa)-te”. By contrast, typical pronunciation in the chant is such that the syllables are prolonged, given out in melismatic or neumatic style: “o—no— —tre—avo(-caaa—)te— —”. In the sound spectrum, we notice that the phrase begins with the vowel / o / in the fs0 level of 130 Hz (c); the syllable / no / ascends to the fs0 level of 190 Hz (fis); and the syllable / tre / descends to the level of 132 Hz (c). Thereafter the syllables “avo-ca” - and mainly its vocal / a / - vibrates or oscillates between the fs0 levels of 132 - 190 Hz (58 Hz), ending with the syllable / te / on the fs0 level of 130 Hz (fig. 125).

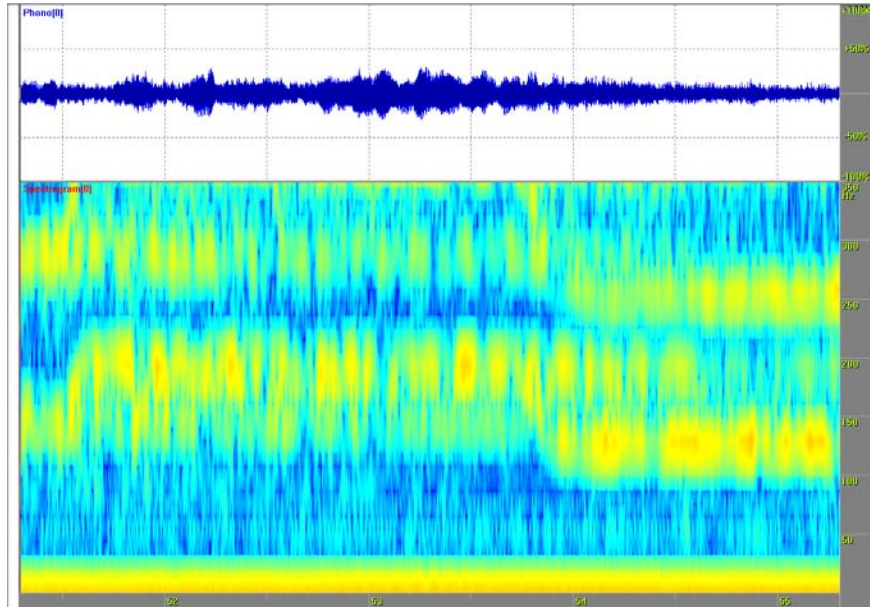


FIGURE 125 Mixed formula $A:a^5_3$ with vibrato in the sound spectrum of the *Salve* (0:51.29-0:55.30, 350 Hz).

The micro-structural analysis brings out an echo phenomenon, for example, between formulas $A:a^5$ and $A:a^6$, or between the words “miséricorde” and “Et”. This echo is clearly noticeable in the first overtone illustrated in Figure 126.

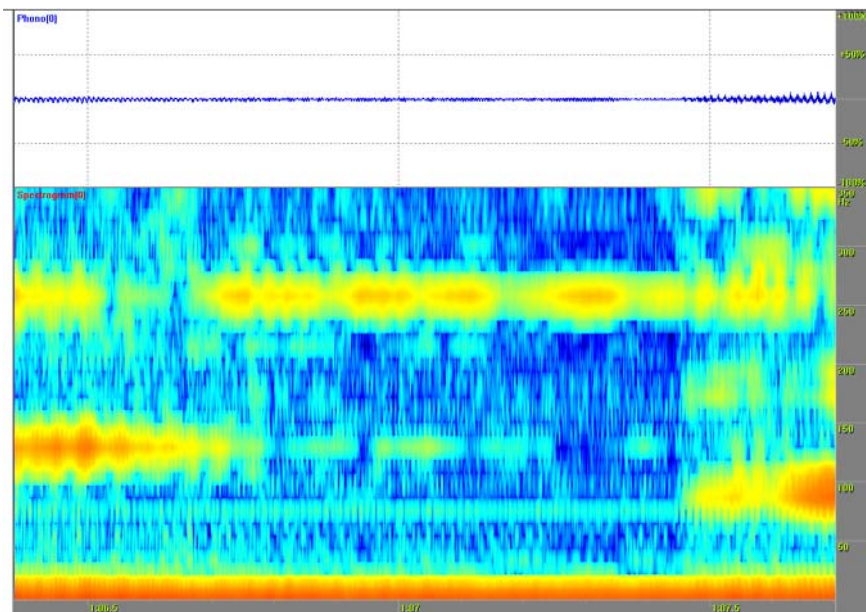


FIGURE 126 Echo phenomenon between formulas $A:a^5$ and $A:a^6$ in the chant *Salve* (1:06.38-1:07.7, 350 Hz).

In *Salve*, the melismatic variations on the vowels / a / and / e / are extremely rapid. Figures 127a and 127b, respectively, show the quick fs_0 movements between 158 - 175 Hz (17 Hz) and 157 - 174 Hz (17 Hz) are rapid. Moreover, the vocal folds create vibrato in the voice. These phenomena we can notate, for example, with the neumatic sign *torculus* ■■ (Solesmes 1989: 151). Such phenomena are typical of Reznikoff’s chanting. Is this only a musical style? Or is it perhaps a “deeper,”

genetic feature of Reznikoff's manner of creation? These questions are analysed and discussed below, in Chapters 5.6 and 6.

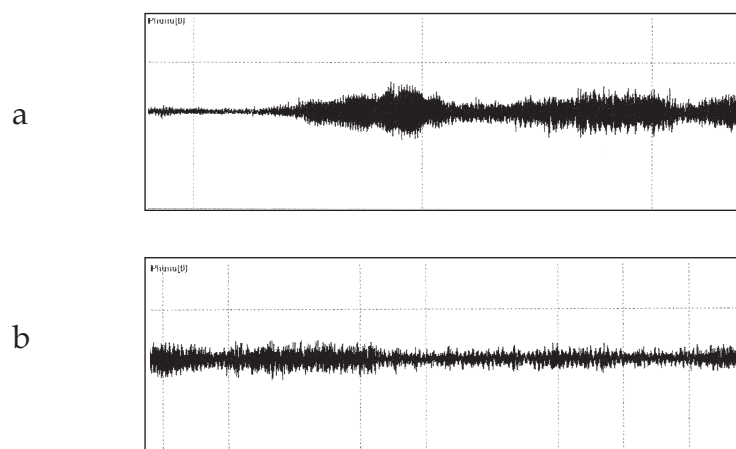


FIGURE 127 Amplitude of melismatic vowels in the *Salve* formula B:b¹: (a) / a-a-a / (1:46.5-1:47.5); (b) / e-e-e / (1:52.1-1:53.1).

5.2.5 Perception Gestalt Analysis PGA2

The Global Perception Gestalt Analysis (PGA2) of the *Salve* consisted of individual analysis (or individual consciousness). Three persons in spring 2002 were sent a letter with listening perception instructions, an audio cassette, and a return envelope. The listeners were between the ages of 45 to 60, one of whom was a professional musician (music teacher), and the other two ordinary music listeners (laboratory worker and teacher). In addition, the results consisted of the author's experiences of the compositions.

5.2.5.1 Global Listening: Free Associations

The following associations were perceived in the listening analysis, which I have divided into nouns, verbs, adjectives, and adverbs.

The following *nouns* resulted: discussion, wind, trace, memory, performance, recitative, church songs, clouds, trees, weather, French chanson, freedom, feeling, structure, tempo, and goodness. The following *verbs* were associated with the music: Good to hear, chanting, [God] is smiling, and flowing from the heart. The music also called for the following *adverbs*, *adjectives*, *places* and *times*: friendly, unreal, warm, in balance, simple, natural, professional, harmonic, suitable length, good feeling, different folk style, orthodox, effective, positive, fair, relaxed, conservative, clear structure, human goodness, care, inner freedom, unhurried tempo, world, in church, high cliff surrounded by the desert, and the Middle Ages. Also, physical resonance was experienced "in the heart and chest" of listeners.

Nouns represent the consciousness (or Self), according to Guttenplan. Hence, in this study I have put the following nouns into categories of people, places, and things (Fig. 128).

People	Places	Things
God	church	church songs
human	high cliff surrounded by the	clouds
	desert	discussion
	world	feeling
		freedom
		performance
		structure
		tempo
		trace, memory
		trees
		weather
		wind

FIGURE 128 Nouns as representation of individual consciousness in *Salve*.

5.2.5.2 Global Listening: Standard Polarity Profile

A general summary of the chant according to the Standard Polarity Profile analysis showed that the *Salve* was a quite light and clear composition. It stimulated leisure and slowness, and suggested a quite potent constancy.

Standard Polarity Profile SALVE									
VALENCE									
	-3	-2	-1	0	1	2	3		
Darkness					1	1	1		Lightness
Dissonance					2		1		Harmoniousness
Opacity					3				Clarity
Displeasure					1	1	1		Pleasure
Joylessness			1	1	1				Joy
STIMULATION									
Rest	1	1	1						Movement
Slowness		2	1						Rapidity
Leisureliness		2	1						Liveliness
Calmness		1	2						Exitement
Silence		1		1					Noise
POTENCY									
Softness	1	2							Hardness
Compliance			1	1	1				Purposefulness
Reservedness		1	1	1					Vigorousness
Weakness				1	1	1			Strength
Tenderness	1		1			1			Harshness

FIGURE 129 Standard Polarity Profile of the composition *Salve*.

5.2.6 Creation Gestalt Analysis CGA2

The composer Reznikoff gives the following thoughts about his creation of the *Salve* (In2):

The main aim of this composition is to pray to the mother of the God. Salve Regina is a Mater Misericordiae and it is a traditional chant from the tenth century; also, it belongs to Cistercian traditions (St Bernard 1100). The origin of the chant is in Latin, but I chant it in French, because I want to chant to the French people. I practice the chant in a monastery - they chant it often in there. I composed Salve in 1977 in France, and it is created over time - not in a single moment. Important is not only the melody, but the beauty of the language. The invisible and its relation to the real world are important. I stress in this chant the melody, its movement and the words. The main aim is the song of praise. The part of the chant that begins "Et Jésus le fruit ..." and continues to the end is perfect. I am satisfied with that part of the piece. It creates the feeling I want to receive with my chants.

The following nouns, verbs, adjectives, time, places and time were found in the creation narrative of the piece (CGA2): *Nouns*: monastery, melody, language, world, moment, stress, relation, aim, invisible, movement, words, and French people. *Verbs*: pray, practice, created, satisfied. *Adjectives, adverbs, time, places*: traditional, origin, tenth century, monastery, in time, moment, invisible, real world, perfect, feeling.

From the interview I collected the following nouns, which are divided into people, places, and things in the table below:

People	Places	Things
French people	monastery	composition
mother of God	invisible	feelings
	real world	melody
		moment
		language
		pray
		words

FIGURE 130 Nouns as a representation of CGA2 in *Salve*.

As a result of the perception analysis and creation analysis of *Salve*, we may interpret that Igor Reznikoff has chanted to French people about the invisible and its relation to the real world, with a traditional Christian chant and prayer of beauty and salvation. Listeners were experienced in church songs from the Middle Ages, or French chansons of freedom, or goodness in their hearts. The *Salve* was also a chant from the memory or memory-trace of the unreal, the friendly, the simple, and the harmony of inner freedom - that private space in which God smiles and speaks (PGA2, CGA2).

5.3 Une lumière a resplendi

5.3.1 Context and Content Analysis

Une lumière a resplendi (3'49") (*A Light Has Sparkled*) is one of the small French chants on Reznikoff's album, *Le chant du Thoronet*. It is prompted by the Christmas introit, *Puer natus est* of St Gall, and its words are from the Bible (Jesaja 9). The *Introit* is the beginning section of the liturgy of the Gregorian Mass (see Fig. 190). In addition, *Une lumière a resplendi* belongs to oral traditions, numbers among the ancient manuscripts of St Gall, and it is composed in G mode. Its first recording appeared in 1981, and the second recording in 1989 in the Abbey of Thoronet in France, in which the resonance is stable and the acoustical space fine. According to Reznikoff (In2):

The main aim of this chant is to praise the eternal light. It is a song of Christmas on the birth of the Christ, and is chanted at the moment when a child is born (girl or boy) and again when he or she dies.

5.3.2 Linguistic Analysis

Une lumière a resplendi is a recitative chant. It thus consists of Latin and French words, so that it begins with the Latin section and continues to the French one. The beginning of the chant reveals good news, "A child, a god is born" (*Puer natus est nobis*), and the French section follows with the message announcing "the light of the Son and his mercy".

*Puer natus est nobis
Et deus natus est nobis
Une lumière resplendi!
car un enfant
nous est né,
un Fils nous est donné.
La peuple qui marchait
dans les ténèbres
a vu la grande lumière.
Le Règne
reposera sur ses épaules,
on le nommera Ange de Conseil
et toute Puissance de Paix.*

*Unto us a child is born
Unto us a god is born*

(continues)

Figure 131 (continues)

*A sparkling light!
for a child
to us is born,
a Son has been given to us.
The people walking
in darkness
have seen the great light.
The Kingdom
will be upon his shoulders,
he will be called Angel of Counsel
and Prince of Peace.*

FIGURE 131 Latin and French words of *Une lumière a Resplendi*, with English translation.

Christmas is one of the most highly celebrated liturgies of the year in Catholic-Gregorian tradition (Jeffery 1992: 61). The words of *Une lumière a resplendi* consist of the main symbols of belief in Christmas: “A child, a Son” represent the birth of the “baby”, or the Christian symbolic Gestalt of God in peoples’ minds and hearts. According to Tresidder (1999: 44), a “child” means purity, potentiality, innocence, spontaneity. A symbol of the natural, paradisaic state, free of anxiety, it also stands for mystic knowledge and openness to faith. Christmas time we may interpret generally to create peace and shine light into people’s life “in darkness”, whereas the “Angel of Counsel” or “Prince of Peace” represents the propitiation (act) and propitiatory (place) of God’s Kingdom and power .

In sum, Reznikoff’s *Une lumière a resplendi* is a song of praise of the spiritual or religious moment of inner light. The chant created among listeners associations such as “light, joy, praise, Bible, shining, good, positive, brightness and peaceful” (PGA3), and these experiences correlated positively with the words and meaning of the chant.

5.3.3 Voice Analysis

Une lumière a resplendi is a neumatic chant, such that the onsets of words are pronounced and stressed with a prolonged and stable vowel, which the short melody follows. The intensity of the voice is high at the beginning of phrases or formulas. For example, the following onsets are typical pronunciations in the chant: “Puuu-eer, naaaa-tus-est nooooo-bis” and “deeee-us est noooo-biis”. Reznikoff’s voice is warm and steady, and the words are articulated clearly. In the neumatic parts of words we hear vibrato in the voice. The words, phrases and formulas stream so that the tension of the voice is in the middle of the formulas. According to the spectral analysis, the fs0 of the voice varies between 20 Hz (below the sense of hearing) on the word “épaules” (2:30) to 310 Hz (dis1) in the phrase “nous”

(1:56), and the average fs_0 level of the voice is about 180 Hz (fis) in the chant. The intensity in amplitude shows two sections in which the air pressure of the voice is high compared to the average level of the amplitude undulation, mainly in the phrases “nous” (1:02) ascending with 45 percent, and “nous” (1:55) ascending with 49 percent.

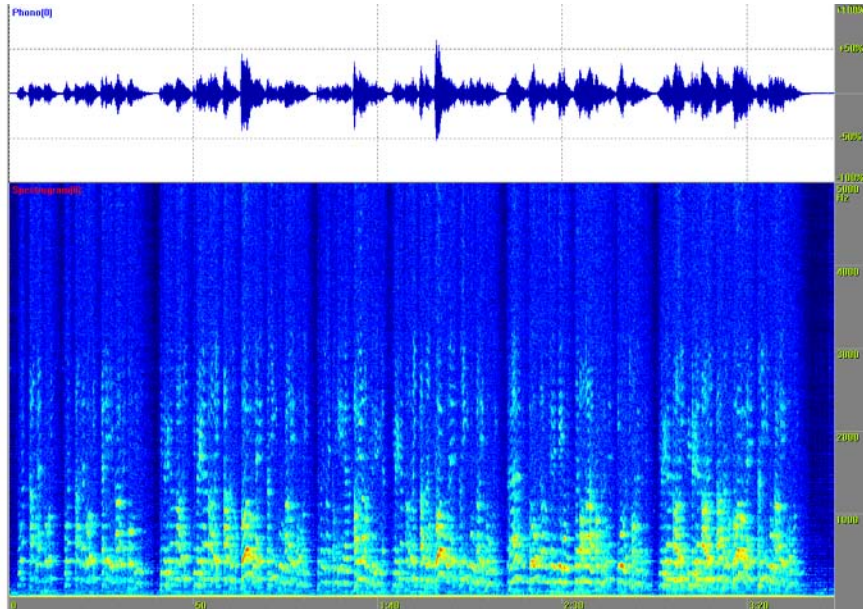


FIGURE 132 Sound spectrum of the chant *Une lumière a resplendi* (0:00 - 3:49, 5000 Hz).

5.3.3.1 Vowels and Nasal Sounds

The onsets of the words in *Une lumière a resplendi* consist of prolonged pronunciation of the vowels / a / (car, natus, Ange), / e / (deus, est, ténébrès, Règne, reposera), / o / (nobis, nous), and / u (y) / (puer, une). The most stressed vowel / o / in the chant is in the word “nous”. It consists of a large ascent of voice in the fs_0 level, as well as high air pressure in the amplitude.

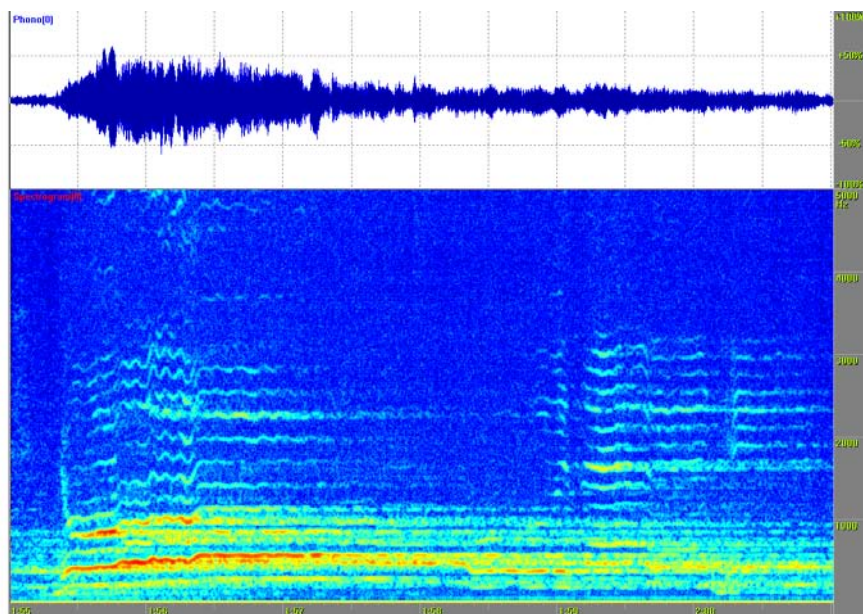


FIGURE 133 Sound spectrum of the word “nous” (1:55 - 2:01.5, 5000 Hz) in *Une lumière a resplendi*.

Une lumière a resplendi also contains stressed nasal vowels such as / u (y) / in the word “une” and / i / in the word “fils”. These phenomena are so typical of Reznikoff’s vocal style that they form something like a spectral “signature”, in which vocalization of the vowel is tense and prolonged. Listeners’ associations of the chant *Une lumière a resplendi* were, for example: “nasal sounds, emotive, disturbed, charismatic, suspicious, light, joy, pleasure, hidden contradictions”, and “consciously affected” (PGA3), all of which we may correlate with the nasality of Reznikoff’s voice.

5.3.3.2 Special Features of the Voice

The word “Nous” is one of the most interesting vocal phenomenon in the chant (Fig. 133), with tension and energetic expression appearing on the vowel / o /. The chant generated associations such as “universe, sky, mountains, shining, emotions, and praise” among the listeners, and these we may connect with the increased intensity of the voice on the vowel / o /.

Also the vowel / e /, with its melismas singing in the phrases “est donné” and “et Deus” create interesting audible experiences, in which the rhythm and style differ from those of the rest of the whole chant. These phenomena are defined as mixed formulas (Fd) in this study, thus “et deus” is illustrated in the Figure 134 to show how the first overtone is stressed.

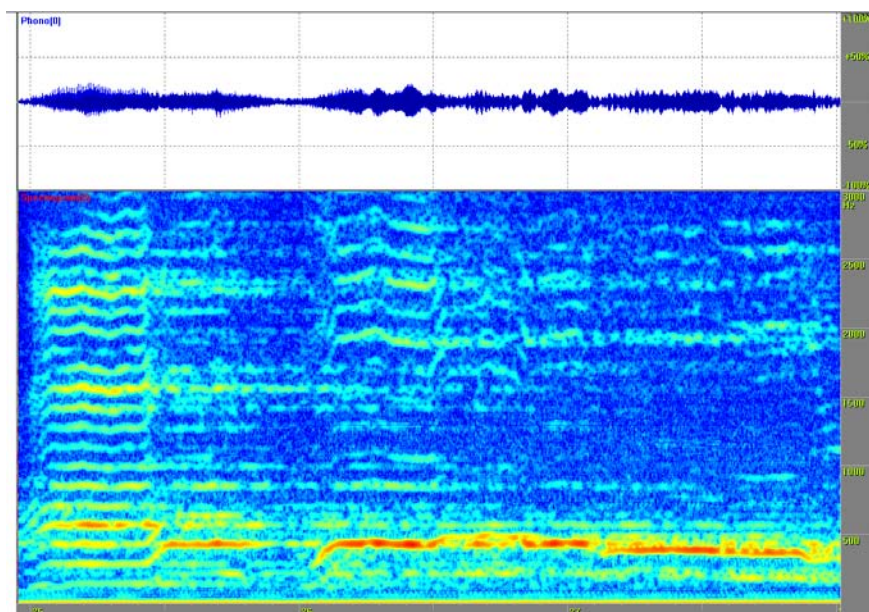


FIGURE 134 Sound spectrum of the words “et deus” in *Une lumière a resplendi* (0:25 - 0:28.7, 3000 Hz).

5.3.4 Formula Analysis

5.3.4.1 Formula Structure and Linguistic Content

We may structure *Une lumière a resplendi* according to the audible and spectral analysis into sections A, B, C, D, with the following as the resulting, overall structure:

$$A, B^1, C, B^2, D, B^3$$

After parsing *Une lumière a resplendi* into sections, we can analyse it into formula structure according its linguistic and melodic content (Fig. 135):

Form	Formulas
A	a ¹ , a ¹ (F ^v), a ²
B1	b ¹ , b ¹ , b ² , b ³ , b ⁴
C	c ¹ , c ² , c ³
B2	b ¹ , b ² , b ³
D	d ¹ , d ² , d ³ , d ⁴
B3	b ¹ , b ¹ , b ² , b ³ , b ⁴

FIGURE 135 Formula structure in the chant *Une lumière a resplendi*.

Forms B1, B2, and B3 are repetitive sections that create feelings of light with the phrase “A sparkling light!...” (*Une lumière a resplendi*). The formulas of the chant consisted of the following structure (Fig. 136) according to the linguistic analysis, wherein section A is in Latin and the others are in French. In short, A serves as the overture of the chant, and B is repeated three times; consequently the chant progresses as follows:

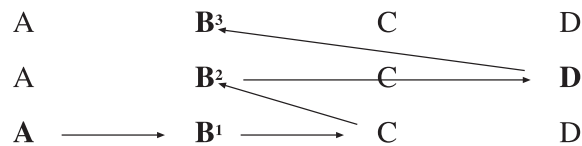


FIGURE 136 Progression of linguistic forms in the chant *Une lumière a resplendi*.

5.3.4.2 Rhythmic Formula Analysis

The rhythmic formula structure of the composition *Une lumière a resplendi* consists of six forms that last from 20 - 43 seconds each, with the average length of the form about 36 seconds. In addition, *Une lumière* consists of 23 formulas that last from 4 to 19 seconds and the variation ratio is 375 percent. The composition has no prescribed pauses, only breathing moments between the forms and formulas. The tempo of the chant is about 80 M.M., and the rhythmic time-unit formula structure of the chant is illustrated Figure 137.

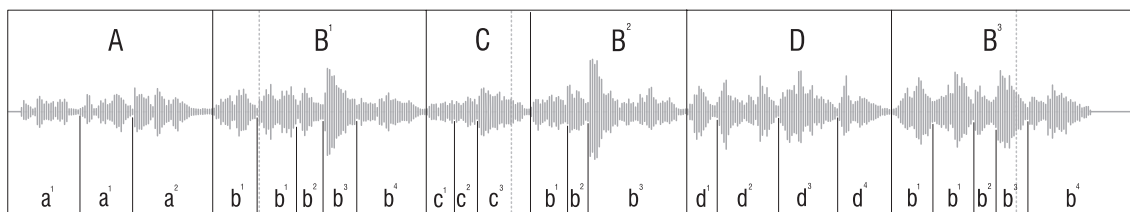


FIGURE 137 Amplitude representation of rhythmic time-unit formula structure in *Une lumière a resplendi*.

Formulas a¹ and a² in the form A vary from 10 - 15.8 seconds, and the variation ratio is 48.3 percent. Forms B¹, B², and B³ vary from 31 to 43 seconds, and the variation ratio is 27.9 percent. Formulas b¹ to b⁴ vary in forms B¹⁻³ from 4 to 19 seconds, and the variation ratio is 170 percent. Formulas c¹ to c³ vary in form C

from 4 to 10.3 seconds, and the variation ratio is 157.5 percent. Formulas d^1 to d^4 vary in form D from 6 to 12 seconds, and the variation ratio is 100 percent.

We may analyse the composition *Une lumière a resplendi* into a rhythmical time-unit formula structure in which the *s* symbolizes short formulas (less than 7.5 seconds) and *L* symbolizes long formulas (7.5 seconds or more).

L L L L L s s L s s L s s L s L L L L L s s L

The composition consists of almost similar length in forms, with repetitive formulas at the beginning of A, B¹, and B³ (e.g., a^1, a^1, a^2). Forms C, D and B² consist of progressive formula development (e.g., b^1, b^2, b^3). The whole composition was experienced by listeners as “liturgical, not concert music”, as if one were “reading the Bible”, so that the “words are strongly stressed, calming, dream-like, blue, peaceful, or narrating” (PGA3).

5.3.4.3 Melodic Formula Analysis

Melody, or the fundamental frequency fs_0 of the voice movements, in *Une lumière a resplendi* consisted of fs_0 voice movements between 20 and 310 Hz (dis^1), whereas the average frequency level of the voice is about 180 Hz (fis) and the average fs_0 width is 290 Hz. The composition begins at the fs_0 level of 123 Hz (H) and ends on the fs_0 level of 134 Hz (cis).

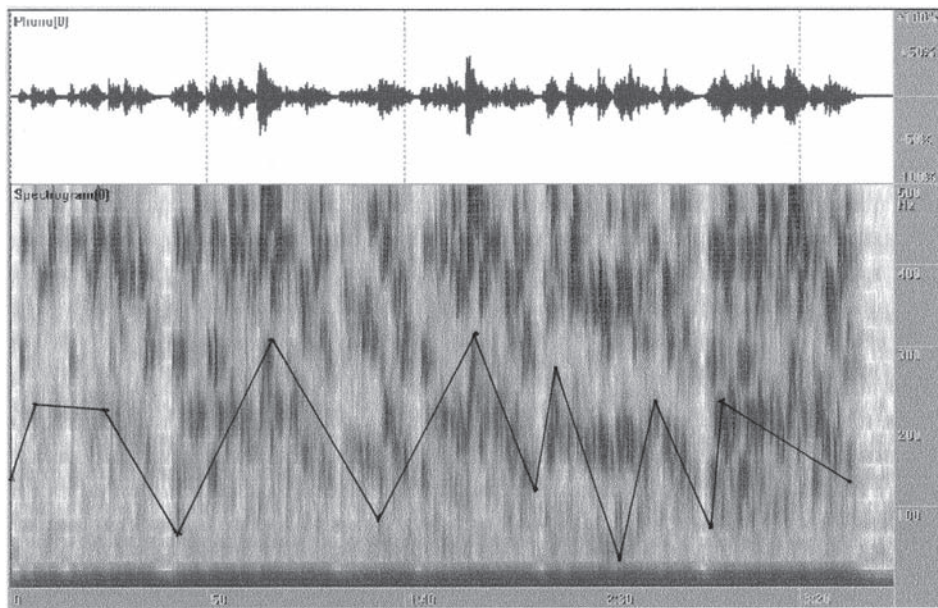


FIGURE 138 Sound spectrum of voice movements in the fs_0 of *Une lumière a resplendi* (example greatly simplified).

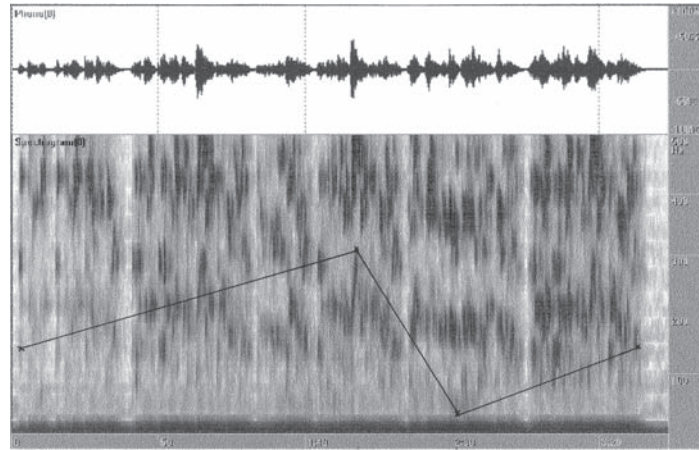


FIGURE 139 Variation ratio of the fundamental frequency in *Une lumière a resplendi* (strongly simplified).

In brief, in the melodic formula analysis the fs_0 increases to its highest level in the middle of the chant in the formula $B^2:b^3$ with the phrase “nous est né”, which is chanted in an intensive and expressive tone of voice. The lowest fs_0 was found in about 2/3's of the chant between the formulas $D: d^2-d^3$, in which we may characterize Reznikoff's voice as peaceful, stable, and with decreasing fs_0 .

The listeners experienced the music with serious associations such as “peace, gentleness, contradiction, consciousness, monastery”, and as “a garden in the past” (PGA3). According to listeners' physical experiences, the music was felt in the “head, above the head, inside the head, or in emotions”. Moreover, it aroused feelings of “relaxed and soothing, partly sad, quiet movements, resonance”, and even the surrendering or abnegating gesture of “hands up” (PGA3), as in “giving up”.

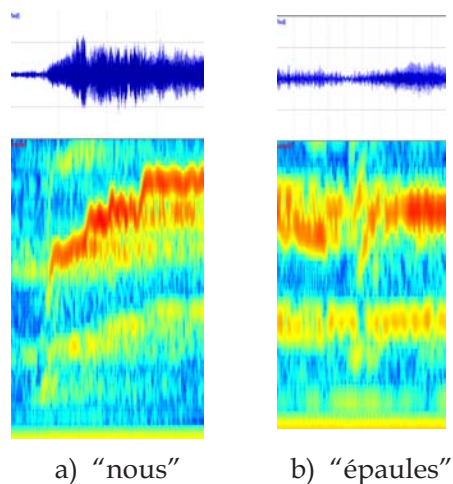


FIGURE 140 *Une lumière a resplendi*: sound spectra of (a) highest fs_0 level $B^2:b^3$ (1:55 - 1:57, 660 Hz); and (b) lowest fs_0 level $D:d^2 - d^3$ (2:29.5 - 2:30.5, 460 Hz).

5.3.4.4 Harmonic Formula Analysis

The avs movements in the composition vary so that the main avs2 level is in the frequency of 1300 Hz, the lowest avs1 level at 456 Hz, and the highest avs3 level reaches the frequency of 3100 Hz. Audible and spectral analysis of harmonic avs movements in the chant reveal that it is a florid composition, which means the articulation, voice, and neumatic style of chanting created variations in the

harmonic avs. Besides, consonances and vibrations in the voice created noise or darkness in the sound spectrum, mainly in the formulas $B^1:b^3$, $B^2:b^3$, and $B^3:b^3$; but these also resulted from intensive transitions in the fs_0 on the word “nous”. To be more specific, the sound spectrum at the beginning of the formulas is clear and the avs level is low, because of clear articulation and voice. At the end of formulas the melody is more neumatic; consequently, there we may notice dark colour in the sound spectrum, and the avs reaches the higher level. The sound spectrum of the formula $D:d^1$ illustrates this phenomenon in Figure 141.

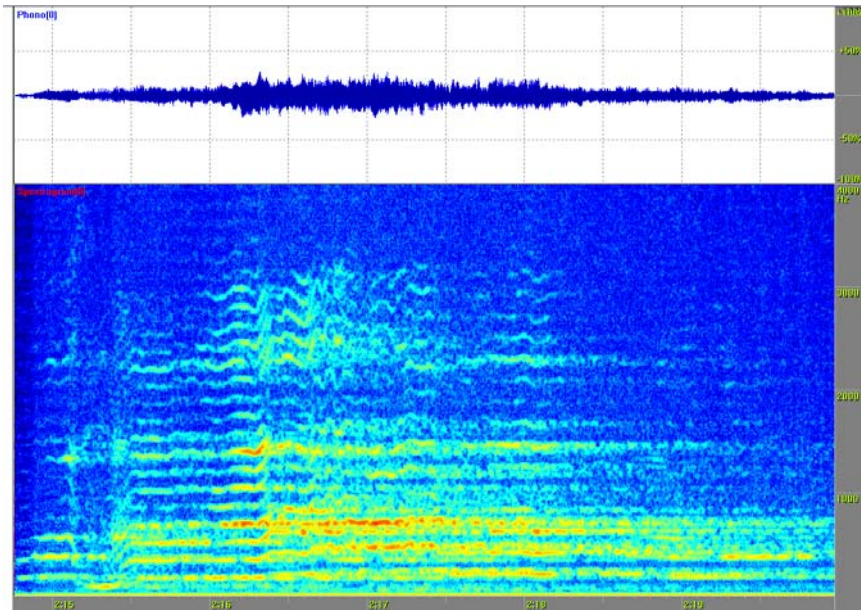


FIGURE 141 Harmonic avs movements in the formula $D:d^1$ “Le Règne”, in *Une lumière a resplendi* (2:14.76-2:20; 4000 Hz).

In the end, we may illustrate the harmonic avs formula analysis of *Une lumière a resplendi* with Figure 142, in which the voice creates increasing movements (tensions) in the formulas, and the main avs level is about 1300 Hz.

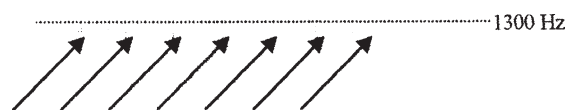


FIGURE 142 Main avs movements in *Une lumière a resplendi* (strongly simplified).

5.3.4.5 Formula Content

Une lumière a resplendi is a neumatic composition with 76.3 percent of Fb formulas, and 23.7 percent of unexpected formulas Fe. Figures 143 and 144 are tables of the structure of the formula content, and the schema of the composition.

Form	Formula content
A:	Fb / Fb / Fb / Fb / Fb / Fe / Fb / Fb
B1:	Fb / Fb / Fb / Fb / Fb / Fe / Fb / Fe / Fb
C:	Fb / Fb / Fb
B2:	Fb / Fb / Fe / Fb / Fe / Fb
D:	Fe / Fb / Fb(e) / Fb
B3:	Fb / Fb / Fb / Fe / Fb / Fe / Fb

FIGURE 143 Formula content structure of the composition *Une lumière a resplendi*.

only slightly. In this study I have interpreted transitions as representing strong musical tensions in the micro-structural level. These are analysed in the following chapter (5.3.4.7).

5.3.4.7 Micro-Structural Formula Analysis

In micro-structural analysis the most interesting musical phenomena are the unexpected formulas Fe. Consequently, this sub-chapter focuses on nine Fe formulas in the chant *Une lumière a resplendi*: A:a²₁, B¹:b³, B¹:b⁴₂, B²:b³, B²:b⁴₂, D:d¹, D:d³, B³:b³, B³:b⁴₂.

Four of these Fe formulas consist of phenomena involving the vocal / e / with its vibrato or melodic variations in the voice and chanting style, as occur in the words “Deus” (A:a²₁), and “est” (B¹:b⁴₂, B²:b⁴₂, B³:b⁴₂). Figure 146 displays the sound spectrum of the formula A:a²₁ and its syllable / (d)e /, in which the voice begins from the fs0 level of 110 Hz (A), increase to the fs0 level of 221 Hz (a), and vibrates around the fs0 level of 134 Hz (c). In the sound spectrum we can notice that the first overtone is especially strong.

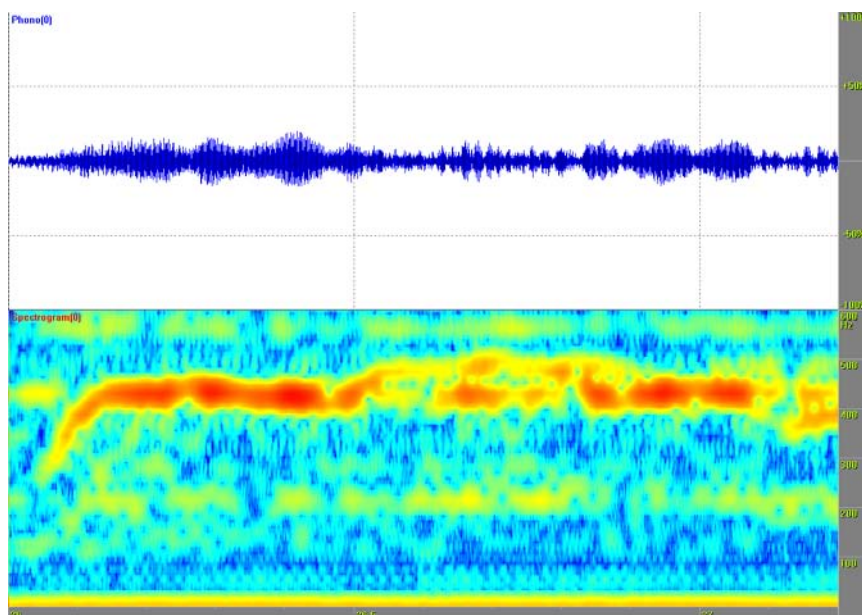


FIGURE 146 *Une lumière a resplendi*: sound spectrum of the syllable / (d)e / and its melismatic vowel / e / in the Fe formula A:a²₁ (0:26.0-0:27.2, 600 Hz).

Three of the Fe formulas, B¹:b³, B²:b³, B³:b³, consist of an intense rise in amplitude on the word “nous”. Figure 147 shows the sound spectrum of the formula B²:b³ with its vowel / o /. This musical phenomenon consisted of an increasing fs0, with vibrations in the voice from 109 Hz (A) to 249 Hz (h). The first overtone is particularly intensive, and the amplitude indicates the tension of the voice.

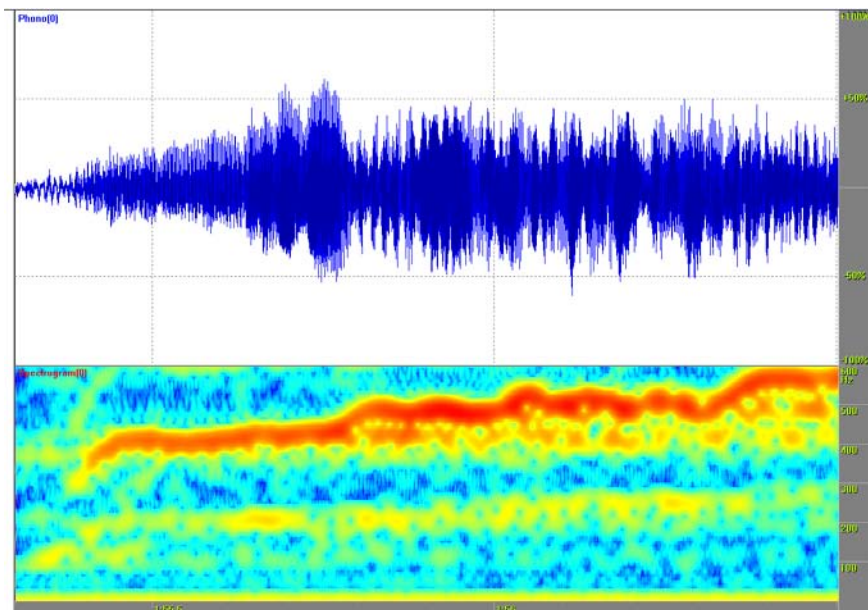


FIGURE 147 *Une lumière a resplendi*: sound spectrum of the Fe formula B²:b³ and its vowel / o / (1:55.30-1:56.50; 600 Hz).

Fe formula D:d¹ (Fig. 148) exhibits a looping phenomenon in the phrase “le régime”, particularly on the syllable / ré(g) /. The fs0 level of 176 Hz (f) decreases to the fs0 level of 76 Hz (Dis) then immediately increases to 176 Hz. A similar phenomenon appears in the analysis of Reznikoff’s compositions at the macro- and micro-levels, and will be discussed in more detail in Chapter 6.

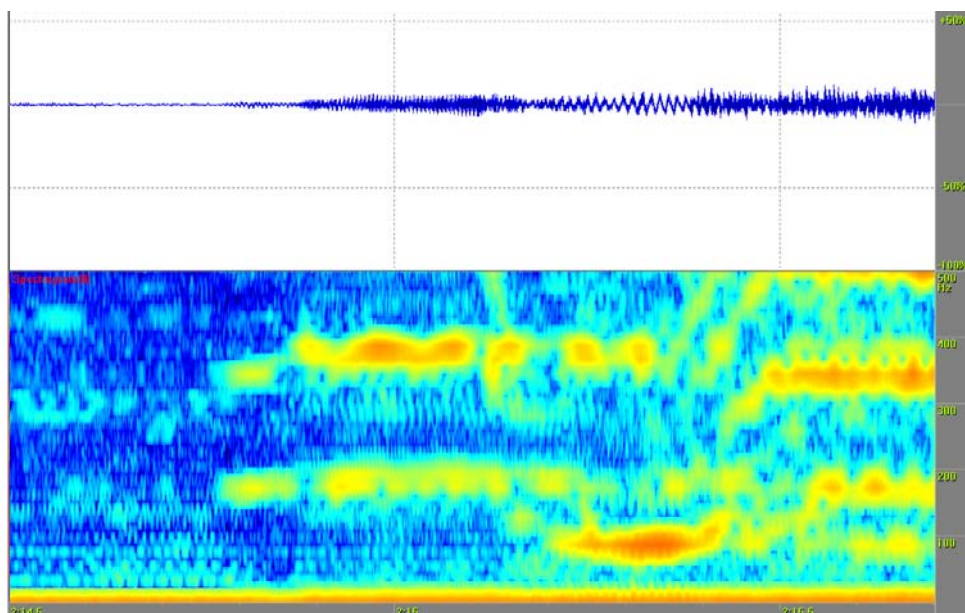


FIGURE 148 *Une lumière a resplendi*: sound spectrum of the formula D:d¹ and its syllables / le - rég / (2:14.9-2:15.5, 500 Hz).

The Fe formula $D:d^3$ consists of rapid and varied rhythmic variations in which the syllable / nom / is chanted so that the melody begins from a low fs_0 , increasing from 20 Hz to 245 Hz (h) in a few milliseconds. This phenomenon is dominated with the low fs_0 level. Consequently, I would define this phenomenon as an emotional formula F^E , because of the sorrowful or features in the voice and in the fundamental frequency. In Figure 150 we notice intensive variations in the microstructural amplitude of the emotional formula.

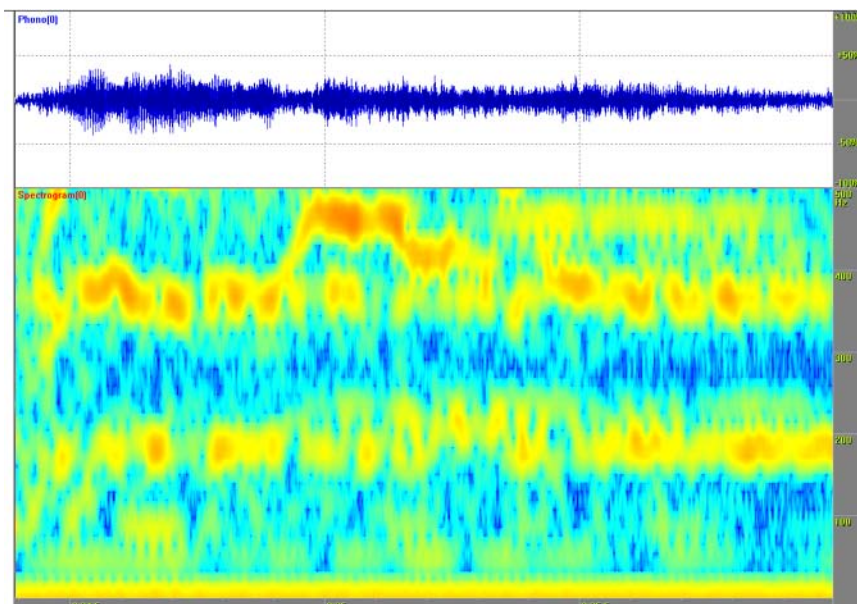


FIGURE 149 *Une lumière a resplendi*: sound spectrum of the formula $D: d^3$, and its syllable / nom / (2:34.4-2:36, 500 Hz).

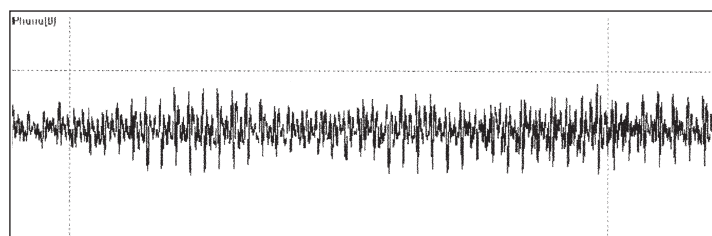


FIGURE 150 Amplitude representation of the vowel / o / (FE) in *Une lumière a resplendi*.

5.3.5 Perception Gestalt Analysis, PGA3

The global analysis of the chant *Une lumière a resplendi* consisted of two analyses, partially similar to that in the PGA2 of *Salve* and using the same three listeners.

5.3.5.1 Global Listening: Free Associations

The following associations were perceived in the listening analysis, which are categorized into *nouns*, *verbs*, *adjectives*, and *adverbs*.

In the individual consciousness the following *nouns* were perceived: praise, universe, human, nature, sky, life, feeling, mountains, arch/path, text/words, Bible, liturgy, echo, smell, nasal sound, ear, light, twilight, joy, meadow, flowers, sun, mood, emotions, polyphony, and dream. The following *verbs* were perceived: read (the Bible), to disturb, to shine, and to calm.

The following *adjectives, adverbs, times, and places* were indicated: calm, blue, simple, good, green, real, original, colourful, pleased, suspicious, soothing, relaxing, sad, positive, acceptance, non-personal, charismatic; brightness, smallness, greenish, gentleness, peace, orthodoxy, pleasure, contradictions, conscious, uninhibited, shiny, peaceful; past time; universe, monastery and garden.

The PGA3 also revealed the following physical experiences: music was felt in or above the head; it was heard as an internal resonance (inside the head); it was relaxing and soothing. It was also partly sad and peaceful, and it consisted of quiet movements such as prayer, such that hands were even felt to be raised in supplication.

In the table below, I have assigned the following nouns to people, places, and things:

People	Places	Things
human	garden	Bible
	meadow	dream
	monastery	ear
	mountains	flowers
	nature	nature
	sky	smell
	sun	sun
	universe	

FIGURE 151 Nouns as representation of individual consciousness in PGA3, *Une lumière a resplendi*.

5.3.5.2 Global Listening: Standard Polarity Profile

The Standard Polarity Profile analysis of *Une lumière a resplendi* depicted it as a quite light, clear and pleasant chant, and it created contradictory stimulations such as rest versus movement as well as slowness versus rapidity. The potency of the chant was felt to be in balance, but it too consisted of opposites such as softness and hardness, as well as tenderness and harshness.

Standard Polarity Profile of the chant UNE LUMIÈRE A RESPLENDI									
VALENCE	-3	-2	-1	0	1	2	3		
Darkness					1	1	2		Lightness
Dissonance				1	1	1	1		Harmoniousness
Opacity						2	1		Clarity
Displeasure				1	1		2		Pleasure
Joylessness				1		2	1		Joy
STIMULATION									
Rest				2			1	1	Movement
Slowness		1	1				2		Rapidity
Leisuriness									Liveliness
Calmness		2		1		1			Excitement
Silence		1	1		1		1		Noise
POTENCY									
Softness		1		1	1		1		Hardness
Compliance		1		1	1	1			Purposefulness
Reservedness				1	1	1	1		Vigorousness
Weakness				1	1	2			Strength
Tenderness		2		1			1		Harshness

FIGURE 152 Polarity profile of the composition *Une lumière a resplendi*.

5.3.6 Creation Gestalt Analysis CGA3

Reznikoff describes the creation of *Une lumière a Resplendi* (In2):

The aim of this chant is to praise the eternal light. It is a song of Christmas about the birth of Christ, and it is chanted the moment when the child is born (a girl or a boy), as well as at the moment of death. It was created for my own child, a boy named Aleksis [his fourth child], when he during a bicycle accident and was in a coma for one week. It was the spring of 1977. The most important thing in this chant is the light when the child is born.

From the interview I collected the following nouns, that are divided into people, places and things in the table below:

People	Places	Things
Boy	eternal	bicycle
Child		light
Christ		moment
Girl		praise
		song

FIGURE 153 Nouns as representation of the composer's creation in CGA3.

To sum up, Iegor Reznikoff has created a chant of praise to the eternal light, and a song to the child of Christmas. It also represents a composition to his own, injured child. At the same time, the individual conscious experiences of the composition extends to the human(ity) of the whole world, mainly in universal "places", where people heard, saw, or otherwise experienced natural light and feelings.

In conclusion, we may say that the creation and perceptions of the composition consist in positive correlations. The associations and experiences of creation and perception, for example, were quite similar to those of "reading the Bible, of heartfelt moods, of emotions, of lightness and sadness" (PGA3, CGA3).

5.4 Grand Magnificat: Liturgie fondamentale

5.4.1 Context and Content Analysis

Grand Magnificat: Liturgie fondamentale (31'02'), the *Fundamental Liturgy*, is one of the most innovative compositions on Iegor Reznikoff's collection, *Le Chant de Fontenay*. In this chant we hear all the chanting styles and performance practices featured in his compositions and group chants. *Liturgie fondamentale*, composed in 1979 in the F mode, was recorded in 1989 at the Abbey of Fontenay in France (In2). There one finds good resonance with the natural echoes of the building, in which the highest and brightest voice increases toward the chorus; this phenomenon is known as the "hidden wave" or "flow" of a performance structure or venue (CD liner notes)¹⁷. *Liturgie fondamentale* thus exploits fully the resonance of the voice. Reznikoff has used tenth-century manuscripts of St Gall, as well as other written sources, such as Solesmes's *Paléographie musicale* (In2).

The main subject of this composition is the creative circle of the world. In this chant I contemplate the basics of the human voice. Any improvisation in the performance is based on living interpretation. This chant praises humanity, the whole world, and especially the Holy mother, St Maria. It is also a praise of the joy and beauty of Nature, and a chant to the birds (In2).

5.4.2 Linguistic Analysis

The words of the *Liturgie fondamentale* come from the Bible (Book of Luke, Chapter I). The chant consists of four linguistic sections, beginning with the purity of voice heard on the vowels / a / o / u /, followed by Latin words. It then continues in French, and ends with the alleluia.

¹⁷ According to Rieger (1996), Sekuler (2002), and the Snowbird Statement on Catholic Liturgical Music (1995), the architectural acoustics of early churches influenced the development of religious services. The first Christian churches were made of stone, and their hard surfaces created echoes and reverberations. Church music had to be played or sung slowly in order to be understood, and a resonant acoustic is also crucial if choral music is to achieve its particular effect. Echoes created, for example, aesthetical value, such as beauty and goodness. As a result, the interaction between acoustic of a singing assembly and a church building is the primary resonating instrument in church music.

Alleluia.
Magnificat
anima mea Dominum
et exultavit spiritus meus
et exultavit spiritus meus in Deo salutari meo
Alleluia.
Et exulte
mon esprit en Dieu mon Sauveur.
Alleluia.

Hallelujah.
My soul doth magnify the Lord
and my spirit hath rejoiced,
my spirit hath rejoiced in God, my Saviour,
Hallelujah.
And rejoice,
my spirit, in God my Saviour.
Hallelujah.

FIGURE 154 Words of the chant *Liturgie fondamentale* in French and Latin, with English translation.

The Liturgie fondamentale, in its usage of Biblical words, reveals Reznikoff's relation to Christianity and God. Through the words of the chant he clearly displays his adherence to the Christian faith and his strong belief in the power of God's spirit. The composition emphasizes the meaning of the words, which stand as *referents* of the relation between God and humans. The whole composition consists of several alleluias to God, in addition to prolonged melismatic chanting of the vowels / a /, / o /, and / u /.

5.4.3 Voice Analysis

Aural analysis of the *Liturgie fondamentale* reveals the chant to be divided into three different voice sections. In the first section, which begins the chant, we hear only low-pitched, ascending voices with vowels, and this section I have defined only according to voice. The second section, with its melismas or chanted vowels, acts as a short overture to the third section. The latter is chanted in variable styles, using both Latin and French words.

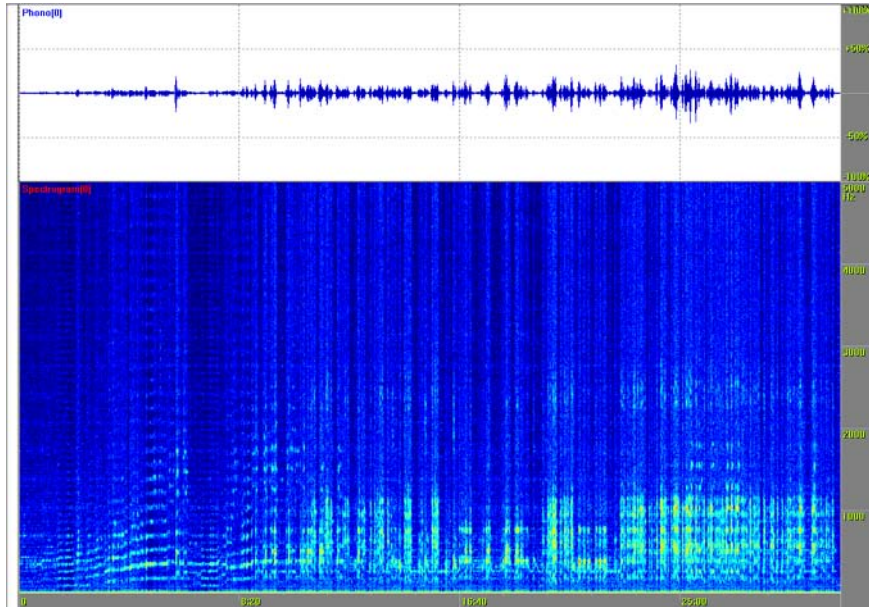


FIGURE 155 Sound spectrum of the chant *Grand Magnificat: Liturgie fondamentale* (0:00 - 31:03, 5000 Hz).

The first linguistic section (0:00 - 11:03) consists of uttered vowels / a / o / u / i / y /. The vowels / a / o / u / of the first section last 663 seconds, including the time in which breaths are taken. They are produced or “voiced” in the beginning at a low fundamental frequency level (fs0) of 24 Hz to 85 Hz (E/F); whereas the vowels / i / y / are voiced at the fs0 level of 260 Hz (c¹). The voice increases at an even pace, to about 236 Hz in the whole section (Fig. 156). In addition, the first section of the composition is voiced from the “body”, that is to say, from low in the chest then ascending to the throat. In this section, Reznikoff uses his vocal organs in a variety of different ways: low voice, ascending micro-intervals, throat singing, and use of the nasalized vowel / i (y) /, which create high overtones, or “bird’s voices”. In this section the vowels are articulated in a prolonged and tense way. Reznikoff’s skillful use of Mongolian throat singing is quite evident in this passage (In2), resulting in brilliance of voice and clear overtones in the first section. Listeners’ experiences betray a kind of personal hesitancy: “What was that?” or “Did I hear that right?” or “Where are they?” (PGA4). The sound spectrum displays more than ten clear overtones above the fundamental frequency (first partial) of Reznikoff’s overtone chanting (Fig. 157).

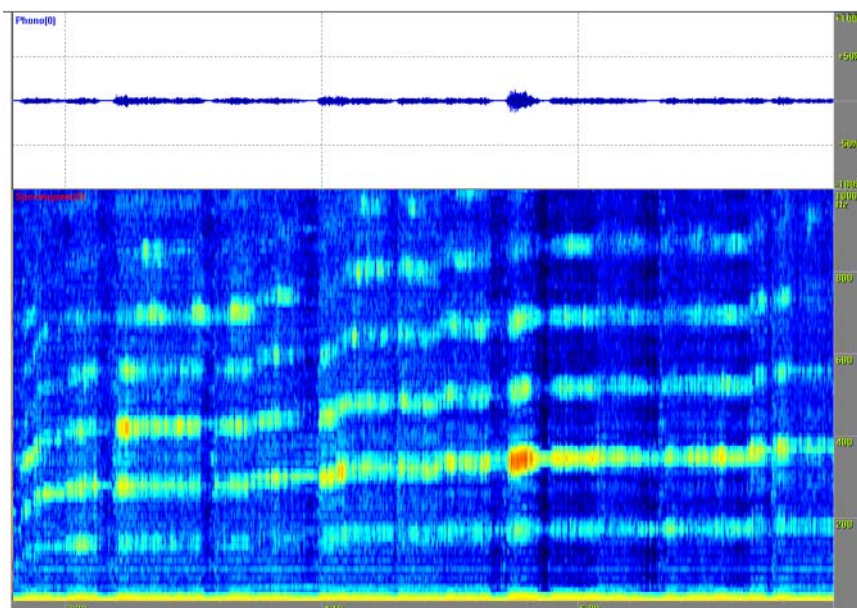


FIGURE 156 Fundamental frequency ascending in micro-intervals, first section of *Liturgie fondamentale* (3:10 - 5:50, 1000 Hz).

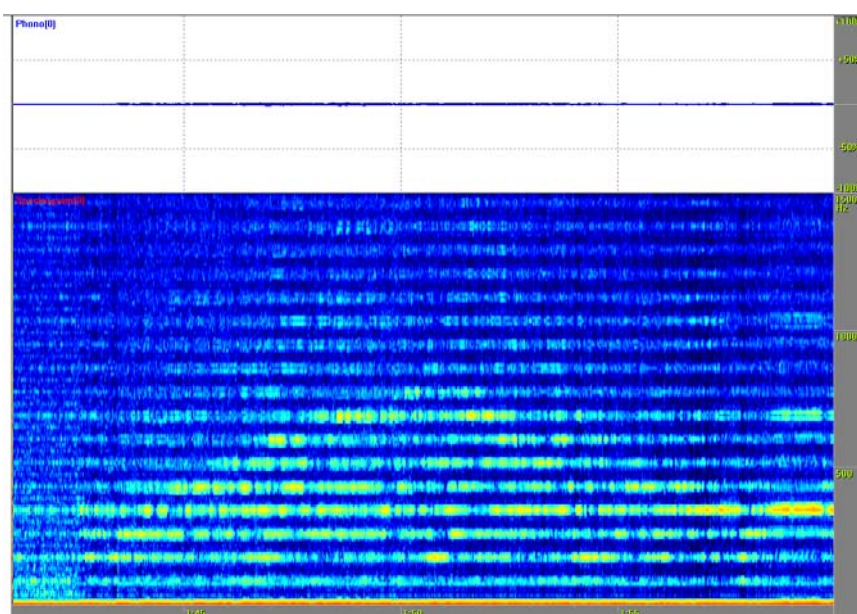


FIGURE 157 Macro-structure for creating overtone formulas (birds' voices) in *Liturgie fondamentale* (1:41:09 - 2:00, 1500 Hz).

The second linguistic section (11:03 - 13:10) of the composition consists mainly of the vowels / a / and / u / with their different melismatic and melodic variations; also, the nasalized vowels / oi / are used in the section creating birds' voices. The voice production varies greatly between the fs_0 of 38 Hz (Dis_1) and 300 Hz (d^1). Figure 158 illustrates the melismatic voice of the vowel / a / with darkness or unclear partials in the sound spectrum, and this seems to be one of the most typical phenomena of Reznikoff's chanting and composing. By this I mean that he produces the vowel / a / so that the voice source or glottis is very open and relaxed, and the air can flow freely from the lungs, creating a lively vibration with the vocal chords.

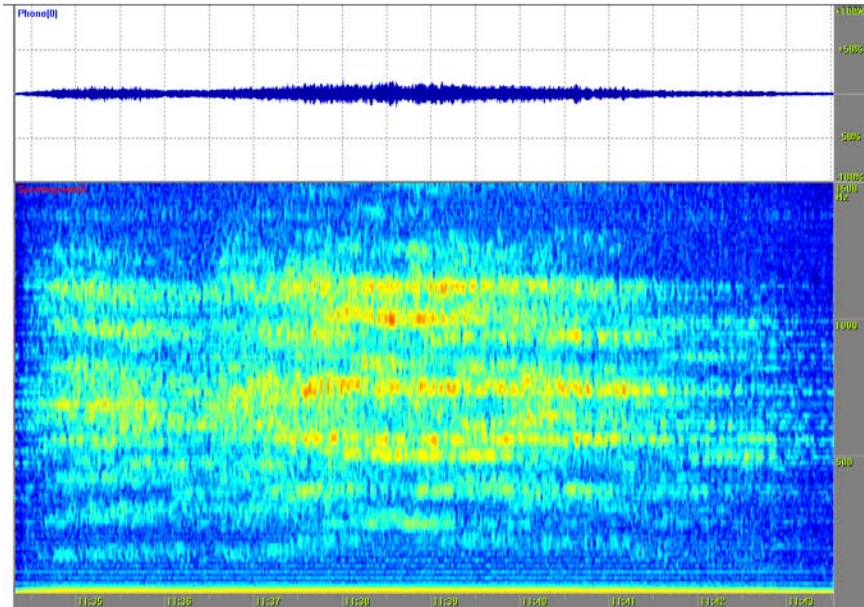


FIGURE 158 Melismatic chanting on the vowel / a / in the *Liturgie fondamentale* (11:34.33 - 11:43.50, 1500 Hz).

The third linguistic section of the chant (13:10 - 31:03) consists of the Alleluia, expressed here in Latin and French. The Latin part of the section (13:10 - 19:40) features mainly melismatic chanting of the vowels / a / u / o / with florid variations in melody and intensity. For example the vowel / u /, illustrated in Figure 159, consists of an ascending melody or fs_0 in the mid-range of the formula, with voice intensity of 6 to 37 percent, shown in amplitude representation and lasting 22 milliseconds. In addition, we notice darkness in the sound spectrum, particularly in the first overtone, where a rapid voice transition (increasing interval) is produced. The voice is chanted with flowing and melismatic variations from 60 Hz (H_1) to 321 Hz (e^1).

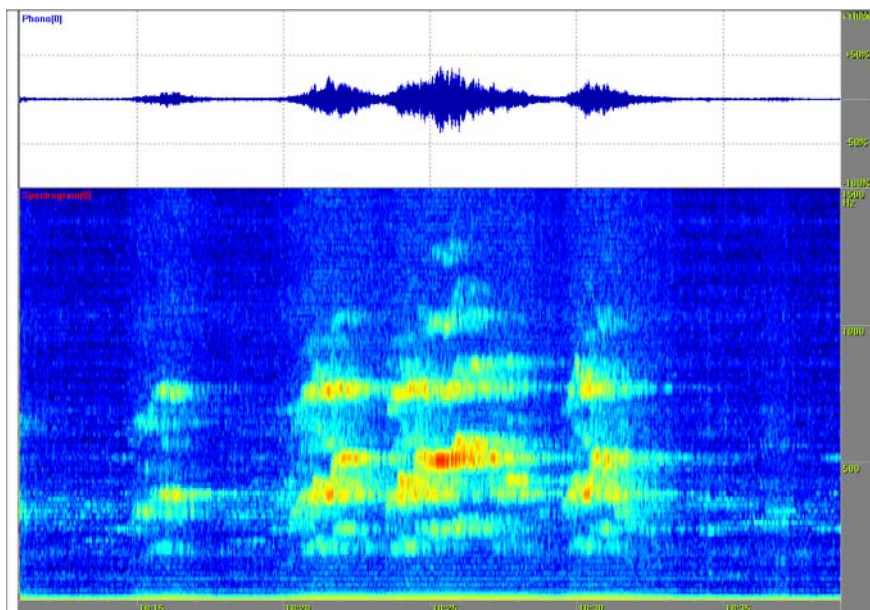


FIGURE 159 Voice intensity with transition of the vowel / u / in *Liturgie fondamentale* (18:11 - 18:39, 1500 Hz).

The French part of the section (19:40 - 28:00) consists mainly of the vowel / a / (315.6 seconds), and also the vowel / u /, along with their numerous melodic and melismatic variations in the formulas with overtone phenomena.

The fourth linguistic section (Alleluia) (28:00 - 31:03) consists of *refrain* and *jubilus*, in which the *jubilus* is chanted floridly and melismatically. For example, the *jubilus* with the vowel / a / lasts a full 125 seconds, thereby ending the whole *Liturgie fondamentale*.

A formulaic vocal paradigm covers the whole sound spectrum of this chant. At the beginning, we hear and see voice production of vowels having from one to four voice formula paradigms that last 3 to 36 seconds. Whereas toward the end of the chant, mainly in the French and Alleluia sections, the voice generates up to ten formula paradigms (about 4 seconds per unit) (Fig. 160).

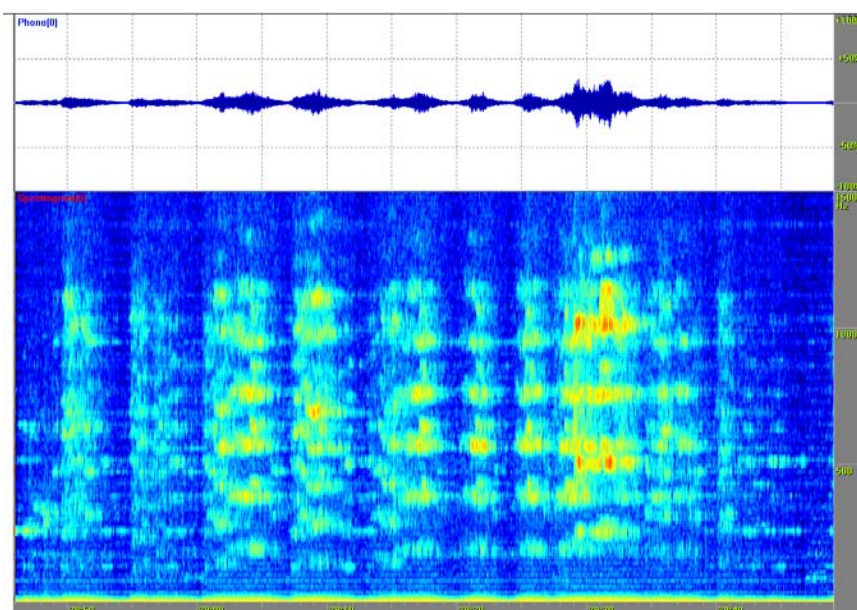


FIGURE 160 Voice pattern of ten formula paradigms on “Alleluia-aa-aa-aa” (28:46 - 29:49, 1500 Hz) in the *Liturgie fondamentale*.

To sum up, the voice in the first section of the *Liturgie fondamentale* sounds quietly (*pp*, *p*) and stably, with increasing micro-intervals. In the latter part of the composition the voice crescendos (*p*, *f*) and becomes more melismatic and melodic.

The whole composition consists of 36 percent of the voiced vowel / a /, 53.8 percent of voiced vowel / ou /, and 1.9 percent of voiced vowels / i / and / e /. In all, the composition consists of 91.8 percent of vowelised voices. The longest vowel / (o)u / lasts 663 seconds in the first section; the vowel / a / lasts 315.6 seconds in the French section; and the vowel / u / lasts 160 seconds in the Latin section; then / a / lasts 125 seconds in the Alleluia section. In conclusion, the *Liturgie fondamentale* was mainly a study or analysis of voice.

5.4.4 Special Features of the Voice

Next we focus on micro-structural voice features that generate unexpected and interesting musical phenomena in the composition. These include, for example, birds’ voices, increasing microintervals, intensity of voice, and phoneme formulas.

Microintervals

Reznikoff voices microintervals in several parts of the composition. For instance, a microinterval was produced with the vowel / u / from the fundamental frequency level of 84 Hz (E), ascending evenly to the fs0 level of 133 Hz (c) in 15.7 seconds (3:11.25 - 3:26.95). To be more precise, we can divide the voice phenomenon into three segments. Between these segments we can notice the first ascending interval of 28 Hz (3:13.07 - 3:14.10) and the second ascending interval of 21 Hz (3:21.7 - 3:23). As a result, the microinterval of 28 Hz is created in this example during 1.03 seconds, and 21 Hz within 1.3 seconds. Consequently, the voice increases 49 Hz in 15.7 seconds (Fig. 161).

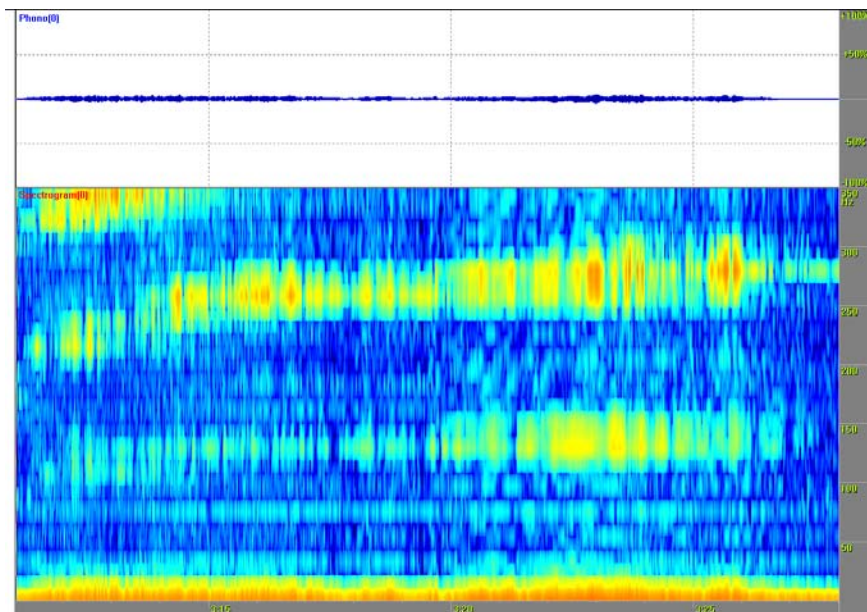


FIGURE 161 Microinterval structure with the vowel / u / in the *Liturgie fondamentale* (3:11 - 3:28, 350 Hz).

Phoneme Formula and Intensity of Voice

One typical phenomenon of Reznikoff's voice in this study was the intensity of the voice production. The voice is generated with three formula paradigms, for example, in which the first and third paradigms consist of the fs0 level of the voice, whereas the middle is chanted with an intensive voice, which adds tension to the whole formula with its higher fs0 and more intense amplitude. I have defined this phenomenon as a *tension formula* with tension formula paradigms. This phenomenon can be noticed in several parts of the third section of the composition, for example, in the time axis of (24:48 - 24:57), (25:32 - 25:39), and (26:52 - 27:01). Figure 162 illustrates one example of the tension formula on the time axis 26:52 - 27:01, with a frequency of 2000 Hz. More precisely put, the first formula paradigm (26:52 - 26:53) is chanted with the vowel / a /, and its melismatic melody or fs0 remains stable at the fs0 level of 188 Hz (fis). Thereafter, the tension formula paradigm in the middle with the vowels / a / i / is chanted at the fs0 level of 250 - 300 Hz (h-d1; 26:53 - 26:57), and the third tension formula paradigm (26:52 - 27:01) is chanted with the vowels / a / i / which alternate between the fs0

levels of 260 - 193 Hz (c1-g) and end on the fs0 level of 160 Hz(e). In the sound spectrum we may notice that the first three overtones are strong as compared to the fundamental frequency of the voice. The tension formula paradigm in the middle plus the descending (third) formula-paradigm generate the overtones or birds' voices with the nasalized vowel / i /.

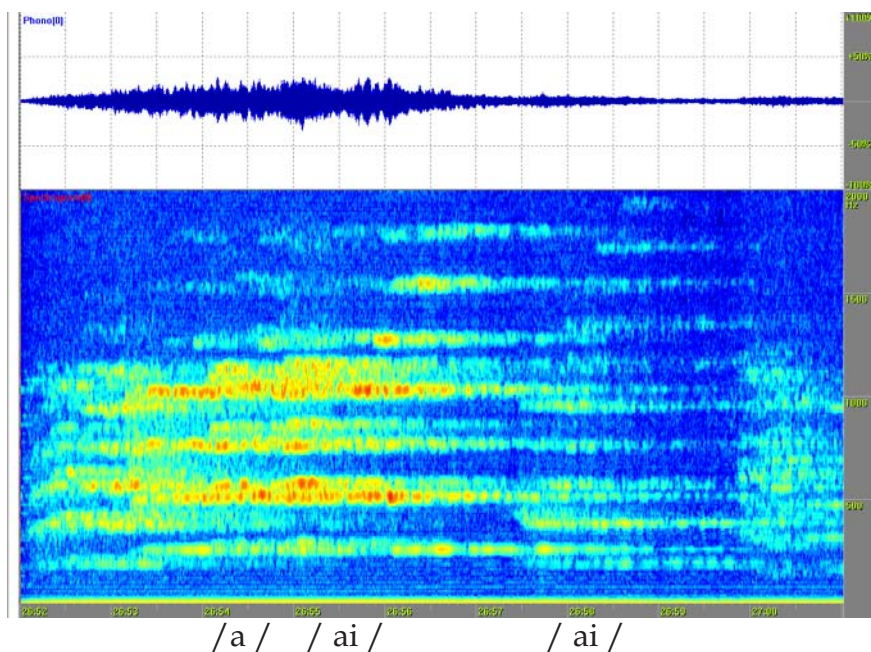


FIGURE 162 Tension formula / ai / in the *Liturgie fondamentale* (26:52 - 27:01, 2000 Hz).

Chanting the "Birds"

In the *Liturgie fondamentale* are 44 units of overtone formulas which I have analyzed as unexpected formulas Fe, and which generate the phenomenon of a "bird's voice". This phenomenon is one of the most typical elements of Iegor Reznikoff's singing, mainly in the concert versions and in the singing groups. In the shorter compositions in this study, for example in the *Alleluia* or *Salve*, we do not hear this phenomenon. By contrast, the "birds' voices" are quite evident, both audibly and visually, on the time axes of 2:03 - 2:28, 10:00 - 10:40, and 25:32 - 25:49 in the *Liturgie fondamentale*.

Reznikoff creates these overtone phenomena at different fs0 levels and with different vowels, but the main technique is similar in both cases. The overtone (bird) exists with the stable level or fs0 of the voice, with nasalized voices / m / n /, or with nasalized vowels / e / i / o / u /. Figure 163 illustrates the typical "bird's voice" production on the time axis of 26:56 - 26:60. This example is generated so that the vowel / a /, at fs0 level of 190 Hz (fis; 1.4 seconds), continues with the nasalized vowel / i / in the fs0 level of 256 Hz (c1; 1.5 seconds). The transition from vowel / a / to vowel / i / is effected in a very special way. Leino (1987: 161-162) describes the main idea of original Mongolian two-voiced throat singing as "pocket lips", in which the first partial is strongly stressed and heard: "The mouth must divide with the tongue into two caves, and with the nasalized vowels of / i / and / u / the caves are varied." I would add that Reznikoff uses the lips also so that they are almost closed, and he also uses other vowels, for example / a / o /.

Reznikoff himself states: “This is my own interpretation of the Mongolian throat singing” (In2); “I have mastered this sacral technique with closed mouth” (In3).

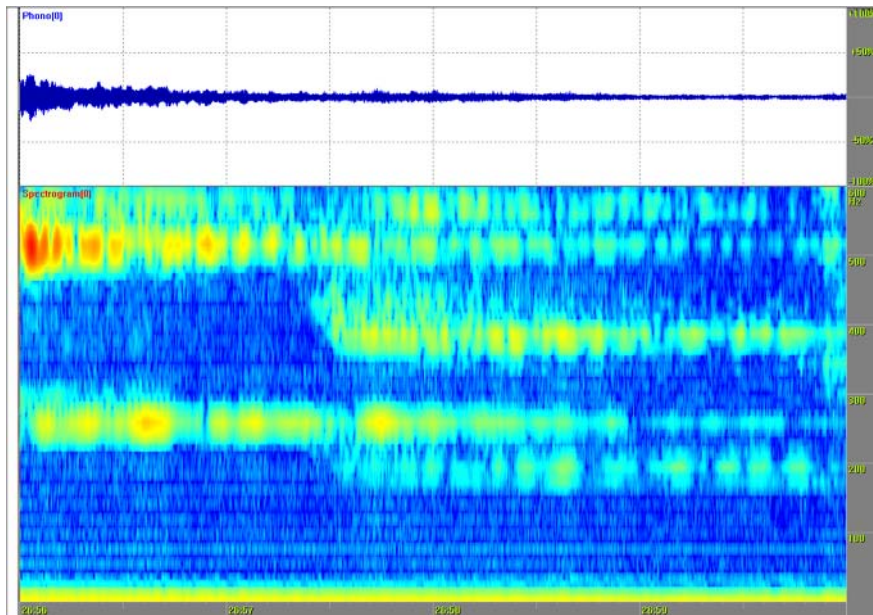


FIGURE 163 Birds' voices with the nasalized vowels / a i / in *Liturgie fondamentale* (26:56-26:60, 600Hz).

5.4.5 Formula Analysis

5.4.5.1 Formula Structure and Linguistic Content

According to our aural, visual, and linguistic analysis, the *Grand Magnificat: Liturgie fondamentale* creates a musical unity consisting of sections A, B, C, D, E. Figure 164 displays the structure of the sections or forms with linguistic content:

A:

a – o – u – (iy)

B:

a-a-, aou-, a-a-, u-u- (oi)

C:

Alleluia.

Magnificat

anima mea Dominum

et exultavit spiritus meus

et exultavit spiritus meus in Deo salutari meo

D:

Alleluia.

Et exulte

mon esprit en Dieu mon Sauveur.

E:

Alleluia.

FIGURE 164 Forms and their linguistic content in *Liturgie fondamentale*.

We may further divide the *Liturgie fondamentale* into the formula structure according to its linguistic and melodic content (Fig. 165).

Form	Formulas
A	a ¹
B	b ¹
C	c ¹ , c ¹ , c ² , c ³ , c ⁴ , c ⁴ (F ^v)
D	d ¹ , d ¹ , d ² , d ³ , d ⁴ , d ⁴ , d ⁵ , d ⁶
E	e ¹ , e ² , e ¹ , e ¹ , e ² (F ^v)

FIGURE 165 Formula structure in *Liturgie fondamentale*.

Forms A and B consisted solely of the vowels / a / o / u / i / y /. I have not categorized form A as music, but rather as pure voice. In contrast, form B is created with melismatic vowels, and consequently is defined as music. Form C is the Latin section with Alleluia formulas, and form D is the French section with Alleluia formulas. The last form, E, consists completely of Alleluia formulas.

As a result, *Liturgie fondamentale* is structured by a progressive development of the linguistic forms (Fig. 166), while consisting of repetitive formula structures (Fig. 165) in forms C, D and E.



FIGURE 166 Linguistic progress of the forms in the *Liturgie fondamentale*.

5.4.5.2 Rhythmic Formula Analysis

The rhythmic formula structure of the *Liturgie fondamentale* is generated with five time-unit forms that last from 127 to 663 seconds, and with 21 time-unit formulas that last from 9 to 663 seconds. The chant contains several pauses or silences, lasting from one to several seconds each. When we analyse the pauses or silence from the sound spectrum, we may notice “echo sounds”, and a very low fs0 of the voice between the forms and formulas (Fig. 167). These voices are difficult to hear with the naked ear, because they lie below the lowest normal frequency of audibility in humans (20 Hz).

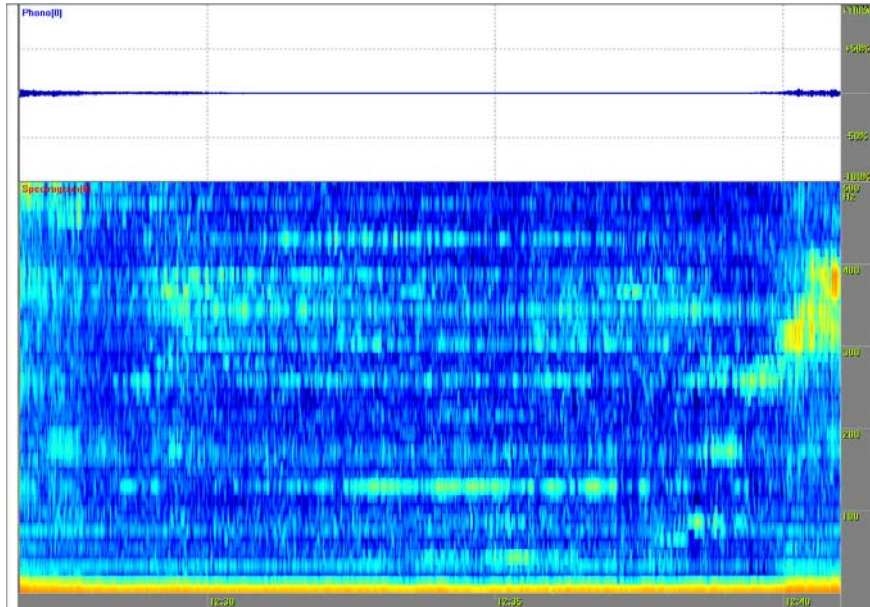


FIGURE 167 Voice in the “silence” (echo sound) in the *Liturgie fondamentale*, near or below the sense of hearing frequency 20 Hz (12:28 - 12:41, 500 Hz).

The speeds of the composition vary between 40 to 90 M.M., with the slow tempo in form A and the rapid tempos in forms D and E. The rhythm of the time-unit formula segments of the *Liturgie fondamentale* are illustrated with amplitude representation in Figure 168.

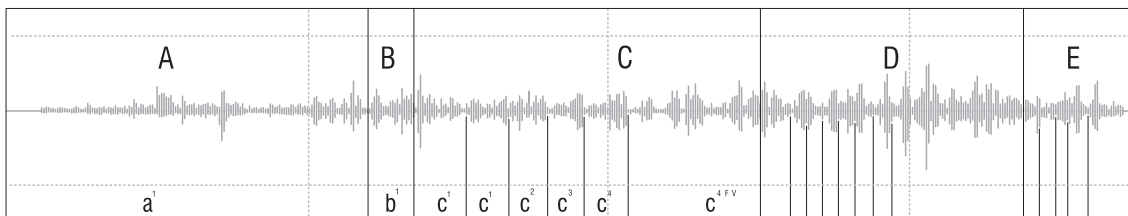


FIGURE 168 *Liturgie fondamentale*: rhythmic time-unit formulas represented as amplitude.

In the *Liturgie fondamentale*, form A last 663 seconds (35.6 percent of the whole), and form B lasts 127 seconds (6.8 percent). Form C lasts 391 seconds (21 percent), with its six formulas that last from 9 seconds to 244.7 seconds, with their variation ratio being 2619 percent. Form D lasts 499 seconds (26.8 percent), with its eight formulas that last from 5.25 seconds to 315.6 seconds, with the variation ratio being 3103.5 percent. Form E lasts 183 seconds (9.8 percent) with five formulas that last from 9 to 125 seconds; their variation ratio is 1148.5 percent.

This conceptual framework allows the time-unit formula of the composition to be structured such that it can be represented with the following formula table. In the table, *s* symbolizes a short rhythmic formula (less than 7.5 seconds), *L* symbolizes a long rhythmic formula (7.5 seconds or more), and *eL* symbolizes an extra-long formula (more than 100 seconds). The *eL* formulas consist of melismatic vowels (a, o, u).

eL eL L L L L L eL L s L L L L L eL L L L L eL

In sum, the rhythmic formula structure of *Liturgie fondamentale* is generated with 15 long formulas and 5 extremely long formulas, besides one short formula, so that the composition begins and ends with *eL* formulas. In contrast, forms C, D, and E begin with *L* formulas, and end with *eL* formulas. The rhythmic time-unit formula structure with melismatic *eL* formulas express heightened emotional moods, as if the composer-chanter is both contemplating and interpreting the voice characters with emotions. Listeners experienced *Liturgie fondamentale* as “slow, boring and personal” or “like voices in the desert” (PGA 4).

5.4.5.3 Melodic Formula Analysis

The melody, or fundamental frequency (fs_0), of voice movements in the *Liturgie fondamentale* is generated such that the voice ranges above and below the fs_0 level of 160 Hz (e) in the sound spectrum. The fs_0 increases to its maximum level of 310 Hz in form D (25:04), which is situated three-quarters through the composition. We find the lowest voices in several formulas of the composition, and a prolonged low voice occurs in the sound spectrum below the sense of hearing (about 20 Hz) at the beginning of form A. The composition both begins and ends with the fs_0 level of 31 Hz (H2). As a result, the mean width of the fs_0 in *Liturgie fondamentale* is around 280 Hz.

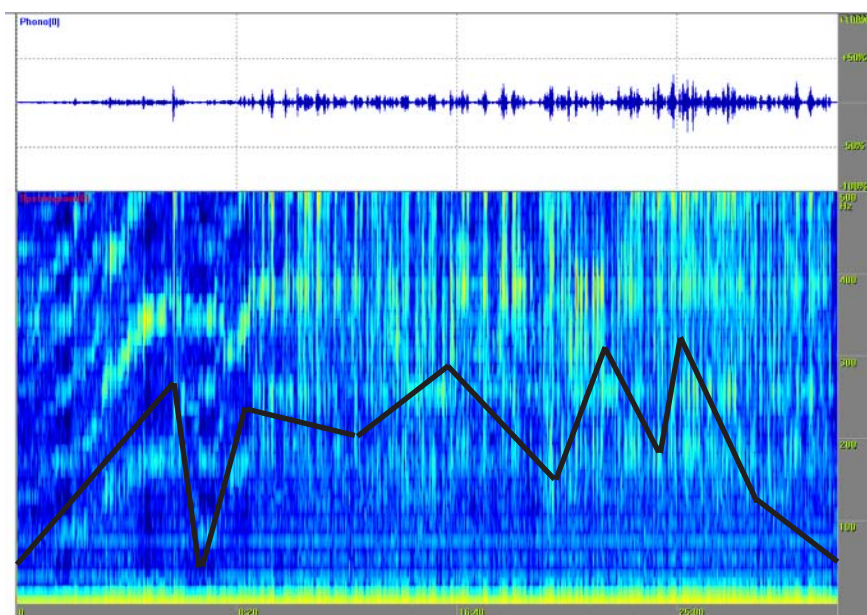


FIGURE 169 Spectral representation of voice movements in the fundamental frequency in *Liturgie fondamentale* (500 Hz; simplified diagram).

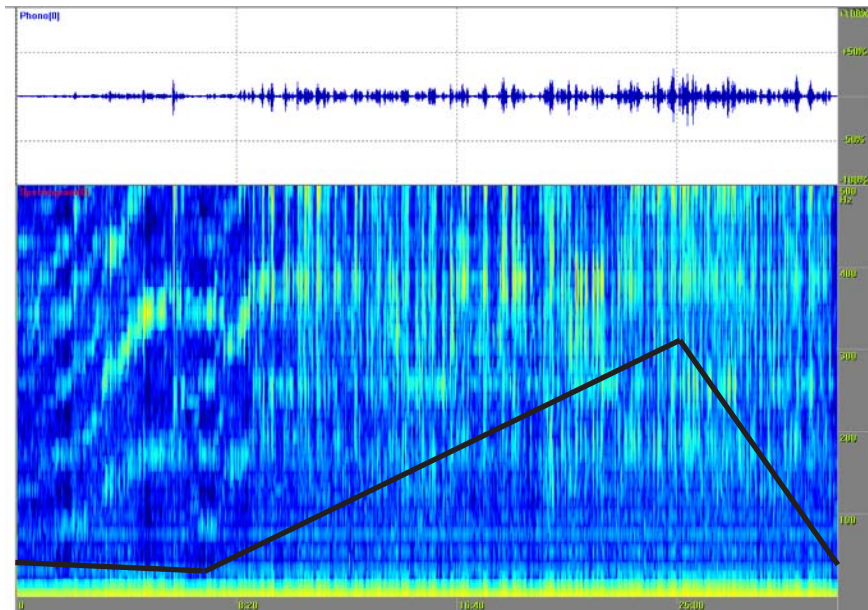


FIGURE 170 Variation ratio of the fundamental frequency in *Liturgie fondamentale* (strongly simplified).

We may divide the melodic, or fs0, movements of the composition in the macro-structural level into three different phenomena: First is a stable melody in the formula that generates the overtones; this phenomenon occurs mainly in the fs0 level of 180 Hz (fis). The second is the tension formula (Fig. 162). Third are the paradigmatic patterns in the formulas (Fig. 171) that usually consist of three to five formula paradigms. In this third phenomenon the melody or fs0 of the voice is created so that all the formulas are chanted similarly with patterns of the different vowels on the time axis 14:30 - 14:50 (/ a /), 18:14 - 18:35 (/ o /), and 21:03 - 21:42 (/ u /).

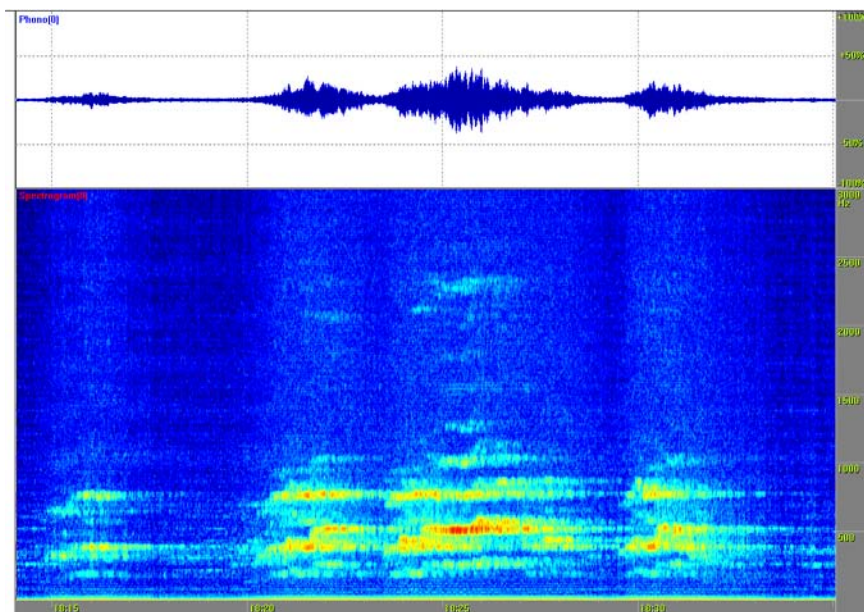


FIGURE 171 Formula in form C with four paradigmatic patterns of / u / in *Liturgie fondamentale* (18:14 - 18:35, 3000 Hz).

5.4.5.4 Harmonic Formula Analysis

Harmonic avs formula analysis of *Liturgie fondamentale* reveals that the main avs2 level is situated below 1180 Hz. The highest avs3 level goes up to 2856 Hz (or peaks above 5000 Hz), whereas the lowest avs1 level is at 450 Hz.

Form A projects clear harmonics, and its avs levels vary widely from the low avs1 level to 5000 Hz on the time axis, because of pure-voice and overtone-chanting technique. In form B the avs level is about 1260 Hz, and the structure of the form consists of harmonic patterns of three or four formulas.

In (the Latin) form C the avs levels vary between 450 Hz to 1170 Hz, so that the highest avs3 level consists of melismatic vowels / a / o / u /, and the lowest avs1 is chanted with words or vowels. In form D the main avs2 is about 1171 Hz, but there we may notice also a low avs level of 795 Hz that is chanted with mixed voices. The highest avs3 level consists of melismatic voices. In form E we find a harmonic structure that remains at the main avs2 level of 1180 Hz.

As a result of the harmonic avs formula analysis of *Liturgie fondamentale*, we can illustrate it with the structures shown in Figure 172, in which the main avs2 level of the composition is 1180 Hz, and varies between the avs level of 450 and 1180. In addition, the chanting technique creates overtones at the highest avs3 level (above 5 kHz).

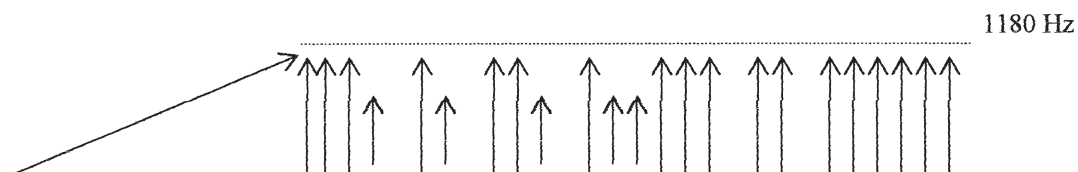


FIGURE 172 Main avs-level movements in the chant *Liturgie fondamentale* (diagram simplified).

5.4.5.5 Formula Content

Liturgie fondamentale varies greatly in its formula content. The beginning (form A) of the chant consists of a long-lasting Ff formula (pure voice), and 30 unexpected Fe formulas with overtones. Transition form B consists of one melismatic formula Fa and two unexpected Fe formulas with overtones. Forms C, D and E are made up of melismatic Fa formulas and mixed formulas Fd, besides 12 unexpected formulas Fe with overtones. The formula content structure is shown in Figure 173, in which Fe formulas are a result of the main formula content; hence they appear as “additional formulas” in the content figure. The schema or grid of the formula content patterns is illustrated in Figure 174.

Formula content

A: / Ff¹⁸ / + 30 units Fe

B: / Fa / +2 units Fe

C: / Fd(a) / Fd(a) / Fa / Fd(a) / Fd /
/ Fa / Fa / Fd / Fd / Fd(a) / Fd (a) / Fd / Fa /

D: / Fd(a) / Fd / Fa / Fa / Fd / Fa / Fd / Fa / Fd / Fa / + 10 units Fe

E: / Fd / Fa / Fd / Fd / Fa / +2 units Fe

FIGURE 173 Formula content of the *Liturgie fondamentale*.

¹⁸ In this study, the Ff formula in form A is analysed as one Ff formula.

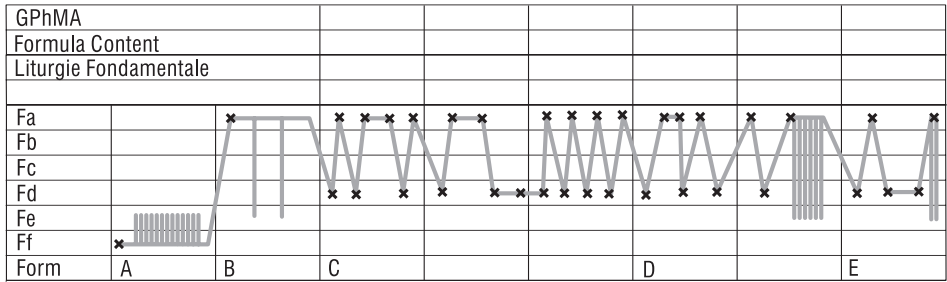


FIGURE 174 Schema of the formula content, with content center (x), of the *Liturgie fondamentale*.

5.4.5.6 Formula Circle

The formula content and its schema is transformed into the formula circle with temporal formula patterns. From Figure 175 we may judge that, according to GMA, the *Liturgie fondamentale* is not a balanced or “conscious” composition, based on the theory that the balance of a composition is situated in the outer circle, and tension in the core of the circle. On the contrary, this composition appears to be generated with tensions. Consequently, we may hypothesize that *Liturgie fondamentale* it is an unconscious and/or superconscious composition.

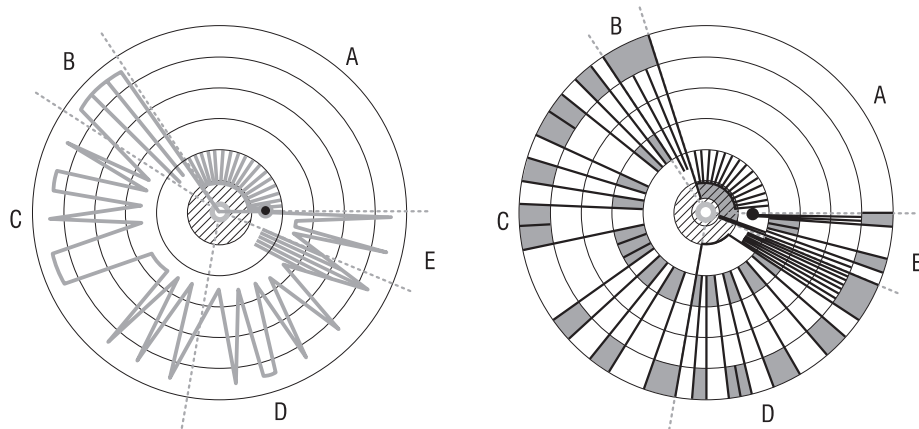


FIGURE 175 Formula circle of the *Liturgie fondamentale*.

5.4.5.7 Formula Relations

Content relations between the formulas consist of 7.6 percent stable (0) transitions, and 73.4 percent increasing and decreasing formula content levels (+/- 1 to +/- 3), plus 17.7 percent (+/- 4) relations in form D. Between forms A and B we find one relation of +5 formula content levels from Ff to Fa.

As a result, we may interpret that 30 unexpected Fe formulas create tension in the composition with the low voice in form A. Besides, the change of the formula content level from Ff formula to Fa formula create the effect of a musical catastrophe. Put more precisely, the “music was born” in the transition section (11:03) in which the Ff formula content level changed to the melismatic formula content level Fa. In short, the music began with the vowels / a-a-a / between forms A and B. According to the formula content analysis we may conclude that *Liturgie fondamentale* is an extremely intensive composition, in which musical thoughts were under a more intensive process than were outward expressions of them.

5.4.5.8 The Relations between the Formulas

Spectral relations in the fundamental frequency fs_0 level of the composition *Liturgie fondamentale* vary between 0 Hz to 173 Hz, and the increasing amplitude relation ratio varies between 2 percent to 12 percent.

The relations of the *forms* are structured so that they descend in fs_0 level from about 45Hz to 173Hz in 75 percent of the relations, and 25 percent of the relations are stable. Between the formula relations C - D, and D - E we can notice a looping phenomenon to the fs_0 level of 83 and 87 Hz. More precisely, the fs_0 relations between C to D consist of fs_0 movements of 256 - 83 - 256 Hz, and the fs_0 relations between D - E consisted of fs_0 movements of 132 - 87 - 174 Hz; moreover, the amplitude relations increased 2 percent and 12 percent.

The *formula relations* in *Liturgie fondamentale* occur mostly with the looping phenomenon 131 - 83/85 - 131 Hz. Relations consist also of a few stable and increasing relations, as well as some decreasing relations. In form B all relations of the vowel patterns consist of looping phenomena (inside the formula). In form C, some of the relations are looping phenomenon, and a few have increasing relations. In form D the relations vary, and form E consists of looping phenomena in all relations. I have interpreted form A as pure voice (Ff formula) in which the relations consist in silence between vowels. The amplitude relations increase from one percent to 12 percent between the formulas.

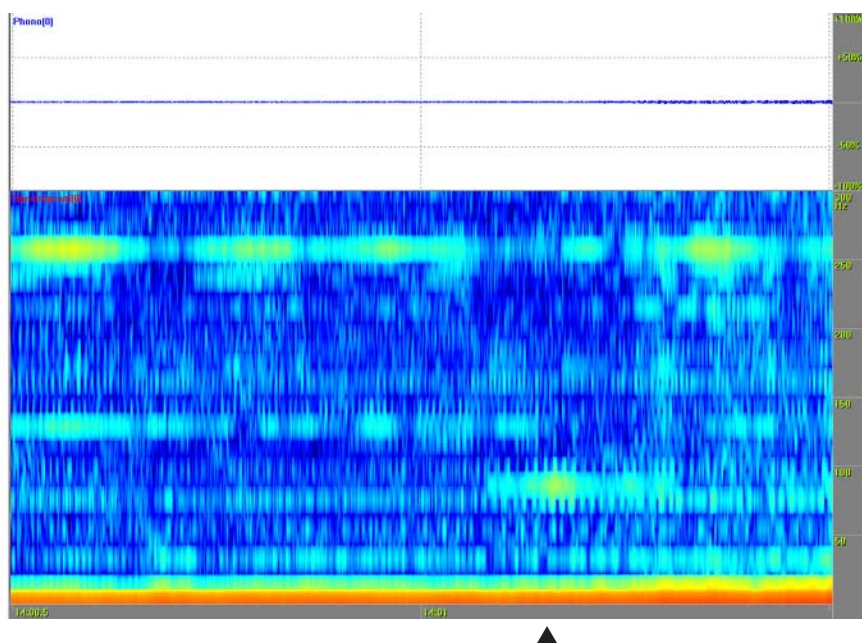


FIGURE 176 Looping phenomena in the *Liturgie fondamentale* (14:00.5 - 14:01.5, 300 Hz)

In the *Liturgie fondamentale*, between the formulas, we notice several breathing pauses in addition to the silence or echo. Echo phenomena are difficult to hear, but we can notice them in the spectral representation. Figures 177 and 178 show macro- and micro-structural examples of echo phenomena between the formula paradigms.

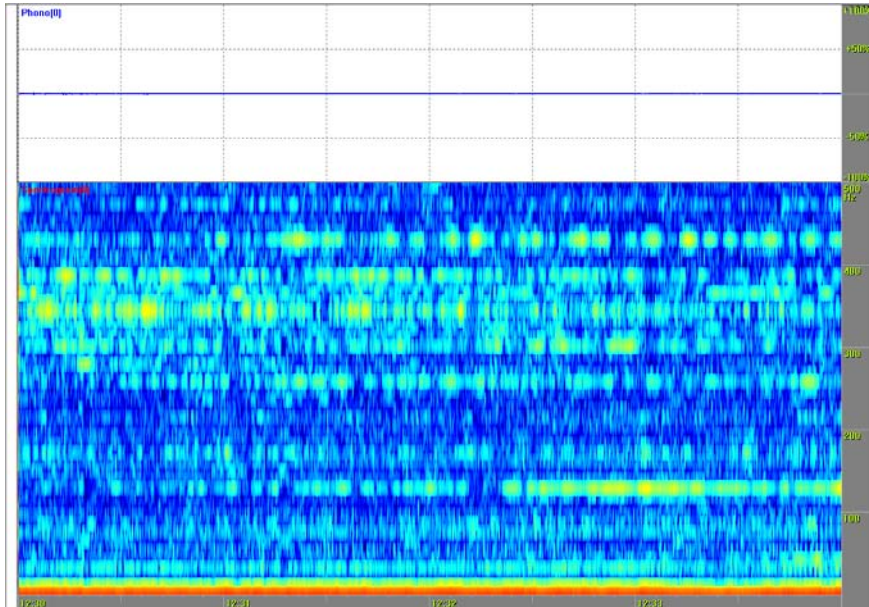


FIGURE 177 Macro-structural echo between formula relations in the *Liturgie fondamentale* (12:30 - 12:39, 500 Hz).

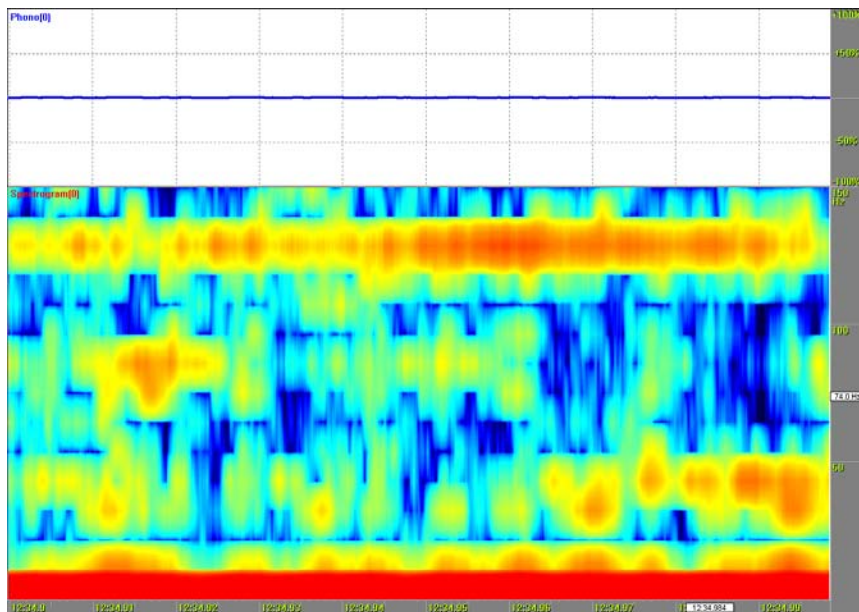


FIGURE 178 Micro-structural echo (seen but not heard) between formula relations in *Liturgie fondamentale* (12:34.9 - 12:35.0, 150 Hz).

5.4.5.9 Micro Structural Formula Analysis

Voice Near the Sense of Hearing

In this study, the voice sounding below the sense of hearing (near 20 Hz) is considered meaningful. We may interpret that the vocal source of this sound, as it comes *from* the “body”, is in the chest or stomach. The voice is also perceived as how it acts *in* the body as well, in the chest or heart for example, with associations of “internally human, inner energy, unconscious, physical, or relaxing music”

(PGA4; Utriainen 2000a). The low-frequency voice phenomenon permeates the *Liturgie fondamentale*, which consists of long lasting voices with a very low fs_0 , particularly at the beginning of the composition. Although the composition consists of low voices, it ironically creates high or bright overtones, or birds' voices, with associations, for example, of "aiming up to the sky, birds, or the Holy" (PGA4).

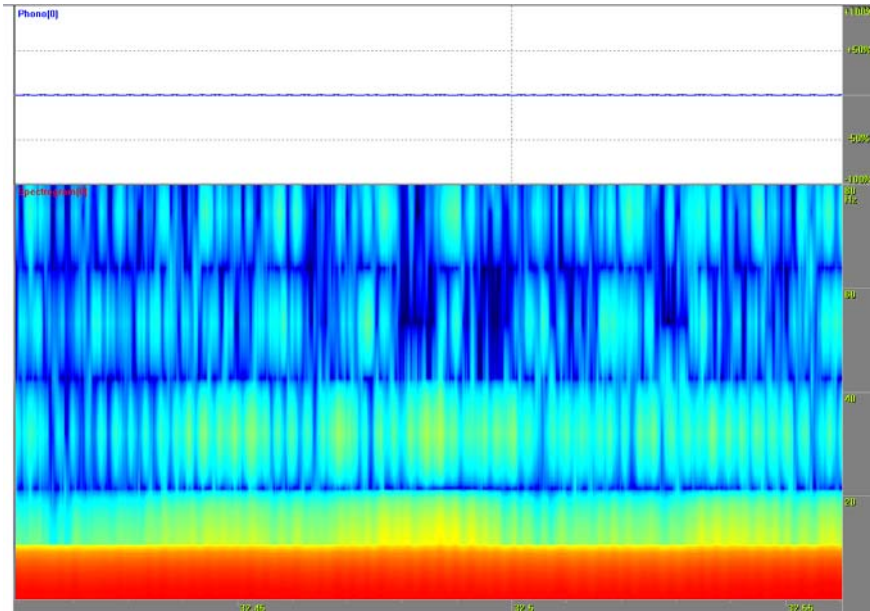


FIGURE 179 The vocalisation / ou / on the border of the sense of hearing (21.4 Hz) in the chant *Liturgie fondamentale* (0:32.41 - 0:32.56, 80 Hz).

The Bird's Voice

In *Liturgie fondamentale* the overtone singing with the birds' voices is generated in several different ways, whereas the phenomenon is based on traditional Mongolian throat-singing and its own modes of interpretation. Iegor Reznikoff produces the overtones in four ways (the parameters are the author's own definitions). Figure 180 shows the amplitude representation of the overtone singing / u / o / phenomena (birds' voices) that are generated with a low fs_0 voice around the level of 86 Hz (F), with a strong third overtone that is almost sine-wave in nature.

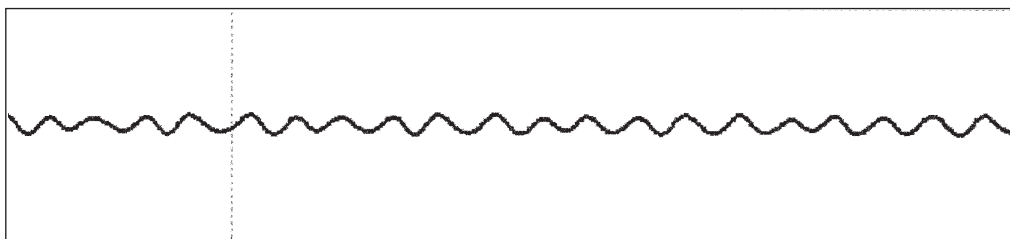


FIGURE 180 *Liturgie fondamentale* (2:13.25 - 2:13.29): amplitude of birds' voices in Reznikoff's overtone singing.

Low Fundamental Frequency

In the first example, Reznikoff produce the overtones with the low, stable and prolonged vowels / a / o / u /. The fs_0 (first partial) of the voice resonates between 67 - 106 Hz (C - Gis) (Fig. 182), and the tempo is about M.M. 60. Reznikoff's style of overtone singing creates a harmonic triangle in the sound spectrum, in which we notice that the second overtone is strong at the fs_0 level of 258 Hz (Fig. 182), and the seventh overtone is also stressed, at the fs_0 level of 688 Hz (Fig. 181). On the whole, Reznikoff's voice produce overtones up to the frequency of 1374 Hz.

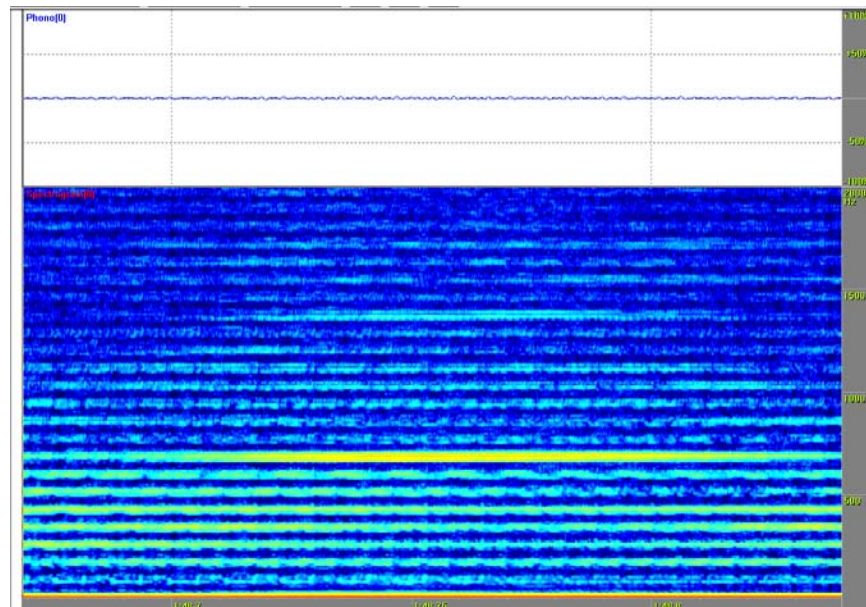


FIGURE 181 Overtone voices (birds) in the sound spectrum in *Liturgie fondamentale* (1:48.67 - 1:48.84, 2000 Hz).

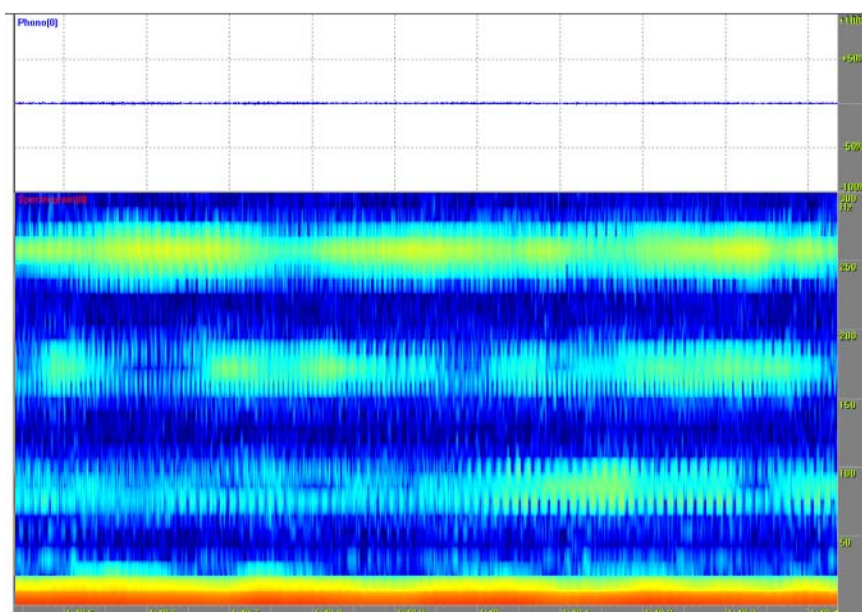


FIGURE 182 *Liturgie fondamentale* (1:48.44 - 1:49.43, 300 Hz): fundamental frequency with resonance, which produces two overtones (vowels /a, u/).

Transitio 1

In *Liturgie fondamentale* we find several transitional phenomena, which I divide into three main categories: *single ascending transitio*, *double ascending transitio*, and *podium transitio*.

In transitio 1 the voice with the vowel / u / at the fs0 level of 172 Hz (f) ascends with a tension of 64 Hz to the fs0 level of 236 Hz (ais). At this level the vowels / o i y i / create bright overtones in seven seconds with clear harmonic spectra. In this phenomenon the first overtone is strong at the fs0 levels of 344 and 486 Hz (Fig. 183), and we can notice overtones at the frequency level of 2450 Hz. I would interpret this phenomenon as Reznikoff's own personal interpretation of overtone singing. It also consists of traditional overtone singing features (Mongolian throat singing style), in which the melody occurs between the second and fifteenth overtones. It is heard clearly, like a bright whistle, above a very low and rough vocal production of the vowels / i / and / u / (Leino 1987: 169).

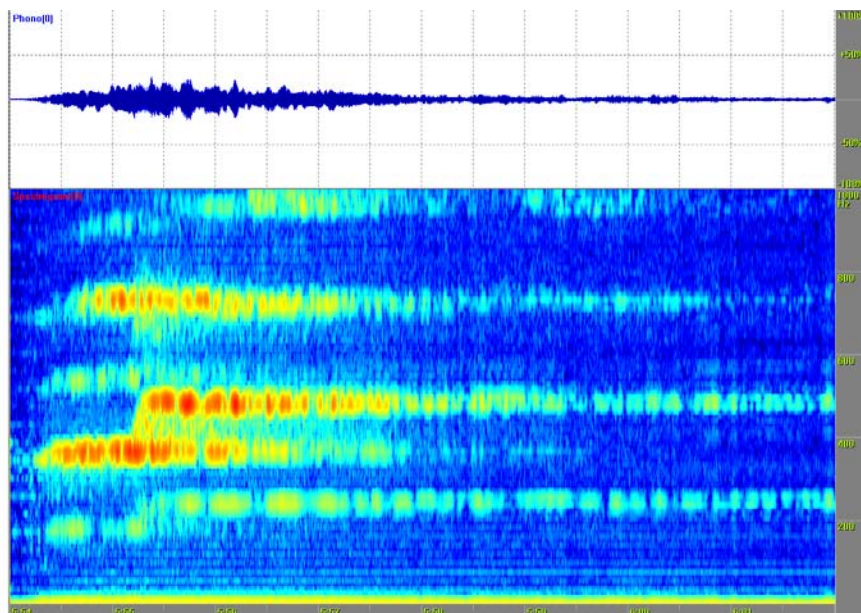


FIGURE 183 Single transitio of the voice / u / - / o i y i / in the *Liturgie fondamentale* (5:54 - 6:02, 1000 Hz).

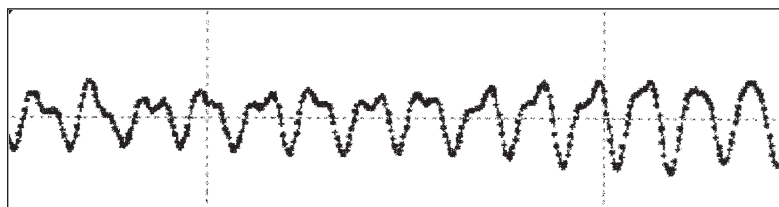


FIGURE 184 Amplitude of the single transitio of the voice / u - oi / in the *Liturgie fondamentale* (5:55- 5:55.1, 1000 Hz).

Transitio 2

Transitio 2, or the *double transitio*, in this study means that the voice energetically ascends two transitis upwards. In this phenomenon the fs0 level of the voice is 125 Hz (H) with the vowel / u / , and it increases to the transitio level of 187 Hz

(fis), and thereafter to the second transitio level of 250 Hz (h). In amplitude, the double transitio increase in the first transitio is 8 percent, and in the second transitio 18 percent. This phenomenon creates two harmonic triangles in the sound spectrum, in which the first overtone is strong. We can also notice overtones at the frequency level of 2900 Hz. The double transitio is illustrated in Figure 185.

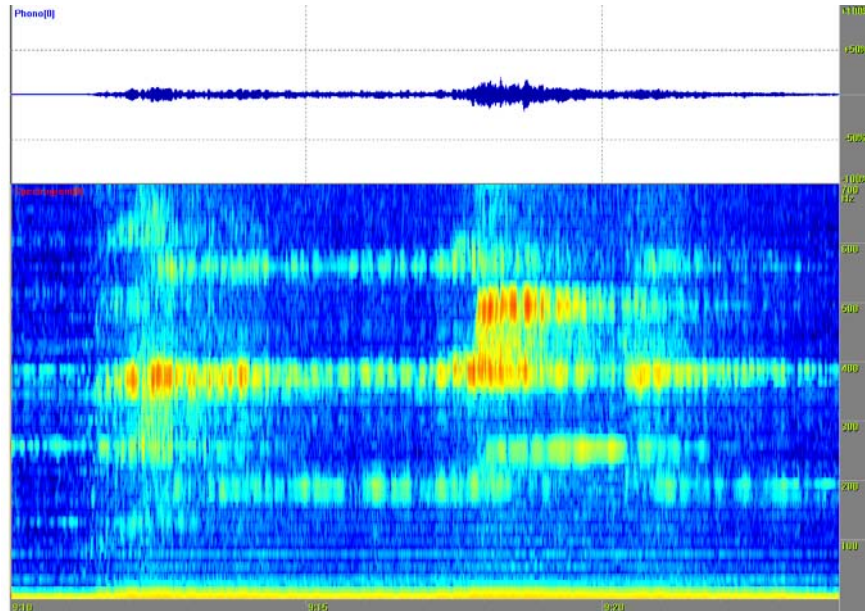


FIGURE 185 Double transitio (transitio 2) of voiced / u / with overtones (9:10 - 9:24, 700 Hz).

Transitio 3

The *third*, or *podium transitio*, consists of a rapid ascent in the voice with a single transitio. Thereafter follows a rapid, descending transitio of the voice in the fs0 level. In the sound spectrum this phenomenon generates a quadratic figure (Fig. 186), and in the amplitude we can notice an ascending onset of 25 percent. For example, the transitio at the fs0 level occurs so that it begins with the vowel / a / at the fs0 level of 190 Hz (fis) lasting 1.16 seconds. Then it increases to the fs0 level of around 257 Hz (c¹) with the vowel / a / that lasts 4.3 seconds, after which the transition goes down to the fs0 level of 190 Hz (fis) with the vowels / a – i / a – i / that last 2.3 seconds. The first overtone in the sound spectrum is stronger than the fs0, and we also notice overtones at the frequency of 2950 Hz. The sound spectrum of the voice consist of darkness in the middle of transitio 3, because of the melismatic style used in chanting the vowel / a /, but we can notice clear overtones in the sound spectrum of the nasalized voice / i /. In the present piece we find podium transitios, for example, at the following onsets: 17, 24:50, 28:40, 27:10, 28:20, 20:30, 30:60.

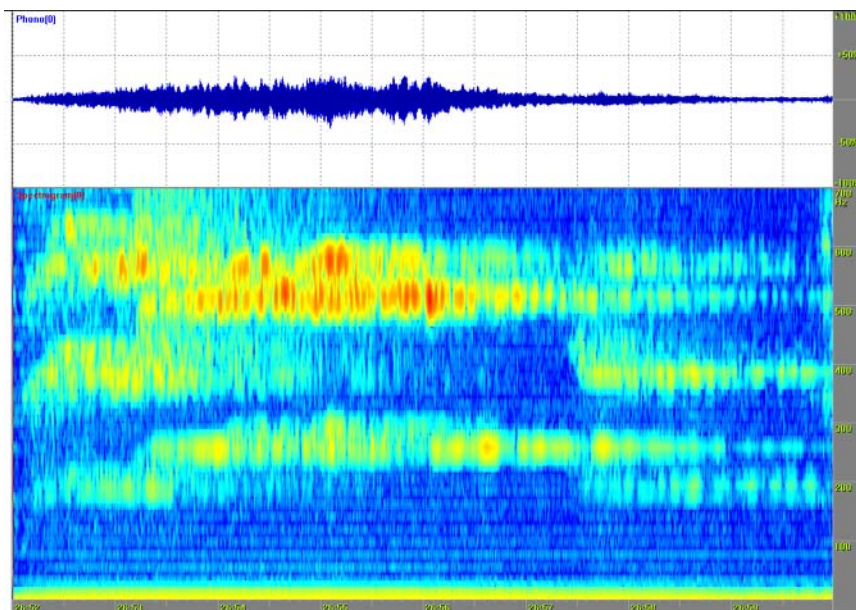


FIGURE 186 Podium transitio of the voiced / a / a / ai / in the *Liturgie fondamentale* (26:52 - 27:00, 700 Hz).

We can summarize that the transitio phenomena in Reznikoff's overtone chanting occur with the ascending transitio ratio of 62 - 64 - 67 Hz from the fs0 levels of 172 - 125 - 190. In addition, the first overtone is strong, and we can hear and see clear overtones up to the frequency level of 2900 Hz.

5.4.6 Perception Gestalt Analysis PGA4

The global perception analysis (PGA4) of the *Grand Magnificat: Liturgie fondamentale* consisted of individual analyses. In spring 2001 sent three persons a letter containing instructions for a 2-part listening task, an audiocassette, and a return envelope. Only one listener responded by sending me his experiences. He was 45-years old, an amateur composer and musician besides his main work as a physiotherapist. In addition, the results consisted the author's experiences of the compositions.

5.4.6.1 Global Listening: Free Associations

The following associations were perceived in the listening analysis, which I have divided into *nouns*, *verbs*, *adjectives* and *adverbs*: The following nouns were experienced: voice, energy, pressure, overtones, voice production, wind instrument, noise, voice scales, major scales, *joiks*. *Adjectives*: personal, peaceful, strong and interesting. *Adverbs*: gentle and whole. *Places*: the human interior and Lappland. In addition, the following physical experiences were also expressed: "relaxing patterns, boring, repetitive, yawning" and even "unconscious".

I have put the nouns into the following categories of people, places, and things:

People humans (birds)	Places human interior Lapland unconscious	Things energy <i>joiks</i> overtones pressure voice wind instruments
------------------------------------	---	---

FIGURE 187 Nouns as representation of individual consciousness in the *Liturgie fondamentale*.

5.4.6.2 Global Listening: Standard Polarity Profile

As a summary of Standard Polarity Profile analysis, we can say that the experiences of the *Liturgie fondamentale* (Fig. 188) expressed lightness. It produced perceptions of harmoniousness, pleasure and even joy. The composition created a semblance of rest, slowness, calmness and silence, and the potency was quite soft, tender and vigorous.

Standard Polarity Profile of the chant LITURGIE FONDAMENTALE.									
VALENCE									
		-3	-2	-1	0	1	2	3	
Darkness				1					Lightness
Dissonance							1	1	Harmoniousness
Opacity					1		1		Clarity
Displeasure						1	1		Pleasure
Joylessness					1		1		Joy
STIMULATION									
Rest		1	1					1	Movement
Slowness		1	1					1	Rapidity
Leisureliness		1			1				Liveliness
Calmness		2							Excitement
Silence			1		1				Noise
POTENCY									
Softness			1	1					Hardness
Compliance						2			Purposefulness
Reservedness					1		2		Vigorousness
Weakness						1			Strength
Tenderness		1		1					Harshness

FIGURE 188 Standard Polarity profile of the composition *Liturgie fondamentale*.

5.4.7 Creation Gestalt Analysis CGA4

The composer says the following about the creation of the *Liturgie fondamentale*:

The main aim focus this composition is the creation circle of the world. I am thinking of what is the basis of human voice in this chant. There is no improvisation, it is living interpretation. I chant the body and the temple of the world, and their relation and resonance in the chant - in other words the curve, the sound. This chant is a praise to humanity and to the whole world - to the mother of the Holy, St Maria ... or the chant to whole universe.

The chant was created in France, and was written in Latin and in French, and I praise nature with joy, beauty, as well as birds. There are high overtones, the technique is my own solution of Mongolian throat singing style. This is not a trick, it is praise and resonance with a natural scale. This is praise to God with joy.

The chant is structured so that the first part is chanted with low voice and at the end of it are overtones, besides pure voice. The second part of the Magnificat is in French, and it consist of alpha and beta sections. The third part is only voice A – – (In2).

In the CGA4 the following *nouns, verbs, adjectives, and adverbs* were mentioned. *Nouns*: God, St Maria, God's mother, alpha, beta, creation circle, world, voice, body, temple of the world, chant, universe, birds, technique, interpretation and praise; *Verbs*: thinking, improvisation, living, praise, create, singing; *Adjectives*: low, joy, beauty, pure; *Adverbs and Places*: temple of the world, body, whole world, Mongolia. The nouns are ordered and categorized into people, places and things in the following table:

People	Places	Things
God	body	body
God's mother	Mongolia	chant
St Maria	temple of the world	creation circle
(birds)	universe	praise
	whole world	temple
		technique
		voice

FIGURE 189 Nouns as a representation of CGA4 of the *Liturgie fondamentale*.

The PGA4 and CGA4 revealed that the *Liturgie fondamentale* created positive associations, for example, with the association of "body, the internally human and the unconscious, energy, and creation circle, Mongolia and overtones". The associations "joy and birds" as well as "peaceful and gentle" correlated 100 percent.

5.5 Comparison Gestalt Analysis

5.5.1 Context Analysis

Medieval chants are tunes basically in an oral tradition of singing that stemmed from Christian rituals in the Middle Ages, though some of them no doubt date back earlier, to the apostolic era and later to that of the early Church fathers. Chanted in unison, they are vocal lines that embody communal and aesthetic sensibilities of the time. Many people find them beautiful to listen to, even if some experts (Grout *et al.* 1996) do not classify chants as pure music, in the sense of being comprehensible apart from their liturgical contexts and purposes.

G1 in this study is a Gregorian chant (St Gall), *Alleluia: Dies sanctificatus*, a small Christmas alleluia in Latin. G2 is Iegor Reznikoff's chant *Alleluia: l'Esprit souffle*, which is a small French alleluia. These chants were selected sporadically, yet retain similarities with the same phrase-formula, "alleluia" with *refrain* and *jubilus*. The pieces are similar in length as well, lasting about three minutes each.

Alleluia G1 represents the tradition of Liturgy of the Word, whereas the G2 alleluia is an interpretation of Gregorian traditions, such that it represents "living art" based on performances, concerts, and recordings. Alleluias consist of the *refrain* (the single word "alleluia", a Psalm verse, then a *jubilus*, wherein the final / ia / is chanted with effusive melisma. Figure 190 shows the structure of the Gregorian Mass Liturgy or the High Mass. The schema of chanting alleluias is given in Figure 191.

THE HIGH MASS		
	Proper	Ordinary
Introductory	Introit	
		Kyrie Gloria
Liturgy of the Word	Collects	
	Epistle	
	Gradual	
	Alleluia/Tract	
	Sequence (rare now, common in the Middle Ages)	
	Gospel [Sermon]	Credo
Liturgy of the Eucharist	Offertory	
	Preface	
		Sanctus Agnus Dei
	Communion	
	Post-Communion	Ite, missa est

FIGURE 190 Schema of the High Mass (Grout *et al.* 1996: 36).

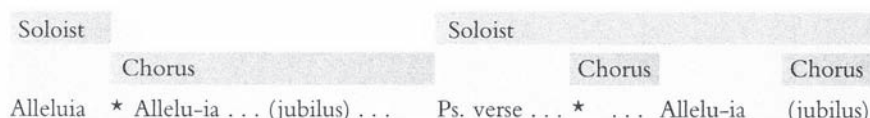


FIGURE 191 Alleluia schema in the Gregorian tradition (Grout *et al.* 1996: 47).

The G1 Alleluia belongs to the High Mass, and is one of the oldest notated manuscripts of St Gall. It is sung responsorially, such that a soloist and chorus alternate back and forth in singing the monophonic melody. The original manuscript is no longer extant, but a modern version, using an *f* clef and Dorian mode, can be found in square-note notation in the *Gradual triplex: Tempus nativitatis* (Solesmes 1998: 49). The figure below gives the original Latin text, plus English translation.¹⁹

Alleluia.
Dies sanctificatus illuxit nobis:
venite gentes, et adorete dominum:
quia hodie descendit lux magna super terram.

Alleluia.
The day made holy hath dawned upon us.
Come ye nations and adore the Lord:
for today a great light hath descended on the earth.

FIGURE 192 Words of the G1 *Alleluia: Dies sanctificatus* in Latin and English.

According to the composer (In2), Alleluia G2 uses biblical words (see Chap. 5.1.6, above) is a Pentecostal chant that is sung during the christening celebration. Reznikoff might have found it interesting to compose because it is “a song of praise” to the “Holy in the invisible worlds”, or because it aids in “meditation” and “contemplation”. In addition to its Biblical source, this chant also draws from the manuscripts of St Gall, and particularly from their oldest neumes. The chant is sung solo, without chorus, and its words are given in figure 193.

Alleluia.
L'Esprit souffle où il veut.
Et tu en tends Sa voix,
mais tu ne sais ni d'où il vient,
ni où il va.
Alleluia.

Hallelujah.
The spirit is blowing where it wants
and you hear Its voice
but you neither know where it comes from
nor where it is going.

FIGURE 193 Words of the G2 *Alleluia: l'Esprit souffle*; in French and English.

¹⁹ Translation by Leofranc Holford-Strevens (PGA5; CD liner notes 1997: 25).

5.5.2 Content Analysis

The analysis of G1 reveals it to be a social and religious way of praying to and praising God and the Lord Jesus, as its words make clear: "Alleluia - let us adore the Lord". In contrast, Reznikoff's alleluia G2 represents religious faith on a more personal level, with the words "Alleluia - you hear the wind". The words of G1 reflect the Liturgy of the Word, whereas those of G2 reflect more intimately sacred and poetical aspects of the Word. The "real" meaning comes from the words, while their context and presumed effects arise from their content. For example, the words "the Lord", as they appear in the actual music, may receive or induce positive or negative effects from and in the chanter as well as the listeners. Of course, the word "wind" is a different locution than is "the Lord". Still, we may interpret "wind" as a poetic synonym of "the Lord", since it is used that way Biblically in scores of instances (Holy Spirit, *ruach*, the "rushing wind" of Pentecost, etc.). As a result, both of the chants in question function as praise to the Lord, God, or spirit.

The melody in the G1 alleluia follows a typical Gregorian "arch", such that it begins low and rises rapidly to a higher pitch, remains there awhile, then descends at the end of the formula; in this case, the arch runs from c - a - d. The G1 alleluia is composed in Dorian mode, and almost all the notes (90.8 percent) are situated above c. The ambitus of the modern notation is the octave between A to a. Alleluia G2 is composed in the G mode (Mixolydian), and its melody begins from the finalis (g¹), rises slowly to a higher pitch, then descends back towards the finalis. The main melodic movement of the chant is around the finalis. The rhythm of both Alleluias arises from the texts and the melodies. From the amplitude analysis, we can see that the tempo of G1 is more stable than that of G2, which consists of intensive onsets as well as undulations in amplitude (Fig. 195). In addition, a comparison of the chirognomy involved reveals similarities between the two chants; the main difference is the symbol quilisma ω and its variations, which is used in G1 but not in G2 (Fig. 194).

G1

Al - le - lu - ia ---

G2

Alle - luia

FIGURE 194 Modern notation of Alleluia formulas (A¹) of G²⁰ (*Alleluia. Dies sanctificatus*), and G2 (*Alleluia. l'Esprit souffle*).

²⁰ Aija-Leena Ranta 2002; original manuscript in the Gradual Triplex (Solesmes 1999: 49).

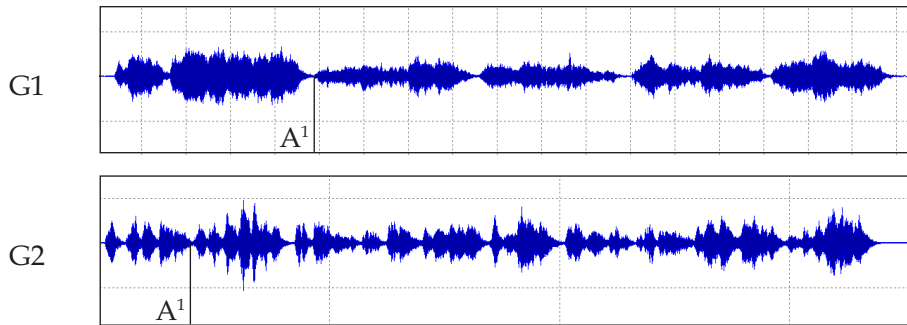


FIGURE 195 Amplitude representation of Alleluia formulas (A¹) in G1 (*Alleluia. Dies sanctificatus*), and G2 (*Alleluia. l'Esprit souffle*).

5.5.3 Macro-Analysis

In the macro-analysis the chants G1 and G2 have been segmented into forms and formulas according to aural and visual analysis. The structures of the forms are as follows:

G1 A B C D E
 G2 A¹ A² B¹ C¹ A³ B² C² A⁴

G1 consists of a progressive structure. By contrast, G2 is cyclical, and form A (alleluia) is repeated three times; form B is repeated once, as is form C. The formula analysis indicates that the formula structures in G1 and G2 are mainly progressive a¹, a¹, b¹, c¹, d¹, and e¹, with repetitive alleluia formulas (a¹).

The formula structures of G1 and G2 are represented in figures 196 and 197. I have given the formulas linguistic and musical content (Fa - Ff) according to the GMA method (Ch. 3.3.7), and thereafter they are translated into the formula circle.

Alleluia G1 consists, according to the formula content analysis, of 100 percent Fa to Fc formulas, of which 50 percent are melismatic Fa formulas, 43.7 percent are syllable Fc formulas, and 6.3 percent are neumatic Fb formulas. Contrarily, G2 consists of 31.2 percent Fa formulas, 50 percent Fc formulas, and 18.8 percent Fd formulas. In G2 we find some mixed formulas in forms C¹ and C², because the word "niu" consists of nasal sounds and vowels, and moreover because they are not sung in Gregorian style. As a result, we may conclude that, according to GMA, G1 is both a superconscious and conscious chant, whereas G2 is mainly a conscious composition.

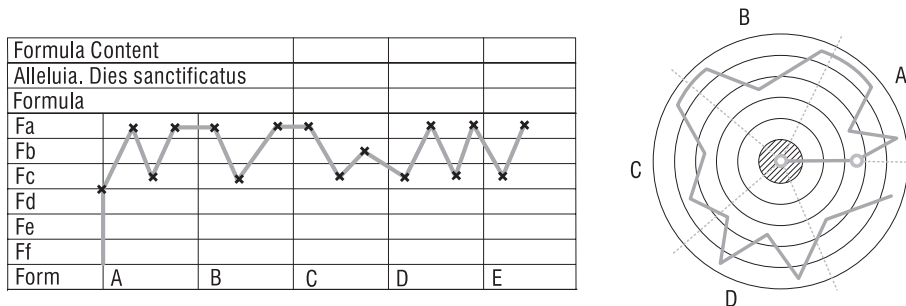


FIGURE 196 Formula structure and formula circle of G1 (*Alleluia. Dies sanctificatus*).

GPhMA analysis								
Formula Content								
Formula								
Fa		x						x
Fb			x	x				
Fc	x	x						
Fd			x					x
Fe								
Ff								
Form	A1	A2	B1	C1	A3	B2	C2	A4

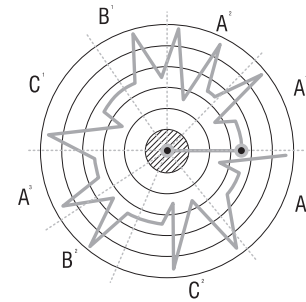


FIGURE 197 Formula structure and formula circle of G2. (*Alleluia. l'Esprit souffle*)

The fundamental frequencies fs_0 's (melodic movements) of G1 and G2 vary slightly in the sound spectrum. In G1, the fs_0 ranges from 121 Hz (H) to 330 Hz (e^1), and the variation level is 209 Hz. The fs_0 in G2 varies from 37 Hz (D^1) to 240 Hz (h), and the variation level is 203 Hz. Thus, the variation ratio between G1 and G2 at the fs_0 level is 6 Hz.

The highest fs_0 in G1 occupies 70 percent of the whole on the x-axis, and the lowest fs_0 is situated in the middle of the G1. Whereas the highest and lowest fs_0 of G2 are situated on the x-axis as 60 percent of the whole.

The harmonic mid-range and highest avs levels in G1 run from 1250 to 3700 Hz. In G2, the main avs2 level is 1100 Hz, and the highest avs3 level is 3100 Hz. The lowest avs1 level in G1 is 430 Hz, and in G2 560 Hz. In addition, the harmonic avs shows that the sound spectrum of G1 consists of clear overtones, whereas G2 contains more darkness, because of the melismatic singing in the *jubilus*.

Formula content relations in G1 vary from levels of +2 to -2. The formula content levels of G2 vary from 0 to +/-3. In sum, the relations are quite stable both in and between G1 and G2, varying only slightly.

5.5.4 Micro-Analysis

The macro-analysis of G1 and G2 produced interesting findings, such as the fact that the cheironomy signs and their spectral representations seemed to follow the fs_0 in the sound spectrum. For example, the symbols virga (/), podatus (J), and quilisma (ωJ) we may interpret as correlating with the fundamental frequency movements. Figure 198 displays the sound spectrum of the quilisma sign in G1.

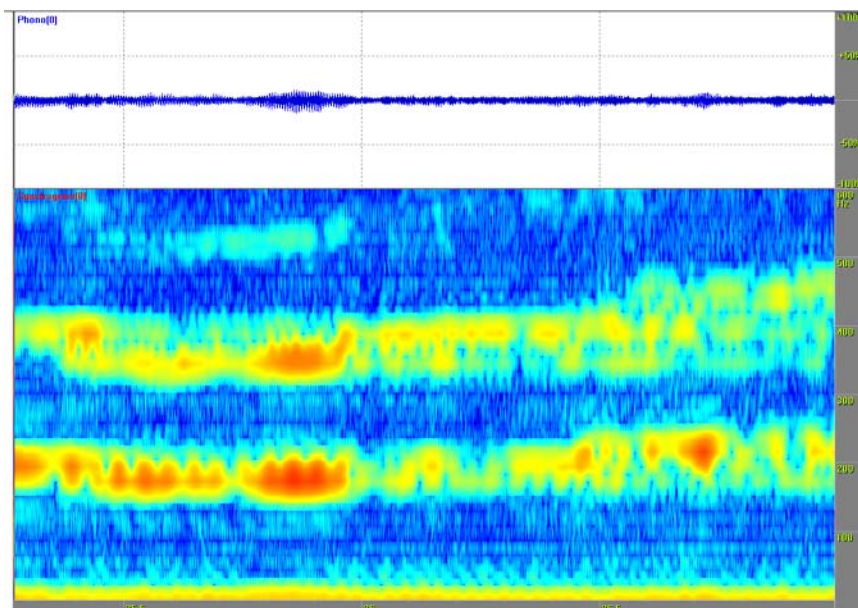


FIGURE 198 Sound spectrum of the syllable (di) i---i of the word “dies”, notated with quilisma, G1 (*Alleluia. Dies sanctificatus*) (0:26:27 – 0:27:00, 600 Hz).

The main vowels in G1 were / a / i / o / and / e /, whereas in G2 the main vowels were / a / e / and / u /. The vowel / a / was the most common in both chants, since it belongs to the *jubilus* with its melismas on the word “*alleluia*”. The other vowels, too, were melismatic and florid. We may interpret all the melismatic or prolonged vowels in G1 and G2 as belonging to the super-conscious formula level (Fa). This latter expresses the meditative mood of the chants, which listeners associated with terms such as “timelessness, eternal, contemplation, meditation, eternity, static” (PGA5).

The relations revealed among and at the onsets of the formulas proved quite interesting. G1 formulas begin with clear and steady (non-vibrato) voices, whereas the formulas of G2 begin with descending onsets (Figs. 199 and 200). 80 % of the formula relations in the G1 alleluia were stable or increasing, whereas the formula relations of G2 consisted of 100 % decreasing onsets (looping phenomena). We can hear and see these phenomena at micro- and macro-structural levels.

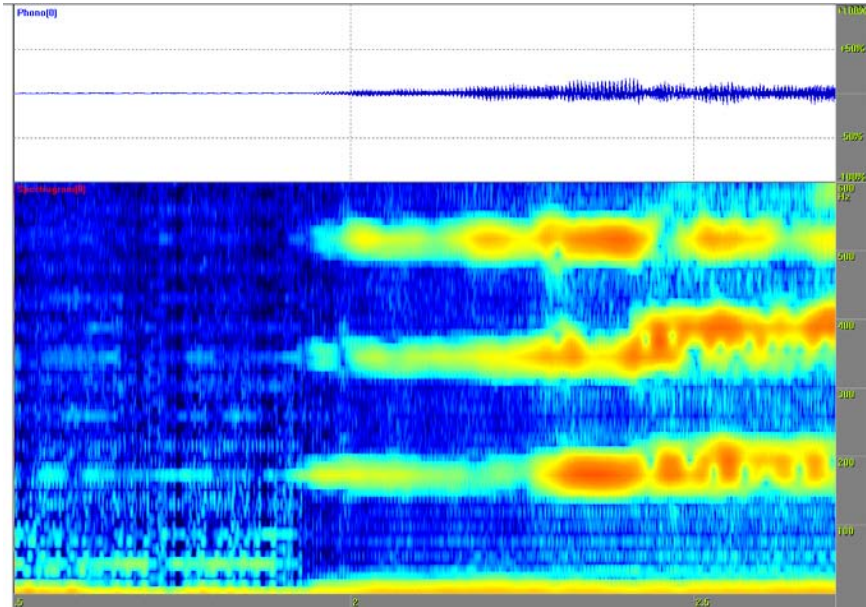


FIGURE 199 Onset of / *Al* / in the sound spectrum of G1 (*Alleluia. Dies sanctificatus*): formula $A^1:a^1$ (0:01.5 -0:02.7, 600 Hz).

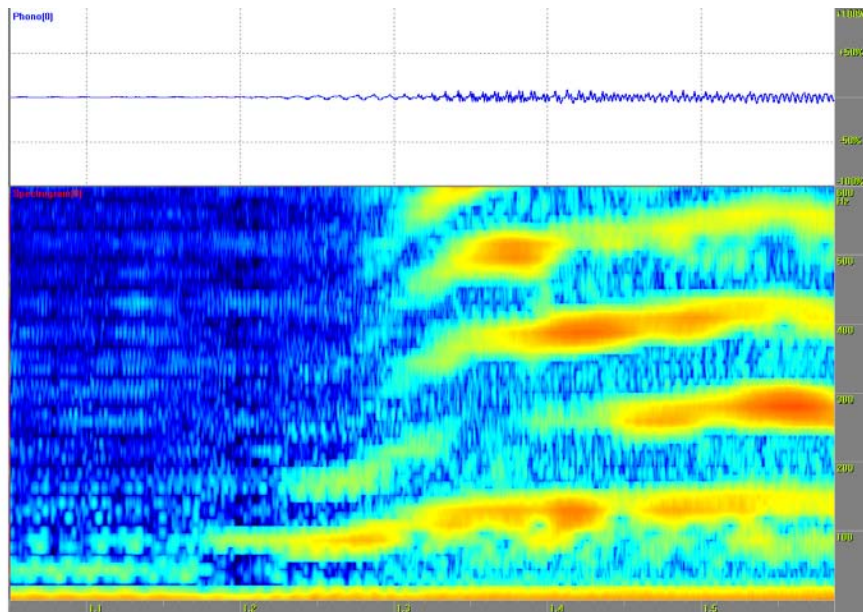


FIGURE 200 Onset of / *Al* / in the sound spectrum of G2 (*Alleluia. l'Esprit souffle*): formula $A^1:a^1$ (0:01.5 - 0:01.6, 600 Hz).

The vocal stylings were also interesting. G1 may not indicate emotions because it operates according to Gregorian “rules” (Grout *et al.* 1996), but it also reflects (or correlates positively with) Clynes’ sentic theory of spectral emotions and of neutral emotive states (Clynes 1989: 28). However, G2 may, and in fact does, express emotions and feelings, because it belongs to the personalized artistic repertoire of Reznikoff’s chants. We may interpret from the sound spectrum that Alleluia G1 is more stable from the emotional perspective than is G2. The latter, which is more active, seems to generate its power from expressive emotional movements in the fs_0 with the loop, in addition to the intensive onsets, tension formulas, and undulations in amplitude.

5.5.5 Perception Gestalt Analysis PGA4 and PGA5

The perception analysis PGA4 and PGA5 consisted of a global perception experiment (collective consciousness) carried out with six postgraduate students and a supervisor in Helsinki University (April 24, 2001). The group listened to Alleluias G1 and G2, and wrote their free associations and Standard Polarity Profile experiences with the aid of “guide nouns” (valence, stimulation, and potency).

G1 was described as “eternal, calm, open, light, intensive, garland, cosmic, timeless”, and it induced descriptors such as “Far East, festivities, devotion, clarity, and chanting in a church”. On the other hand, G2 was “harmonic, balanced, soft, gentle, wet, mystic, static, miraculous”, and it generated impressions of “thought, meditation, eternity, chanting in a cave” (PGA4, PGA5). As a result of the PGA, we may infer that the words or associations of “calm” (G1) and “gentle” (G2) stand for the different characters of G1 and G2.

5.5.6 The Creative Gestalt of Iegor Reznikoff

The aim of the analysis was to reveal composer Iegor Reznikoff’s individual creative Gestalt as it stands in relation to traditions. The following features were found as a result of the analysis.

G2 represents Reznikoff’s individualized, creative form of self expression as a composer. G1, in contrast, represents meditation and contemplation within Latin chant traditions and style. In G2, Reznikoff is chanting his personal faith in the Holy with sacral and symbolic words. Further, he sings these songs in churches and in concert halls. G2 is “artistic”. In addition to the use of poetic words, his ultra-quiet vocal sounds and intensive onsets in amplitude created emotional linguistic associations among listeners (PGA4). His expressive gestures and body movements in the performance analysis revealed an animated, upward-headed tension, and he co-opted the performance space as a part of his creative, individual style. Reznikoff’s voice and articulation, and also the formula relations in fs0 with looping phenomena, stamped a “spectral signature” on his compositions. Reznikoff even used the alleluia formulas (in the A forms) in a personal way, as a meditative tool. As a conclusion, and in terms of the present study, Reznikoff generates musical moods or modes through his creation and unique usage of cyclic and looping styles in his compositions.

6 SUMMARY OF THE ANALYSIS

My goal in this sub-chapter is to draw together the results of the GMA analysis into one unity of the musical Gestalt of the composer Iegor Reznikoff. In Chapter Six I will discuss the meaning of the results as a whole, and say more about Gestalt quality apart from the theory and method of the GMA.

6.1 Linguistic Analysis

Every word of a language is a Gestalt quality (von Ehrenfels 1890).

In the four compositions studied here, Reznikoff mainly uses words from the Bible. Gregorian chants are based on scriptural liturgy of the Word, and belong to Christian traditions. Consequently, we may consider Christianity to be the spiritual source of Reznikoff's compositions.

The main language of the compositions is French (originally, Latin), with which Reznikoff mixes Latin. This multilingual practice, we recall, is typical of Reznikoff and is based on the following reason: "I want to chant these songs to the French people" (In2). However, I would interpret this mixing of languages at a somewhat deeper level, based on his cultural roots. His family's ancestry is Russian, but his own culture is French; thus, he has had to live in at least two different linguistic cultures. This is perhaps one reason why he combines several languages in his compositions.

The words and subject matter of the compositions concern the mystery and spirit of the Lord God and His existence in a world invisible to most mortals. Moreover, the sentence "my spirit hath rejoiced in God, my Savior" (*Liturgie fondamentale*) held major symbolic content, according to our linguistic analysis of the compositions. God is the male symbol of Christianity in Reznikoff's chants; on the other hand, the Mother of Mercy, Mary Magdalene, and the Virgin Mary represent the female Christian symbols in his compositions. These Christian symbols create the core of his musical thoughts, while adding both tension and balance to his compositions. I would interpret these symbols to represent the dualism of his creativity, in which the male symbol represents the mystery of God; for example, in the phrase "you hear Its voice". Female symbols, on the other

hand, represent hope and mercy in Reznikoff's compositions; for example, with the phrase "turn your merciful eyes toward us". The meaning of the words of the compositions may consist also of pure emotional content, with expressions such as "to you we cry" or "mourning and weeping", "a sparkling light" (*Salve*) or "walking in darkness" (*Une lumière a resplendi*).

I have divided the linguistic processes of the compositions into two structural categories. The first consists of progressive linguistic processes, by which I mean that the music is structured into forms such as A B (*Salve*) or A B C D E (*Liturgie fondamentale*). The second structural category consists of repetitive or cyclical procedures; for example, with the structure of forms A A B C A B C A (*Alleluia: l'Esprit souffle*), and A B C B D B (*Une lumière a resplendi*). In sum, about 50 percent of the forms of the compositions are progressive, and 50 percent consist of a repetitive progression.

The linguistic formula structure of the compositions is mainly progressive, with repetitive beginnings; for example a^1, a^1, a^2, a^3 or b^1, b^1, b^2, b^3, b^4 . This repetitive structure is found also at the micro-structural level of words, syllables, and vowels. For example, Reznikoff uses melismatic, prolonged vowels at the beginnings of words: "Miseri-: miiiiiseriii-", "l'Esprit: l'Eeesprit", "Salut: Saaaalut".

In conclusion, I have interpreted the repetitive or cyclic linguistic process as a meditative or emotional phenomenon that correlates with the looping phenomenon in the fundamental frequency level. Iegor Reznikoff uses these means to create the spirit or mood of his compositions.

6.2 Voice Analysis

The voice analysis of Reznikoff's four compositions revealed it to be very clearly articulated. We also noted that his main vocal channel was from chest to throat, and that the vibrato of the voice came forth in a relaxed and flowing style in the melismatic formulas. The style of the voice varies within the chants, mainly because he stresses nasalized voices and vowels in the melismatic formulas.

According to this study, Reznikoff creates his compositions with melismatic, neumatic and syllabic chanting, mainly with prolonged vowels / a / e / i / o /, and / u /. The vowel / a / is the most typical vowel and has several melodic variations; the vowel / o / also receives much stress in the compositions. Reznikoff combines the vowels such that the nasal voices and nasal vowels create unexpected formulas (Fe); for example, with the syllables / niu / and / ou /, with overtone singing, and with different vocal melismas on the vowels / e / or / ai /. His style of singing generates strong transitions in the spectral representation, in which the first up to the tenth overtones are shown to be stressed.

To sum up, nasalized voices generate tension and unexpected formulas in the compositions. By contrast, the vowel / a / adds balance to the voice when sung warmly and with gentleness.

6.3 Rhythmic, Melodic, and Harmonic Formula

Gestalt qualities may be divided into apprehension of processes (melody) and apprehension of momentary states (harmony) (von Ehrenfels 1890).

The tempos of the compositions vary between 40 - 90 M.M. The rhythmical formula analysis of structural time-units showed that the compositions in this study are structured such that they consist of 57.5 percent *L* formulas, 36.8 percent short formulas *s*, and 5.7 percent *eL* formulas.

I have interpreted short formulas *s* as those of intense or emotional “bursts.” At the same time, there are also repetitive formulas with linguistic and melodic repetitions. Long formulas *L* are meditative, “wave-like” formulas comprised of prolonged and melismatic vowels. The extra long *eL* formulas are emotionally-charged formulas, by which we may interpret the emotions involved as *prolonged emotions* or moods sustained by melismatic voices (cf. Damasio 2000: 341; and Chap. 3.3.17). Consequently, the compositions are mostly meditative and emotional.

Melodic, or fundamental frequency, movements in the compositions are generated with tension formulas (Fig. 162) in which the *fs0* level ascends to the upper *fs0* level (musical culmination in formulas) and descends back to the basic *fs0* level of the chant. This movement varies evenly in the composition. In addition, the highest *fs0* level of all the compositions was found between 53 percent to 80 percent of the horizontal time axis, whereas the lowest fundamental frequency was found between 50 to 53 percent of the horizontal time axis. Only in the *Liturgie fondamentale* the lowest *fs0* level appears at the beginning of the composition. The highest *fs0* level of the chants varied between 240 Hz (*h*) to 310 Hz (*dis1*), and the lowest *fs0* level varied between about 20 Hz to 37 Hz (*D1*).

The average *fs0* level of the voice varies between 150, 160, 170, and 180 Hz. These *fs0* levels correlate the modes of the compositions, so that *Salve* (*D* mode) has an average *fs0* level of 150 Hz, and *Liturgie fondamentale* (*F* mode) of an average *fs0* level of 160 Hz. *Alleluia: l'Esprit souffle* and *Une lumière a resplendi* (*G* mode) consist of an average *fs0* level of 170 and 180 Hz.

The harmonic *avs* analysis (Fig. 33), revealed that the main *avs2* level varied between 1100 - 1300 Hz, the highest *avs3* level between 2850 - 3100 Hz (above 5 kHz in overtones), and the lowest *avs1* level between 456 to 795 Hz. In general, the higher *avs* level consist of more melismatic formulas than do the lower *avs* levels, and the amplitude is stronger in the higher *avs* levels. In addition, we can notice dark colour or noise in the sound spectrum when the *avs* level is high and the amplitude plus intensity are strong. On the contrary, when the voice is more stable, clear and prolonged, then the sound spectrum pictures clear overtones.

We may summarize, from the harmonic *avs* movements of the compositions, that the *avs* level is low at the beginning of the forms, and ascends in the latter part of the forms to a higher or the highest *avs* level of the composition.

6.4 Formula Relations

There are also non-intuitive founded-contents, as for example relations (von Ehrenfels 1890).

Formula *relations* between forms and formulas in the sound spectrum occur such that the relations in the *fs0* level between *forms* consist of 75 to 100 percent descending and looping relations in all of the compositions; and 20 - 25 ascending

or stable relations. Relations between *formulas* in the fs0 level consist in decreasing or looping relations in three compositions, and variations in one composition. The looping phenomenon occurred so that the fundamental frequency descended or looped to an fs0 level of around 83 Hz (E). Relations consist also of silence, or breathing pauses, and only in the *Liturgie fondamentale* do we find rather longer silences between relations; but these were analysed as low voices or echoes in the sound spectrum. In addition, amplitude relations in the compositions increase drastically, from 1 to 55 percent.

Formula *content relations* in the pieces vary between the levels 0 to +5, whereas the main movements are 25.7 percent stable, and 30.3 percent stable between +/- 3 levels, 9.1 percent between +/- 2, and 26.3 percent between +/- 1. One formula content relation (0.6 percent) consisted of level +5 in the analysis, and 8 percent consisted of +/- 4 relations.

In sum, the relations in all of the compositions are quite vivid. As an exception, the *Grand Magnificat: Liturgie fondamentale* consists of intensive relations between the levels of 0 to +5, and may thus be viewed as the most “expressive” composition.

6.5 Formula Content and Formula Circle

[t]hen a presentation of new category can arise in consciousness, a unitary presentation [that] belongs to a new category for which the name ‘founded content’ came into use [...] (von Ehrenfels 1890).

According to the *formula content* analysis in the GMA, all four of Reznikoff’s compositions consist of the following formula-content ratio: the main formula is the unexpected formula Fe (29.3 percent); 23.8 percent are neumatic formulas Fb; 17.7 percent are melismatic formulas Fa; 14.9 percent are mixed formulas Fd; 13.8 percent are syllabic formulas Fc; and 0.55 percent are unconscious formulas Ff (Fig. 201).

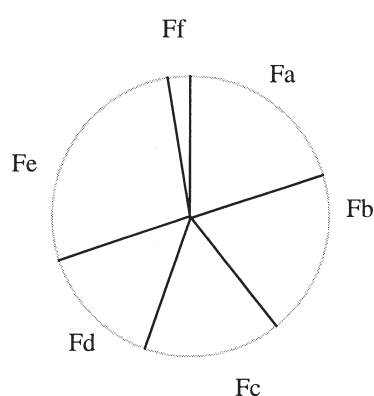


FIGURE 201 The formula content-ratio of all formula units in the compositions, in which Fa is a melismatic formula, Fb is a neumatic formula, Fc is a syllable formula, Fd is a mixed formula, Fe is an unexpected formula, and Ff is a hypothesized unconscious formula (see Ch. 3.3.7).

Consequently, we may hypothesize that, in terms of levels of consciousness, 52.5 percent of the works are conscious music with Fb, Fc, and Fd formulas. They are 17.7 percent superconscious compositions with Fa formulas, and 29.9 percent

unconscious compositions with Fe and Ff formulas. In addition, according to the analysis of the formula content relations, the more the formula content level varied in terms of wider relations, the more multiply conscious levels appear in the compositions.

6.6 Formula and Phoneme Store

By *formula store* I mean such linguistic formulas that are repeated similarly (F:F) or as clear variations of each other (F:F^v). The focus in this sub-chapter is on identical or similar linguistic formulas. In the following (6.7) I scrutinize variation formulas. By *phoneme store* I mean the occurrences of voices, phonemes, vowels, and consonants of the compositions.

Linguistic formula store analysis reveals that three of Reznikoff's compositions consist in a single repeating linguistic formula, namely, the "alleluia" formula. It is used with the *refrain* (allelu(ia)) and *jubilus* (ia) in *Alleluia: l'Esprit souffle*, in *Salve*, and in *Liturgie fondamentale*. Alleluia formulas were found also in the comparison analysis with *Alleluia: Dies sanctificatus of St Gall*.

Alleluia: l'Esprit souffle consists of 16 units of alleluia formulas; *Salve*, of 4 alleluia formulas; *Liturgie fondamentale*, 12 alleluia formulas; and *Alleluia: Dies sanctificatus* of 2 alleluia formulas. Altogether, these four compositions by Reznikoff contain 32 alleluia formulas.

I have emphasized the *phoneme store* in this study because the compositions consist of several melismatic and prolonged vowels (between 2 to 663 seconds), as well as variations in how the phonemes are chanted. I have interpreted these prolonged or melismatic voices or vowels in terms of how they create affect, mood, or prolonged emotions in the compositions.

In all, the compositions in this study consist of 77 percent vocals / a, e, i, o, u /.¹ Focusing on individual compositions, we notice that *Alleluia: l'Esprit souffle* consists of 49 percent of vowel / a / and 9 percent of vowel / u /, whereas 14.1 percent of *Salve* consists of the vowels / a, e, i, o /. *Une lumière a resplendi* is a recitative composition that contains no prolonged or melismatic voices. *Liturgie fondamentale*, in contrast, consists of 91.8 percent vowels, / a, e, i, o, u /. The compositions also feature different styles of singing the vowels, for example, a different rhythm or emphasis of the vowels (e-e-e) or melodic structure (a-a-a, a a-a-a). These phenomena I have analysed and interpreted as the variation F^v formulas or genetic formulas.

As a result, the GMA analysis of the compositions is mainly a vocal and linguistic analysis of words and their syllabic, neumatic, or melismatic singing style.

¹ In the chant one can also notice the vowel / y / and / ae /, but the vowels are analysed in the way they are pronounced.

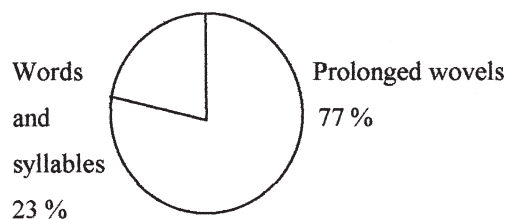


FIGURE 202 The ratio of words, syllables, and prolonged vowels in the four compositions by Reznikoff.

6.7 The Variation Formula

The variation-formula analysis consisted of formula content analysis, harmonic formula analysis, melodic formula analysis (fs0 analysis), as well as voice analysis. Here I focus mainly on the formula content variations and voice.

In the formula content variation analysis I have examined formulas that appear in at least two compositions in this study, in relation to 32 alleluia formulas and their variations in three compositions. These alleluia formulas we can divide into 19 units of *refrain* formulas and 13 units of *jubilus* formulas. *Refrain* formulas of the compositions lasted from 2.3 seconds to 10.3 seconds; consequently, the variation ratio was 7 seconds, or 304.3 percent. In addition, *jubilus* formulas lasted from 2.9 seconds to 125 seconds, with a variation ratio of 122.1 seconds, or 4210 percent.

Alleluia formulas generate formula patterns having from two to five alleluia formulas (e.g., a^1, a^1, a^2, a^3). For example, the formula pattern consists of two to three *refrain* formulas, and one to three *jubilus* formulas, in the following combinations: three patterns of 2 refrains and 2 jubilus; two patterns of 2 refrains and 1 jubilus; one pattern of 2 refrains and 3 jubilus; one pattern of 3 refrains and 1 jubilus, as well as one pattern of 3 refrains and 2 jubilus. The main alleluia formula pattern consists, for example, of the following structure of formulas: Alleluia. Alleluia, a – a, a-a.

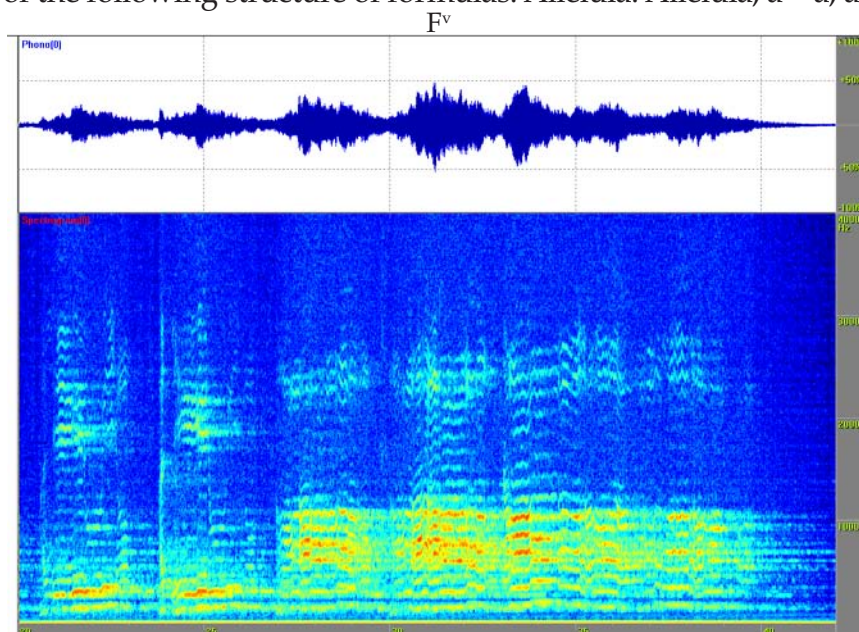


FIGURE 203 Alleluia formula pattern ($a^1, a^1, a^2, a^2(F^v), a^3$) with variation formula in *Alleluia: l'Esprit soufflé* (0:20 - 0:42, 4000 Hz).

Variations of the voice in the alleluia formulas occurred in syllabic, neumatic and melismatic singing styles. As a result, the *refrain* is comprised of syllabic or neumatic formula content, whereas the *jubilus* consists mostly of melismatic formula content (Fa). In addition, mixed formula content Fd was also noticed.

To be more specific: the refrains in *Alleluia: l'Esprit souffle* are 100 percent syllabic with Fc formulas, and in the *Salve* they are neumatic and mixed formulas (Fb, Fd). The refrains in *Liturgie fondamentale* consists of 100 percent mixed Fd formulas, with some melismatic endings Fd(a). On the contrary, the contents of the *jubilus* in the compositions are mainly melismatic (78.5 percent) Fa formulas, but with mixed formulas Fd also in evidence (21.5 percent).

To sum up, variation in this study was focused on the 32 alleluia formulas with *refrain* and *jubilus*, along with their duration on the time axis, and occurrences of alleluia formula patterns. Linguistic variation formulas were also found within individual pieces; for example, the words “Une lumière” in *Une lumière a resplendi*, the phrase “l'Esprit souffle” in *Alleluia: l'Esprit souffle*, as well as “alleluia” phrases in the performance analysis of *Tuuli puhaltaa*.

6.8 Emotional Formula

According to GMA, an emotional formula may consist of a short and yet meaningful moment; on the other hand, it can last several seconds or minutes. The emotional formula analysis is hypothesized in the study to consist of three parameters and their meaning. The first was *mode* and its appearance in the music. The second was the *emotional formula* content in the fundamental frequency level and in the spectral representation (in other words, neutral, intense, or sad emotional formula content). The third was the *unexpected formulas* Fe, and more specifically, the characteristics of those formulas. I added a fourth parameter to this category, the global listening or Perception Gestalt Analysis (PGA), which indicates mean the experiences of the listeners. In interpreting these parameters I have adapted, for example, Antonio Camurri's grid of emotions, Sundberg's theory of emotion in voice and spectral representation, and Damasio's emotional parameters. In addition, we may find several studies and parameters in the literature concerning emotions and music, as well as emotions and art, aesthetics, or philosophy. Therefore, the focus is very interesting but ambiguous (see, e.g., Arnheim 1961, Meyer 1956, Juslin & Sloboda 2002).

The mode of the compositions in this study were G in *Alleluia: l'Esprit souffle* and *Une lumière a resplendi*; D in *Salve*; and F in *Liturgie fondamentale*. Reznikoff understands the G mode as meaning gentleness and warmth, and it is the most common one in his chants. The D mode means empathy and consolation, and the F mode is one of praise. According to PGA1, *Alleluia: l'Esprit souffle* created, for example, such emotional experiences as “harmony, peace, mood elevation, delight, devotion, beauty, holy, peaceful, positive, balanced, strong, mystic, meditation”. Hence we can conclude that our experiments correlated positively with the notion of the G mode as having the meaning of *gentle* and *warm*.

The emotional experiences of the PGA2, *Une lumière a resplendi*, were those of “calm, good, green, pleased, relaxing, sad, positive, brightness, gentleness”. These descriptors, too, correlate positively with the G mode as *gentle* and *warm*.

The emotional experiences of the *Salve* in PGA2 included “friendly, unreal, warm, in balance, good feeling, positive, fair, relaxed, God is smiling, goodness”.

Comparing these experiences to the D mode as having the meaning of *sensitive* and *consoling*, we may conclude that the correlation was positive.

The emotional descriptors used by listeners to the F-mode composition *Liturgie fondamentale* were, for example, “gentle, peaceful, strong, relaxing, boring, yawning, and even unconscious” (PGA4). Correlations to the mode of *praise* had some correlations with the reaction of “peaceful”.

We may interpret, according to emotional formula content analysis with the fs0, that the *forms* consisted of 75 to 100 percent descending fs0 relations, whereas 25 to 0 percent were stable or increasing relations. The relations between formulas on the fs0 level occurred so that the *formulas* consisted mainly of decreasing relations. Thus, we may interpret that they were emotionally sad compositions, because of the descending fs0 movements. By contrast, the amplitude relations in the compositions increased from +1 to +55 percent, so that the formula onsets were highly intense; further, the tension inside the formulas created energy in the compositions.

In this study, we may also interpret the unexpected formulas Fe to represent emotional formulas because of their intensive emotional tension or “outbursts” inside the formulas. In the compositions, we counted 53 units of Fe formulas or formula paradigms (29.3 percent) in *Une lumière a resplendi* and in *Liturgie fondamentale*.

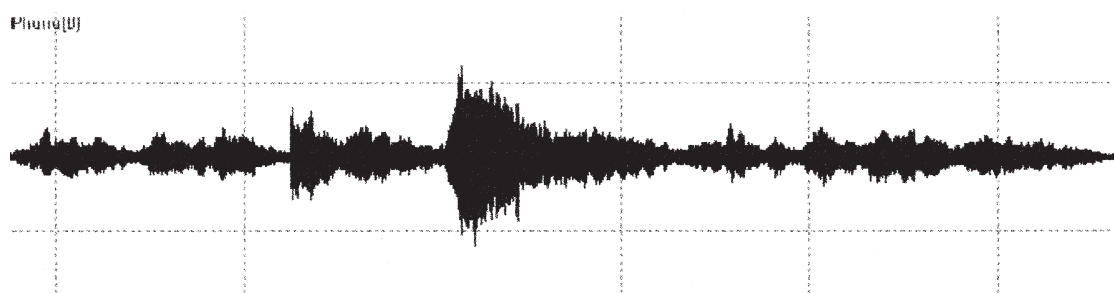


FIGURE 204 Amplitude representation of the unexpected formula Fe, occurring in the middle of *Une lumière a resplendi* (1:40 - 2:15).

Une lumière a resplendi consists of nine units of Fe formulas with tension and release in the voice, so that the pronunciations seem to create a kind of stutter. We may demonstrate the emotional context of the Fe formulas, for example, with the vowel / e /. Fe formulas may consist of different rhythmic or melodic movements with vowels e-e-e in the words “et de-e-e-us” and “nous est ne-e-e-e” (A¹:a₁²; B²:b₂⁴; B³:b₂⁴). They consist also of an intensive amplitude ascent of 41 percent (B³:b³), and 36 percent (B¹:b³), as well as rhythmic movement in the formula “on le nomme...” (D:d³). Reznikoff states (In2): “It is created for my own child ... when he fell from his bicycle and was in a coma for one week”.

Liturgie Fondamentale is made up of 44 Fe formulas with overtone (birds’) voices, which I have interpreted as emotional or sad expressions having stable, low and nasalized vocalizations / iu / or / ai /. Form A consists of 30 overtones, forms B and E of 2 overtones each, and form D of 10 units of overtones. On the whole, the composition displays emotional or unexpected formulas (Fe) in the form of A, B, D and E, in which the “birds” were created in a musical way to “overcome the loneliness” or express “repetitiveness, yawning, and boredom” (PGA4). These experiences we may interpret to correlate with the words of the

chant: "My soul doth magnify the Lord ... my spirit hath rejoiced in God, my Savior, Hallelujah."

Regarding emotional formulas, I quote Damasio (2000): "emotions form patterns which are determined processes, and they appear automatically without conscious deliberations, and all emotions use the body as their theater". He specifies that emotions have varied temporal profiles, in which some emotions are "burst" patterns (e.g., short formulas *s*, *Fe* formulas), which go through a fairly rapid onset, peak of intensity, and rapid decay (anger, fear, surprise, disgust). Some emotions have "wavelike" patterns (long formulas *L* and melismatic formulas *Fa*) which generate such feelings as, for example, sadness. Damasio says that when emotional states become fairly frequent or continue for long periods of time, they become moods, and a particular background emotion can be sustained over time to create a mood (ibid.: 341-342).

We may summarize the *Liturgie fondamentale* as consisting of 15 emotional, wavelike patterns (*L*), and 5 units of prolonged emotional states, or moods (*eL*), as well as one short (*s*) and 44 units of outburst patterns or manifestations with birds' voices. By contrast, *Une lumière a resplendi* consists only of 9 units of short emotional formulas *Fe* ("bursts").

6.9 The Genetic Formula

One aim of this study was to determine if GMA analysis could reveal genetic features of the compositions. By "genetic" I mean a microstructural musical unit that exists in every composition and presumably joins in creating the musical Gestalt of the composer. The analytic results show some features or phenomena that we may hypothesize to be genetic musical features of Igor Reznikoff's compositions. One main feature was the *looping phenomenon* to the frequency level of around 83 Hz, with a repetitive or cyclical structure of the forms, formulas or formula paradigms in every composition. Another conceivably genetic feature is the *melismatic tremolo* and its variations on the vowel / a /.

The looping phenomenon at the microstructural level means cyclic movements or relations of the *fs0* level in the sound spectrum. For example, the following microstructural formula relations clarify the phenomenon (Fig. 205) in which the paradigmatic formula relations in the form $C^1:c^2$ "il - vi - ent", with the characters / vi / represent the looping frequency of 83 Hz with *fs0* movements of 144 - 83 - 140 Hz. Moreover, the formula relations between $C^1:c^2-c^3$ "il vient" - "ni" also represent the looping phenomenon of 83 Hz with *fs0* movements of 134 - 83 - 155 Hz. These phenomena are illustrated in Figure 206.

Finally, we come to the microstructural focus in Figure 207, in which the amplitude of the looping phenomenon 83 Hz is illustrated with a "genetic wave", by which I mean genetic features in the spectral representation with air pressure of +6 to -7 percent (undulations in amplitude).

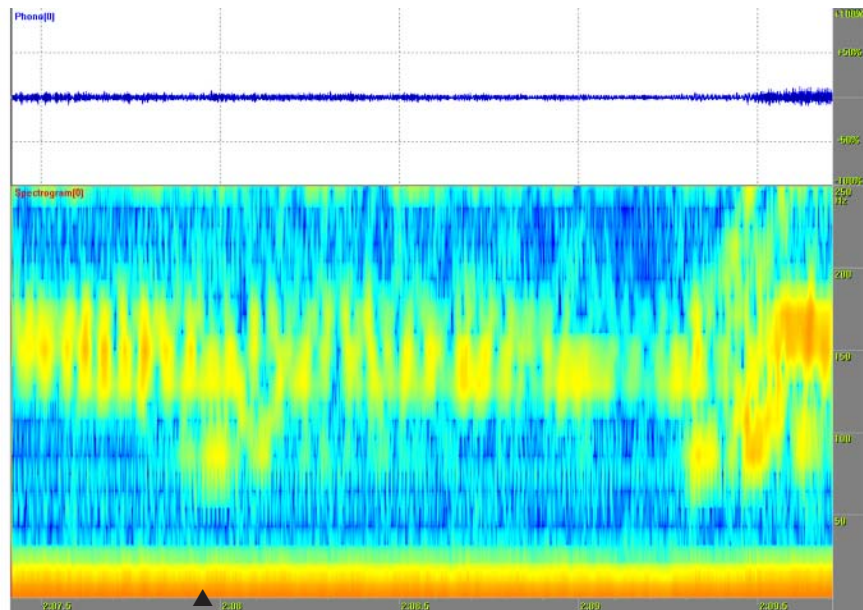


FIGURE 205 Formula and formula paradigmatic relations in *Alleluia: l'Esprit souffle* "il vient, ni..." (2:07.42 - 2:09.7, 250 Hz).

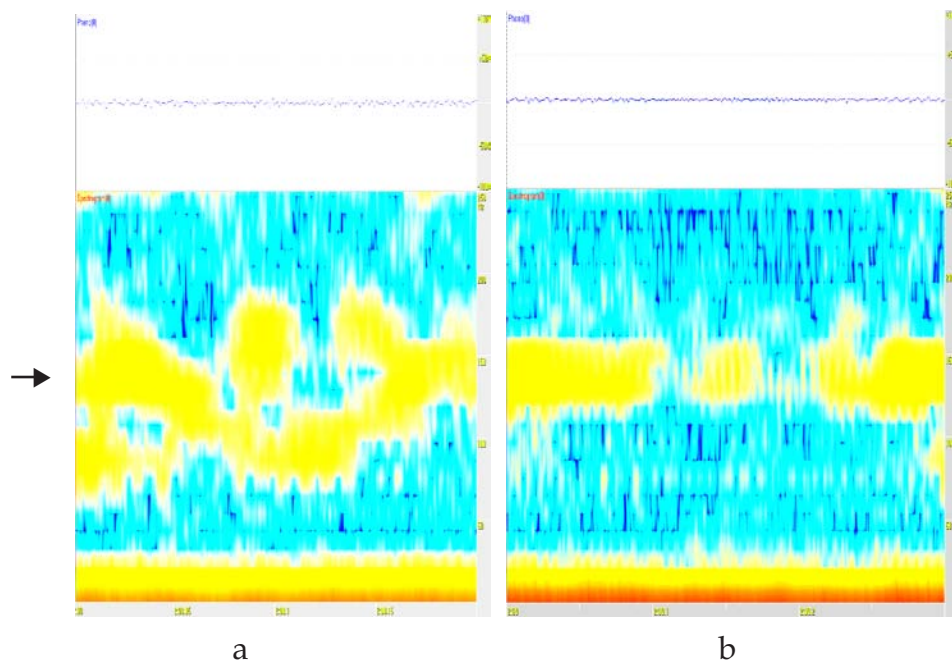


FIGURE 206 Looping or genetic frequency level of 83 Hz in *Alleluia: l'Esprit souffle*: (a) formula paradigm C1:c2 (2:08 - 2:08.2, 250 Hz); (b) formula relation C1:c2-c3 (2:09.0 - 2:09.3, 250 Hz) .

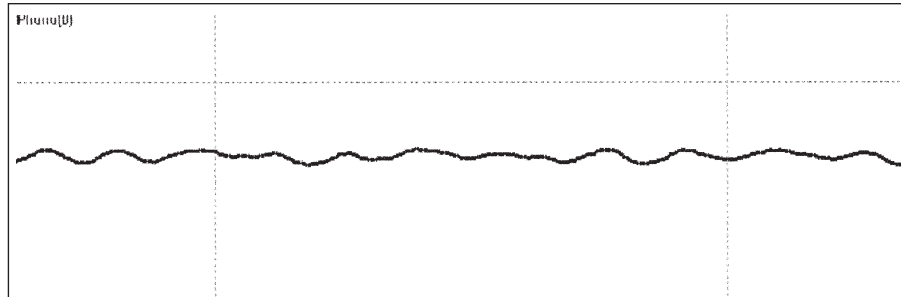


FIGURE 207 Looping or genetic waves in amplitude / vi / (2:07.98 - 2:08.02).

A *melismatic tremolo*, for example “a-a-a, e-e-e, u-u-u”, is a phenomenon that is repeated consistently in Reznikoff’s compositions. Thus, I have hypothesized this phenomenon as a *genetic formula* paradigm that consists of three vowels a-a-a, or four vowels a a-a-a. This phenomenon we can symbolize with a neume or sign *torculus* \mathcal{S} (Mocquereau 1989: 144-176) or *torculus resupinus* \mathcal{S} . The compositions in this study consisted of several variations and repetitions of these tremolos, besides several looping phenomena at the macro- and micro-analytical levels.

In Figure 208 we can see both of these genetic musical features, the looping phenomenon in the horizontal time axis, and the tremolo a-a-a in the vertical frequency axis (around 83 Hz). I would compare these musical phenomena with Dennett’s time representation in his Multiple Drafts model (Fig. 6), in which the experienced time seems to be similar to the looping phenomenon or tremolo in the sound spectrum.

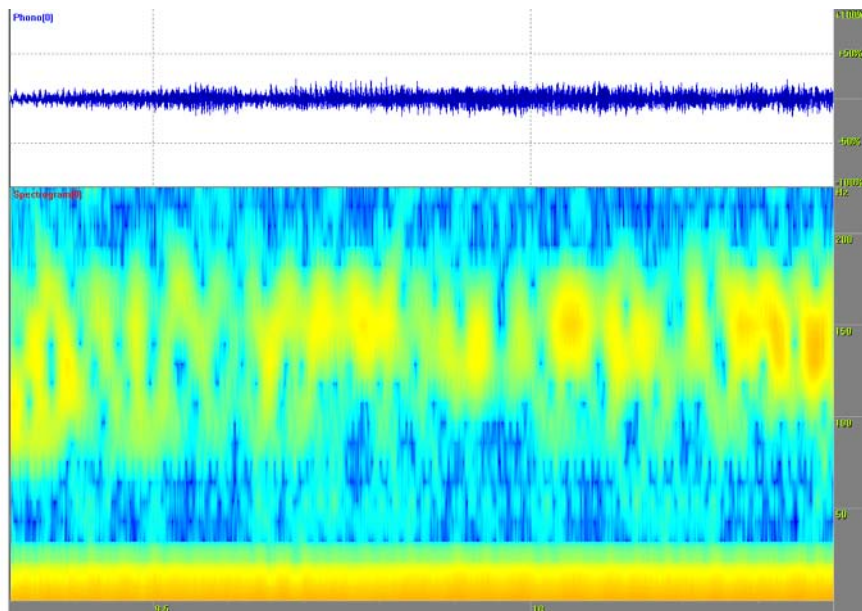


FIGURE 208 Genetic formula paradigm / a-a-a / in *Alleluia: l’Esprit souffle* (0:09.31 - 0:10.4, 225 Hz).

In the end, we may find the genetic musical unit (or paradigm or code) at the fs0 level of 83 Hz to reflect the personal mood and genetic roots of Reznikoff’s Russian ancestry combined with his French acculturation. Consequently, we may condense the genetic features of Iegor Reznikoff to the genetic and emotional note E, or

tremolo of the vowel / a /, in addition to the looping phenomenon at 83 Hz in the fundamental frequency level of the voice. This frequency level may also be the transformation point in which the (creative) musical mind or musical consciousness of Reznikoff was born.



FIGURE 209 Hypothesis of Igor Reznikoff's genetic formula paradigm at the fs0 level of 83 Hz (E).

7 DISCUSSION

Is the musical Gestalt basically sporadic or basically systematic?

This study has explored the musical functions of the GMA, for example, to generate theoretical and methodological frames for analysing musical Gestalten, and to investigate how the musical Gestalt might represent a composer's inner creative process. In addition, the aim was also to discuss the existence of the Gestalt quality as the "third dimension" of the music.

The GMA theory and method proved to be functional for the analysis of the musical Gestalt of Igor Reznikoff's compositions and creative process. The macro-structural views of composing, and particularly our focus on micro-structural musical details, appear to be the most fruitful outcomes of the analysis. Setting these analytic results into the theoretic frames for interpretation also proved useful, since those frames may be used for future and perhaps other kinds of musical research. The methodology followed here is quite rare when compared to traditional music analysis; this also presents a drawback, in that there is a shortage of similar methodologies with which we may compare our own. Still, and at the very least, this study sheds light on the author's previous research in Gestalt music analysis (2001a, 2001b) and points toward future work, such as further contemplation of the genetic formula (F^g), the creative formulas (F_e , F_f), the unconscious formula (F_f), and emotional formula (F^E), and correlations between phenomenal mind and computational mind.

One of the most interesting parts of the analysis was the comparison of "invisible" music (audible) with the "visible" music shown as sound spectra, and using this comparison to help interpret phenomenal experiences of the music. The focus was on setting out ways of discussing and interpreting the phenomenal and computational mind. The aim was to shed light on how certain acoustical formulas are associated with the experiences and effects of music. The global (phenomenological) analysis of listening resulted in linguistic fragments. In contrast, listening to the music "subjectively", in one's own time and space, produced complete sentences to account for the listening experience *ex post facto*. Therefore, the experiences described by linguistic fragments should perhaps be the main focus in future developments of the method and theory, in the hope of gaining more precise information about the acoustical and sub-symbolic aspects

of the music. This would require more laboratory experimentation and physical analysis with measuring instruments. The present study itself leaned toward the empirical, using analysis to correlate the music with phenomenal experiences of it; for this reason we derived specific musical formulas for describing the macro- and, especially, micro-analytic levels. We tried to avoid contradictions in the present analyses by using proper methodological (philosophical, phenomenological) and theoretical requirements, especially those calling for ongoing self-critique.

The (musical) consciousness remains a mystery. The phenomenological view of (musical) mind gives us one way of hypothesizing the links between those who listen to music and those who create it. The computational view of (musical) mind, as formula-content and formula-circle, provide insight into how music is created. As a result, the invisible became visible in many ways, on the acoustical, subsymbolic, and symbolic levels. The results of the present study may offer a small but reasoned view of the field of Gestalt music analysis. To the question, "Is the musical Gestalt basically sporadic or basically systematic?" I respond with the following findings, which also shed light on the claims and research questions posed by this study.

7.1 The Creative Gestalt and Gestalt Process

Reznikoff says, "The composition process consists in organizing musical thoughts into various orders. The themes can be in an illogical order while being composed - but in the end, they are all in the right musical structure" (In2). The musical theme, symbolized as x (Fig. 2), can originate from an inner (x^i) or outer (x^o) impulse, around which the whole composition is generated. In this study, we use the word "tension" as a synonym for the word "impulse". It is an important factor in creativity, and it can manifest several ways in the creative process (Russ 1999: 664).¹

The author, and indirectly the listeners, have sought the x in the music both aurally and analytically. The GMA served as a functional method for finding and analysing the Gestalt with x . The most challenging problem was posed by the contrast between creation and analysis. That is to say, the composer created his music around the x , whereas the author had to analyse the x from a completed musical unity.

The formula circle represented the composer's creation process as a whole, and it was also a model of musical mind, with segments of forms and with content formulas Fa to Ff, representing elements of musical thought, stream of consciousness, or creative flow. More precisely, the formula circle represented the process and the unity of musical Gestalt, in which the relations among forms, formulas, and formula paradigms generate the inner process of creation. Finally, the musical Gestalt - x - was found from the formula circle and from the musical forms and formulas in the macro- and micro-structural level, in its variable appearances (E, 83 Hz, tremolo with the vowel / a /, and loop).

The most important data in the analysis of the creative Gestalt are the formula

¹ For example, consider motivation in creative problem-solving, or internal conflict. Affective pleasure could also be part of the creative process, as well as a mix of negative (tense) and positive affects (Russ 1999: 664).

contents and their relations in the formula circle. The formula content analysis disclosed the agents of musical creativity, and the present study showed that the agents were the unexpected formulas Fe, with sudden voices or musical details, while the unconscious formula Ff represented the origin of creativity. The mixed formulas Fd were also meaningful, because of their related movements in the formula circle. A summary of the formula content analysis shows that all compositions consisted of 29.9 percent Fe and Ff formulas, and 14.9 percent Fd formulas. Consequently, we can hypothesize that the compositions by Reznikoff that we have studied here are 29.9 percent creative on the whole. How creative is Reznikoff himself? That question will be the focus of future analysis and theorizing, because we do not yet have comparative data or results by which to interpret the creative ratio.

The relations on the macro- and micro-structural levels were meaningful concerning the interpretation of the creative process or creative act. The results showed that, on the macro-structural level, when the unexpected formulas Fe or mixed formulas Fd existed, or when the formula content movement was towards the core of the circle or Ff formula, then the relations moved toward the melismatic Fa formulas in the outer circle. From these results, we may conclude that the formula Fa represented the musical Gestalt of the compositions, and the agent of the Gestalt was the *jubilus* formula, with the melismatic vowel / a /. In addition, the formulas Fe and Ff represented the pre Gestalt (in this study, the tension Gestalt or tension formula) with the creative impulse x. In addition, we may interpret the latter part of the *jubilus* as representing the trace Gestalt (Fig. 210).

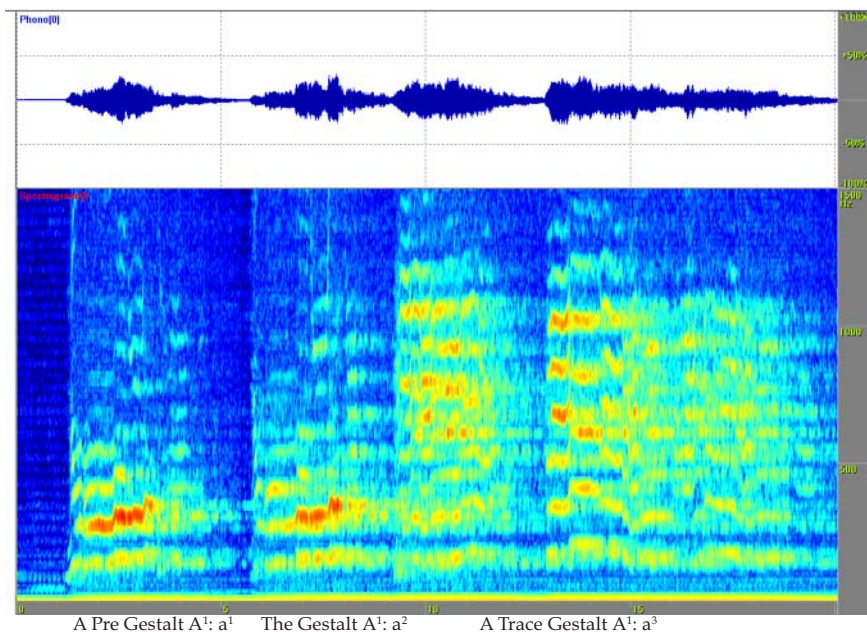


FIGURE 210 The Gestalt process of Igor Reznikoff's compositions in the alleluia formulas (A: a¹, a², a³): Pre Gestalt, the Gestalt, a trace Gestalt (in *Alleluia. l'Esprit souffle*, 0:00 - 0:20, 1500 Hz).

On the microstructural level, the main meaningful relations are descending or looping relations in the main fundamental frequency level (fs0) to 83 Hz. Consequently we may interpret it as representing the creative source of Reznikoff's creation process. In short, the note E or 83 Hz represented the inner creativity of Reznikoff, or the creative impulse x (Fig 211), with which he generated his

compositions. The looping phenomenon was interpreted also as a genetic feature or genetic formula paradigm, in addition to being a representation of an emotional formula. In this study, the looping phenomenon consisted in the vowel / a / with tremolos of three to four repetitions (genetic musical code). I emphasize the meaning of the looping phenomenon in the context of the meaningful moments of the compositions in the following sub-chapter (7.2).

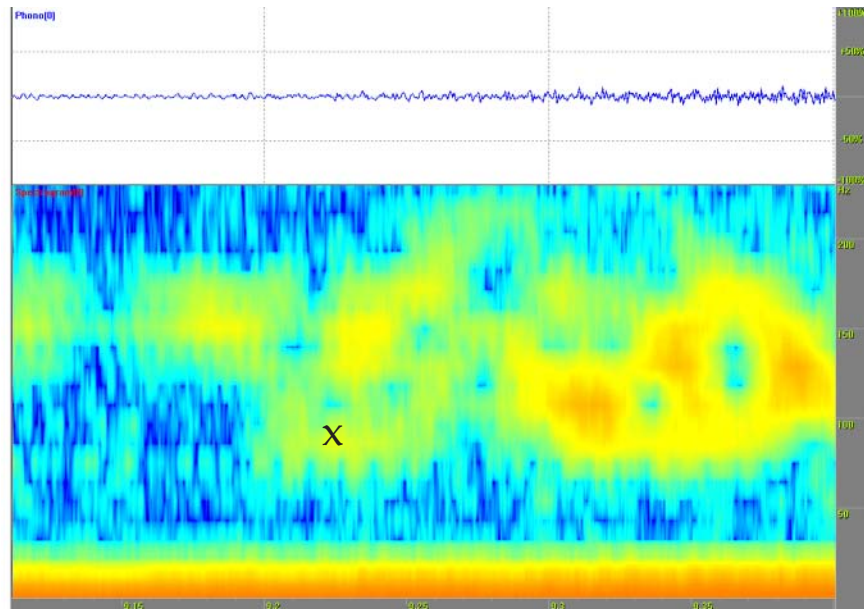


FIGURE 211 The microstructural x of Igor Reznikoff's composition / a-a-a / in the spectra of *Alleluia: l'Esprit souffle* (0:09.11 - 0:09.40, 230 Hz).

The creation process in the performance analysis gave support to the interpretation of the Creation Gestalt Analysis, such that the tension of the performance formulas, along with the unity of the composition, was created by ascending intensity in the movements of hands, eyes, and head, as well as the movements of the fundamental frequency of the voice and of the neumes or signs.

It was concluded that the *jubilus* was the manifestation of the inner creative Gestalt of Igor Reznikoff, and that it may represent Reznikoff's individual, aural, or visual perception of God or the Holy in this analysis. In Gregorian tradition, the *jubilus* is a praying to God in the liturgical context of the High Mass. On the other hand, Chambers (1972) views the significance of the *jubilus* or *jubilato* as its being "part of the mystical phenomena relating to the prayer of quietude". Furthermore, because "he [the person praying] has continually given himself to constant devotion to God, when Christ wills it, he shall receive - not of his own need but of Christ's goodness - a Holy sound sent from Heaven, and thought and meditation shall be changed into song, and the mind shall bide in marvelous melody..." (Chambers 1972: 28-29).

7.2 The Gestalt Quality - The third dimension

7.2.1 The Meaningful Moment in Individual Consciousness

An important moment in the analysis came when the author was struck by the following question while listening: “What does this particular musical phenomenon mean?” The whole musical content suddenly changed, in the middle of two forms or sections, with the vowels / u / and / a / in the *Grand Magnificat: Liturgie fondamentale* (at 11’03”). For the analysis, this phenomenon grew into a meaningful musical moment having an important relation to the whole. Says von Ehrenfels (1890):

[...] the structural Gestalt of the music comes forth, for example, via a relation between two elements that is not just the sum of [the two]; in addition, it forms the third dimension in the listener’s conscious mind.

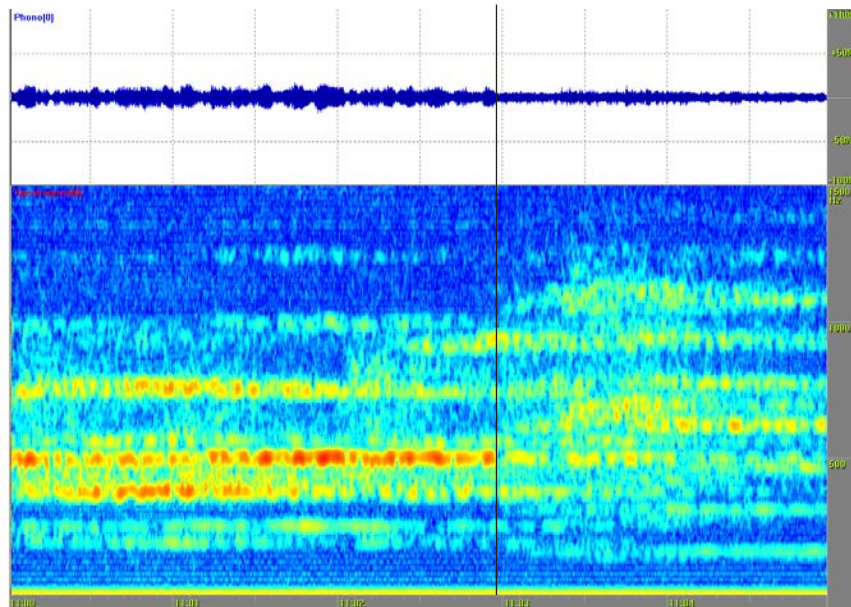


FIGURE 212 A meaningful moment in the transition from form A to B, or from the vowel / u / to / a / , in *Liturgie fondamentale* (0:11.00 – 0:11.05, 1500 Hz).

This meaningful moment was *the Gestalt* of the compositions, and consequently the key to all the compositions was found. The content of that meaningful moment in *Liturgie fondamentale* was the transition from form A to B. It was where the Ff formula, which consists of tension in the voice and several overtones generated by the vowel / u / , shifted to the formula Fa with the melismatic vowel / a / . This shift in formula contents consisted of +5 levels (having the meaning of “catastrophic”). No significant changes took place in the amplitude, and the sound spectra remained similar. *Aurally*, however, the perception of the transition had a huge impact. The sad mood of the composition halts abruptly, when the voice changes from stable and high to warm and gentle on the melismatic vowels a-a-a. The relations in the fs0 level of the voice descend from 245 Hz (h) to 183 Hz (fis). That moment may be associated with the following verbal scene: “a lonely person, waiting for someone, was in the meantime creating bright overtones with a low and stable voice, trying to amuse himself, when suddenly something created a

sense of togetherness, and music was born" (PGA4). According to Reznikoff (In2), the whole composition praises "the Holy mother, St. Maria, the whole world and universe"; at the same time, it is also "a joyful praise to God".

7.2.2 The Meaningful Moment in Collective Consciousness

Collective conscious experiences of the music were expressed by the listeners as words or other linguistic fragments. The free-association method represented mainly a stream of consciousness, in contrast to the polarity profile method, with its grid of nouns representing functional experiences of the music. Free associations thus consisted of more individual, spontaneous, or intuitive interpretations of the music than did the polarity profile. In this study, the nouns represented the consciousness and "the Self". Therefore, the focus was on these experiences with nouns in the Perception Gestalt Analysis (PGA) and in Creation Gestalt Analysis (CGA).

The results of the PGA indicate that the Gestalt quality of Iegor Reznikoff's compositions is an "inside" experience in consciousness (mind or body), as well as an "outside" experience prompted by written words or by some other "x-sign" on the grid. It may be concluded briefly that listeners had experiences of the human being, of Gestalt, or God. The experiences were perceived as either inside the person or outside of the world - a place where we can find the space and peace to meditate and be with sounds, voices, nature, and the Word.

Contrarily, the CGA suggests that Reznikoff has created compositions of the invisible world (inside) and of the real world (outside), mainly with Christian male or female Gestalts or symbols. His main themes appeared to reflect the aesthetics of the music; in other words, beauty, holiness, and feelings describable in Christian terms, melody, moments, and praise to the world.

From the findings of the GMA we may conclude that Iegor Reznikoff's vocal technique generates voices that bring a wide range of experiences and associations to the listeners and to the composer. I would finally emphasize one voice phenomenon in this study. It consisted of the sounds of beautiful and bright overtones, or birds' voices, or a whistle, causing the hearer to try find the source of such sounds, which generated questioning in the perceivers' minds: "What was that?" "Was it music, or were they just birds in a park?" (PGA4). We return to von Ehrenfels (1890):

By a Gestalt quality we understand a positive content of presentation bound up in consciousness with the presence of complexes of mutually separable (i.e. independently presentable) elements. That complex of presentations which is necessary for the existence of a given Gestalt quality we call the foundation [Grundlage] of that quality.

(Smith 1988: 93, quoting von Ehrenfels 1890)

In closing, I would describe the whole study of GMA with this philosophical conclusion:

Life and reality are on the earth, in the mundane, in the body (downwards); Reznikoff's compositions and chanting aim toward the spirit, to the holy or to God, toward the mind (upwards). The entire body, the bodily gestures, as well as the whole musical unity illustrate the philosophical or aesthetic Gestalt phenomenon of musical dualism, as well as the dualism that is the life of the human being.

YHTEENVETO

HAHMOPERUSTAINEN MUSIIKKIANALYYSI

Hahmofilosofinen teoria, metodi ja musiikkianalyysi Iégor Reznikoffin sävellyksistä

Väitöskirjan tavoitteena on kehittää hahmofilosofinen musiikkianalyysiteoria ja -metodi GMA, jota sovelletaan ranskalaisen Iégor Reznikoffin laulusävellyksiin. Tutkimuksen tavoitteena on myös löytää vastauksia väitteelle, jonka mukaan sävellyksistä on analysoitavissa ja tulkittavissa säveltäjän luova musiikillinen hahmoprosessi eli säveltäjän sisäinen musiikillinen hahmo. Tämä hahmoprosessi on analysoitavissa ja tulkittavissa GMA:n avulla vertailemalla sävellysten symbolista, akustista ja alisymbolista representaatiota. Tutkimuksen tavoitteena on myös analysoida ja tulkita sävellyksistä filosofi von Ehrenfelsin hahmoteoreettista käsitettä "Über Gestaltqualität" eli musiikin hahmon laatua kuulijoiden tietoisuudessa.

Tutkimus kuuluu kognitiivisen musiikkitieteen, musiikin estetiikan ja filosofian tieteenaloihin. Kognitiivisen musiikkitieteen alueelta tutkimuksessa käsitellään hahmofilosofisia suuntauksia musiikintutkimuksessa, kuvaillaan musiikin symbolista, akustista ja alisymbolista representaatiota, kehitetään musiikkianalyysissä käytettyä formulateoriaa ja kuvaillaan laulun keskeisiä äänianalyysiteorioita sekä musiikkiesityksen esitysanalyysia. Filosofiselta näkökulmalta tutkimuksessa käsitellään fenomenologista havaintoanalyysia, mielen filosofisia hahmoteorioita sekä musiikin filosofisesteettisiä suuntauksia.

Väitöskirja jakaantuu kolmeen osaan: *teoreettiseen, metodiseen ja analyttiseen* osaan. *Teoreettisessa* (1) osassa kuvaillaan keskeiset hahmofilosofiset suuntaukset sekä musiikin hahmofilosofiaan vaikuttaneet filosofit ja musiikkitieteilijät 1900-luvulta 2000-luvulle, ja esitellään Marc Lemanin ja Jukka Louhivuoren teorit, jotka ovat vaikuttaneet tähän tutkimukseen. *Metodisessa* (2) osassa teorioita sovelletaan musiikkianalyysimetodiin, jonka avulla musiikin hahmoa voidaan analysoida ja tulkita musiikin hahmoteorian kontekstissa. Metodologinen osa käsittää neljä musiikkianalyysiosaa: formula-analyysin, sävellysprosessin hahmoanalyysin, fenomenologisen kuunteluanalyysin ja musiikin taustahahmoanalyysin. *Formula-analyysi* käsittää musiikin konteksti- ja sisältöanalyysit sekä makro- ja mikrotason formula-analyysin, jossa musiikkia analysoidaan pääasiassa akustisen representaation tasolla (äänianalyysi), mutta myös symbolisen representaation tasolla (nuotit, laulun sanat). *Sävellysprosessin hahmoanalyysi* käsittää säveltäjähaastattelun neljästä analysoitavasta sävellyksestä sekä esitysanalyysin yhdestä sävellyksestä. *Fenomenologinen kuunteluanalyysi* sisältää vapaiden assosiaatioiden analyysin ja strukturoidun analyysin, joissa tutkitaan musiikin tuottamia fenomenologisia kokemuksia ja mielikuvia kuulijan tietoisuudessa viidestä analysoitavasta sävellyksestä. Musiikin *taustahahmoanalyysin* tavoitteena on selvittää mitkä musiikilliset ominaisuudet ovat selkeästi säveltäjän omia musiikillisiä piirteitä verrattuna säveltäjän käyttämiin esikuviin ja tyyliin. Taustahahmoanalyysissä vertaillaan yhtä Reznikoffin sävellystä gregoriaaniseen lauluun. Reznikoffin musiikki toimii tässä kontekstissa musiikkianalyttisenä objektina, ja siten se ei ole tutkimuksen tekijän meritoitumisen tavoitteena. Hahmofilosofisessa *musiikkianalyysiosassa* (3) sovelletaan muodostunutta teoriaa ja metodia Reznikoffin neljään ranskankieliseen sävellykseen. Tutkimuksessa saatuja tuloksia verrataan asetettuihin tavoitteisiin ja niitä tulkitaan ja pohditaan hahmofilosofisen teorian kontekstissa. Tavoitteena on todentaa tutkimuksen väite, analysoida sävellysten hahmon laa-

tua sekä pohtia miten muodostunut teoria ja metodi soveltuu musiikin hahmofilosofiseen analyysiin ja tulkinnan välineeksi.

Tutkimustuloksia ja johtopäätöksiä

Formula-analyysi ja sen parametrit osoittivat, että säveltäjän luovuus on analysoitavissa formulaympyrän representaatiosta ja sen musiikillisten formuloiden ja formulatasojen suhteesta, jotka kokonaisuudessaan representoivat säveltäjän sisäistä luovaa prosessia. Sävellyksen ja sävellysprosessin luovuus havaittiin muodostuvan odottamattomien formuloiden (Fe), tiedostamattomien formuloiden (Ff) ja formulatasojen esiintymisestä formulaympyrässä sekä niiden suhteesta muihin formuloihin. Sisäinen luova impulssi X, eli luova formulaparadigma, josta Reznikoffin musiikki näyttäisi kehittyvän, todettiin tutkimuksen mukaan löytyvän spektrin perusäänentaajuuden tasolla 83 Hz/E (Fig. 209). Sen mikrotason musiikillisia ominaisuuksia olivat muun muassa silmukointirepresentaatio äänen- taajuuden perustasolla f_{s0} (Fig. 148). Tutkimustuloksia ja niiden tulkintaa tukivat myös esitysanalyysin tulokset, jossa säveltäjän käsien ja pään liikkeet sekä laulun lauserakenteiden ja musiikillisten muotojen toistuvuus korreloivat positiivisesti silmukointi-ilmiötä (Ch. 5.1.4.11; Fig. 74). *Jubilus*-formula osoittautui tutkimuksen mukaan Reznikoffin sisäisen luovan prosessin musiikilliseksi ilmentymäksi, ja se tulkittiin esittävän hänen yksilöllistä, visuaalista ja kuulonvaraista kokemuk- sellisuutta jumaluudesta tai pyhydestä. Musiikillisen hahmon agenttina tai rep- resentaationa havaittiin analyysin perusteella toimivan melismaattinen formula Fa ja vokaali / a / (Ch. 7.1; Fig. 210). Sävellysten esihahmo havaittiin representoi- tuvan formulatasoilla Fc, Fd, Fe ja Ff (Figs. 86, 120, 144, 174), joiden suuntaukset formulaympyrässä olivat pääasiassa kohti formulatasoa Fa. Musiikin hahmon laatu eli musiikin kolmas ulottuvuus havaittiin löytyvän tekijän tietoisuudessa merki- tyksellisen hetken kokemuksena. Musiikissa tutkimuksen tekijä havaitsi sen kah- den formulon (Ff - Fa) ja kahden muodon A - B välisenä fenomenologisena kuu- lohavaintoja, kielellisenä kokemuksena ja assosiaatioina sekä spektrianalyyttise- nä ilmiönä (Fig. 212). Ryhmän tietoisuudessa hahmon laatu eli musiikin kolmas ulottuvuus voidaan tutkimuksen tuloksena tulkita sisäisenä ja/tai ulkoisena ko- kemuksena, joka tiivistettynä voidaan ilmaista kuulijoiden sanallisina symbolei- na ”inhimillinen olento (ihminen), hahmo tai jumala”. Tutkimuksen johtopäätök- senä todettiin, että musiikkianalyttiset osatekijät ilmaisivat Reznikoffin musii- kin filosofisesteettistä ja dualistista hahmoprosessia, jossa korkeat ja matalat ää- net, ylös- ja alaspäin suuntautuvat musiikilliset makro- ja mikrotason muodot ja liikkeet, mieli ja keho, henki ja aine sekä jumaluus ja maallisuus loivat jännitettä ja tasapainoa sävellyksiin.

Tutkimuksen tulokset osoittivat, että hahmofilosofinen musiikkianalyysiteoria ja -metodi olivat toimivia ja niillä saatiin vastauksia asetettuihin tutkimuskysymyk- siin ja väitteeseen. Formula-analyysi ja sen analyysiparametrit hahmottivat mu- siikin rakenteen hyvin makro- ja mikrotasoilla kokonaisuudesta yksityiskohtiin sekä yksityiskohdista kokonaisuuksiin niin symbolisella, akustisella kuin alisym- bolisella tasolla. Musiikkianalyysi rakentui pääasiassa kokonaisuudesta yksityis- kohtiin, mutta fenomenologiset kuulohavainnot aiheuttivat yksityiskohtien ana- lysointia suhteessa kokonaisuuteen, joten kokonaistulkinta muodostui molem- mista näkökulmista. Sävellysprosessin hahmoanalyysi eli säveltäjän haastattelut,

tiivis biografia ja esitysanalyysi tukivat säveltäjän sisäisen luovan hahmon prosessin tulkintaa. Kuunteluanalyysissa yksilön musiikin fenomenologisista kuulohavainnoista voimme todeta, että yksittäiset kielelliset assosiaatiot muodostuivat sanafragmentteina kuulokokemuksien aikana ja kokonaisassosiaatio musiikista muodostui lauseina kuulokokemuksen jälkeen. Tämä havainto korreloi positiivisesti musiikin estetiikan näkemystä, jonka mukaan musiikki luo kuin elävän hahmon kuulijan tietoisuudessa jälkeinpäin (Ch. 2.1.1). Taustahahmoanalyysin menetelmä, jossa kahta samantyylistä musiikkia vertailtiin symbolisella, akustisella ja alisymbolisella tasolla havaittiin tuottavan analyysituloksia, joiden avulla säveltäjän yksilöllisen musiikillisen hahmon tulkintaa ja johtopäätöksiä voitiin tehdä, joskin tästä tarvitaan vertailevia tuloksia laajempien johtopäätösten tekemiselle.

Väitöskirjan tulosten perusteella todettiin, että jatkotutkimuksia voisi tehdä luovan prosessin, erityisesti formulaympyrän ja luovan formulän Fe näkökulmista, sillä tutkimuksen mukaan formula Fe ja sen suhteet formulatasoilla osoittautuivat luovan hahmon ratkaisevaksi makrotason ilmiöksi. Vertailevaa ja syventävää tietoa tarvittaisiin, jotta voisimme teoretisoida ja tulkita luovuutta sävellyksissä. Tutkimuksessa fenomenologisten (kielellisten) assosiaatioiden kohdentaminen täsmällisesti tietyn akustisen representaation formulaan tai formula-paradigmaan tutkimusasetelman näkökulmasta yleisessä kuunteluanalyysissä oli mahdotonta, sillä musiikki kuunneltiin vastaanottajan omassa tilassa ja omana aikana. Sitä vastoin tutkimuksen tekijän musiikillisia kokemuksia oli selkeämpää sijoittaa akustiseen formulaan ja tehdä siitä mikrotason analyttisiä tulkintoja. Kuulohavaintojen sijoittaminen ja analysointi akustiseen formularepresentaatioon osoittautuikin teoreettisesti, metodisesti ja analyttisesti yhdeksi mielenkiintoisimmaksi jatkotutkimuksen aihealueeksi.

REFERENCES

- Ahonen, H. 1997. *Musiikki. Sanaton kieli. Musiikkiterapian perusteet*. (2nd printing) Helsinki: Oy Finn Lectura Ab.
- Arnheim, R. 1961. *Emotion and Feeling in Psychology and Art*. In *Documents of Gestalt Psychology*. (Ed. Henle, M.) USA: University of California Press, 334-352.
- Asplund, A. & Hako, M. 1981. *Kansanmusiikki*. Helsinki: Suomalaisen Kirjallisuuden Seuran toimituksia 366.
- Batstone, P. 1969. *Music Analysis as Phenomenology*. *Perspectives of New Music* (2), 94-110.
- Bent, I. 1998. *Analysis*. *The New Grove Handbooks in Music*. Ipswich Suffolk: Macmillan Reference Ltd.
- Block, N. 2001. *Consciousness*. In S. Guttenplan (Ed.) *A Companion to the Philosophy of Mind*. (8th printing) Great Britain: Blackwell Publishers Ltd, 210-219.
- Budd, M. 1992. *Music and the Emotions: The Philosophical Theories*. London: Routledge.
- Camurri, A., De Poli, G., Leman, M. & Volpe, G. 2001. *A Multi-layered Conceptual Framework for Expressive Gesture Applications*. Proc. Int. MOSARTWorkshop. Barcelona, Nov. 2001.
- Camurri, A. & Coglio, A. 1998. *An Architecture for Emotional Agents*, IEEE Multimedia, <http://www.infomus.dist.unige.it/Publications.html>, IEEE Computer Society Press, 24-33.
- Castañeda, H-N. 1980. *On Philosophical Method*. *Nous Publications 1*. Detroit: cop.
- Chambers, G.B. 1972. *Folksong – Plainsong. A Study in Origins and Musical Relationships*. (2nd edition) London: Merlin.
- Clynes, Manfred 1989. *Sentics. The Touch of the Emotions*. Bridport: Prism.
- Cogan, R. 1984. *New Images of Musical Sound*. Cambridge, Mass.: Harvard University Press, 1-44.
- Cogan, R. & Escot, P. 1976. *Sonic Design. The Nature of Sound and Music*. Englewood Cliffs, N.J.: Prentice-Hall, 327-401.
- Cook, P. R. (Ed.) 1999. *Music, Cognition and Computerized Sound. An Introduction to Psychoacoustics*. UK: Cambridge Mass, MIT Press.
- Dahlhaus, C. 1999. *Esthetics of Music*. Translated by William Austin. USA: Cambridge University Press (Original 1967).
- Dahlhaus, C. 1980. *Musiikin estetiikka*. Translated by Ilkka Oramo. Suomen Musiikkiteollisuuden seuran julkaisu. (Original 1967).
- Damasio, A. 2000. *The Feeling of What Happens. Body, Emotion and the Making of Consciousness*. London: Vintage.
- Dawkins, R. 1981. *Selfish Genes and Selfish Memes*. In Jackendoff, R. 1987. *Consciousness and the Computational Mind*. (2nd printing) Cambridge Mass.: MIT.
- Dennett, D.C. 1999. *Tietoisuuden selitys*. Translated by Tiina Kartano. Jyväskylä: Art House.
- Dennett, D.C. 1993. *Consciousness Explained*. London: Benguin Books.
- Dennett, D.C. 1969. *Content and Consciousness*. London: Routledge & Kegan.
- Eco, U. 1986. *Art and Beauty in the Middle Ages*. Translated by Hugh Ledin. (4th printing) New Haven: The Bath Press.

- von Ehrenfels, C. 1932. Über Gestaltqualitäten. In *Foundations of Gestalt Theory*. Ed. and translated by B. Smith 1988. Munich, Vienna: Philosophia Verlag, 121-123.
- von Ehrenfels, C. 1916. Kosmogonie. Gestalt Level and Gestalt Purity. In *Foundations of Gestalt Theory*. Ed. and translated by B. Smith 1988. Munich, Vienna: Philosophia Verlag, 118-120.
- von Ehrenfels, C. 1890. Über Gestaltqualitäten. In *Foundations of Gestalt Theory*. Ed. and translated by B. Smith 1988. Munich, Vienna: Philosophia Verlag, 82-114.
- ESCOM: <http://musicweb.htm-hannover.de/escom/english/index.htm>
- Fasko, D. Jr. 1999. Associative Theory. In M. Runco & S. Pritzker (Eds.) *Encyclopedia of Creativity*, Vol. 1 A-H. San Diego: Academic Press, 135-139.
- Freud, S. 1923b. Das Ich und das Es. Vienna: *Gesammelte Schriften*, 1924-34.
- Gabrielsson, A. & Juslin, P. 1996. Emotional expression in music performance. *Psychology of Music* 24 (1), 68-91.
- Godøy, R. & Jørgensen, H. (Eds.) 2001. *Musical Imagery*. Lisse: Swets & Zeitlinger.
- Goldstein, E. B. 2002. *Sensation and Perception*. (6th edition) USA: Wadsworth.
- Grout, D. & Palisca, C. V. (Eds.) 1996. *A History of Western Music*. (5th edition) USA: W.W. Norton & Company, Inc.
- Guttenplan, S. (Ed.) 2001. *A Companion to the Philosophy of Mind*. (8th printing) Great Britain: Blackwell Publishers Ltd.
- Haug, E., Sand., O. & Sjaastad, O. V. 1999. *Ihmisen fysiologia*. Porvoo: WSOY.
- Hautamäki, A. & Saraste, M. 1988. Hermoverkot, aivot ja koneet – Teuvo Kohosen Haastattelu. *Tiede ja edistys* 13 (2), 122-133.
- Heikinheimo, S. 1985. Aikasiirto askeesin vuosisadoille. *Helsingin Sanomat* 20.6.1985.
- Heinonen, Y. 1998. Hello Little Girl. John Lennonin ensimmäinen laulu ja sen psykoanalyttinen tulkinta. In *Musiikki* (4), 424-453, 472.
- Heinonen, Y. 1995. Elämyksestä ideaksi – ideasta musiikiksi. Sävellysprosessin yleinen malli ja sen soveltaminen Beatles-yhtyeen laulunteko- ja äänitysprosessiin. Jyväskylä: University of Jyväskylä.
- Hopkins, Jim. 2001. The Unconscious. In S. Guttenplan (Ed.) *A Companion to the Philosophy of Mind*. (8th printing) Great Britain: Blackwell Publishers Ltd, 598-607.
- Huottilainen, M. and Tervaniemi, M. 2003. Suomalaisia tuulia musiikin aivotutkimuksessa. *Musiikki* (1), 67-81.
- Husserl, E. 1979. *Aufsätze und Rezensionen 1890-1910*. B. Rang. (Ed.) (*Husserliana*, Vol. XXII). The Hague: Nijhoff.
- Husserl, E. 1970. *Logical Investigations*. Translated by J. N. Findlay. London: Routledge (Original 1900/01).
- Husserl, E. 1964. *The Phenomenology of Internal Time-Consciousness*. Translated by J.S. Churchill. USA: Indiana University Press (Original 1905-1910).
- Hänninen, R. 2002. Kokemuksia harmonisesta laulusta – löytöretki ääneen. Sibelius-Akatemia. Musiikkikasvatuksen osaston teemaseminaarityö.
- Jackendoff, R. 1989. *Consciousness and the Computational Mind*. Explorations in Cognitive Science Vol. 3. (2nd printing) Cambridge (MA): The MIT Press.
- James, J. 1995. *The Music of the Spheres*. Music, Science and the Natural Order of the Universe. England: Abacus.
- Janata, P. 2001. Neurophysiological Mechanisms Underlying Auditory Image Formation in Music. In Godøy & Jørgensen (Eds.) *Musical Imagery*. Lisse: Swets & Zeitlinger B.V., 27-42.

- Jeffery, P. 1992. *Re-envisioning Past Musical Cultures. Ethnomusicology in the Study of Gregorian Chant*. Chicago: The University of Chicago Press.
- Juslin, P. & Sloboda, J. 2002. *Music and Emotion. Theory and research*. Great Britain: Oxford University Press.
- Järvelä, I. 2003. Suomen kulttuurirahaston vuosikertomus 2002-2003, 19-22. Helsinki: Suomen Kulttuurirahasto.
- Järvinen, M-R. 1999. Maailma äänessä. Tutkimus pohjoissaamelaisesta joikuperinteestä. Vammala: Suomalaisen Kirjallisuuden Seuran toimituksia 762.
- Kaipainen, M. 1999. Kognitiotieteen paradigman vaihdos ja musiikin tutkimus. In J. Louhivuori & A. Sormunen (Eds.) *Kognitiivinen musiikkitiede*. (3rd printing) Jyväskylä: Jyväskylän yliopiston musiikkitieteen laitoksen julkaisusarja A: tutkielmia ja raportteja 8, 149-168.
- Karma, K. 1986. *Musiikkipsykologian perusteet*. Helsinki: Suomen Musiikkitieteellisen Seura.
- Katz, D. 1948. *Hahmopsykologia*. Translated by Martti Takala. Helsinki: Kustannusosakeyhtiö Otava.
- Kivy, P. 2002. *Introduction to a Philosophy of Music*. Great Britain: Oxford University Press.
- Klingholz, F. 1993. Overtone Singing: Productive Mechanism and Acoustic Data. *Journal of Voice* 7 (2), 118-122.
- Koffka, K. 1935. *Principles of Gestalt Psychology*. London: Routledge & Kegan Paul.
- Kohonen, T. 1990. The self-organizing map. *IEEE proc.* (78), 1464-1480.
- Kohonen, T. 1984. *Self-Organization and Associative Memory*. Springer Series in Information Sciences, Vol. 8. Berlin: Springer.
- Köhler, W. 1969. *The Task of Gestalt Psychology*. Princeton, NJ: Princeton University Press.
- Laukkanen, A-M. & Leino, T. 1999. Ihmeellinen ihmisääni. Tampere: Gaudeamus.
- Lehtiranta, E. 1989. Iëgor Reznikoff – gallialainen Orfeus-inkarnaatio. *Synkooppi* 11 (1), 31-36.
- Lehto, A. 1988. Tie täydelliseen lauluun. *Rondo* 26 (9), 29-30, 34.
- Leino, T. 1987. Spektrihavaintoja yläsävellaulusta sekä samanaikaisesta laulusta ja vihellyksestä. In P. Hurme & H. Dufva (Eds.). *Fonetiikan päivät – Jyväskylä 1987*. Jyväskylän yliopiston viestintätieteiden laitoksen julkaisuja 4, 160-177.
- Leman, M. 1999. Music. In M. Runco & S. Pritzker (Eds.) *Encyclopedia of Creativity*, Vol. 2 I-Z. San Diego: Academic Press, 285-296.
- Leman, M. (Ed.) 1997. *Music, Gestalt, and Computing*. Studies in Cognitive and Systematic Musicology. Germany: Springer-Verlag.
- Leman, M. 1995. *Music and Schema Theory*. Cognitive Foundations of Systematic Musicology. Germany: Springer-Verlag.
- Leman, M. 1993. Symbolic and Subsymbolic Description of Music. In G. Haus (Ed.) *Music Description and Processing*. Madison: A-R Editions, 119-164.
- Leman, M. 1989. Symbolic and subsymbolic information processing in models of musical communication and cognition. *Interface, Journal of New Music Research* (18), 141-160.
- Leman, M. & Schneider, A. 1997. Systematic, Cognitive and Historical Approaches in Musicology. In M. Leman (Ed.) *Music, Gestalt, and Computing*. Studies in Cognitive and Systematic Musicology. Germany: Springer-Verlag, 13-29.

- Lippman, E. 1992 (Ed.). *The Aesthetics of Music. A History of Western Musical Aesthetics*. USA: University of Nebraska Press.
- Lord, A. 2001. *The Singer of Tales*. (2nd edition) S. Mitchell & G. Nagy (Eds.). Cambridge (Mass.): Harvard University Press.
- Louhivuori, J. & Sormunen, A. (Eds.) 1999. *Kognitiivinen musiikkitiede*. (3rd printing) Jyväskylä: Jyväskylän yliopiston musiikkitieteen laitoksen julkaisusarja A: tutkielmia ja raportteja 8.
- Louhivuori, J. 1997. *Systematic, Cognitive and Historical Approaches in Musicology*. In M. Leman (Ed.) *Music, Gestalt, and Computing. Studies in Cognitive and Systematic Musicology*. Germany: Springer-Verlag, 30-41.
- Louhivuori, J. 1988. *Veisuun vaihtoehtot. Musiikillinen distribuutio ja kognitiiviset toiminnot*. Jyväskylä: Suomen Musiikkitieteellinen Seura.
- Markus, R. A. 1996. *Signs and Meanings. World and Text in Ancient Christianity*. Liverpool: Liverpool University Press.
- Merriam, A. 2000. *The Anthropology of Music*. (4th printing) Evanston: Northwestern University Press.
- Meyer, L. B. 1956. *Emotion and Meaning in Music*. Chicago: University of Chicago Press.
- Mocquereau, D. A. 1989. "Le Nombre Musical Grégorien". *A study of Gregorian Musical Rhythm*. Translated by J.B.Ward. France: Solesmes.
- Murray, D. 1995. *Gestalt Psychology and the Cognitive Revolution*. Great Britain: Harvester-Wheatsheaf.
- Niiniluoto, I. 1999. *Johdatus tieteenfilosofiaan. Käsitteen- ja teorianmuodostus*. (2nd printing) Helsinki: Otava.
- Parry, M. 1971. *The Making of Homeric Verse. The Collected papers of Milman Parry*. A. Parry (Ed.). UK: Oxford, Clarendon Press.
- Peacocke, C. 2001. *Content (1)*. In S. Guttenplan (Ed.) *A Companion to the Philosophy of Mind*. (8th printing) Great Britain: Blackwell Publishers Ltd, 219-225.
- Pekkilä, E. 1981. *Salomon Katilan juoksuvalssit: kulttuurinen musiikkianalyysi*. *Musiikki* 11 (2), 103-147.
- Randurp, A. 2002. *Collective Conscious Experience Across Time*. *AOC. Antropology of Consciousness* 13 (1), 27-37.
- Rapoport, E. 1997. *Singing, Mind and Brain – Unit Pulse, Rhythm, Emotion and Expression*. In M. Leman (Ed.) *Music, Gestalt, and Computing. Studies in Cognitive and Systematic Musicology*. Germany: Springer-Verlag, 451-467.
- Rauhala, H. 1973. *Musiikkiterapia: teoria ja metodinen mallisto*. Jyväskylä: Gummerus.
- Rauhala, L. 1992. *Mitä meditaatio on?* (2nd printing) Helsinki: Esoterica Publishing.
- Reybrouck, M. 1997. *Gestalt Concepts and Music*. In M. Leman (Ed.) *Music, Gestalt, and Computing. Studies in Cognitive and Systematic Musicology*. Germany: Springer-Verlag, 57-69.
- Reznikoff, I. 1995. *On the sound dimension of prehistoric painted caves and rocks*. In E. Tarasti (Ed.) *Musical Signification. Essays in the Semiotic Theory and Analysis of Music*. Berlin New York: Mouton de Gruyter.
- Rieger, M. 1996. *Music before and after Solesmes*. <http://www.pudel.uni-bremen.de/pdf/Rieger96La1.pdf>

- Roads, C. 1999b. Musiikkirepresentaatioista. In J. Louhivuori & A. Sormunen (Eds.) *Kognitiivinen musiikkitiede*. (3rd printing) Translated by Järvinen, Isoherranen, Ihatsu, von Essen & Lammi. Jyväskylä: Jyväskylän yliopiston musiikkitieteen laitoksen julkaisusarja A: tutkielmia ja raportteja 8, 45-78.
- Roads, C. 1999a. *The Computer Music Tutorial*. Cambridge (MA): MIT Press.
- Rossing, T. D. 1990. *The Science of Sound*. (2nd edition) Reading (MA): Addison-Wesley.
- Rusko, M. 1997. Towards a More General Understanding of the Nasality Phenomenon. In M. Leman (Ed.) *Music, Gestalt, and Computing. Studies in Cognitive and Systematic Musicology*. Germany: Springer-Verlag, 351-360.
- Russ, S. 1999. Emotion/Affect. In M. Runco & S. Pritzker (Eds.) *Encyclopedia of Creativity*, Vol. 1 A-H. San Diego: Academic Press, 659-668.
- Ryle, G. 1968. *The Concepts of Mind*. Harmondsworth, Middlesex: Penguin Books.
- Saha, H. 1996. Kansanmusiikin tyyli ja muuntelu. *Kansanmusiikki-instituutin julkaisuja* 39. Jyväskylä: Gummerus Kirjapaino Oy.
- Schwarz, R. 2001. Representation. In S. Guttenplan (Ed.) *A Companion to the Philosophy of Mind*. (8th printing) Great Britain: Blackwell Publishers Ltd, 536-541.
- Sedlacek, K. & Sychra, A. 1963. Die Melodie als Faktor des emotionellen Ausdrucks. *FP* (15), 89-98.
- Sekuler, R. 2002. Architectural acoustics: The \$20,000,000 mistake. https://webct.brandeis.edu/NPSY_12A/senpro2002/topic_6_stuff/archi_acoustics.html
- Sihvola, A. 1997. Musiikissa soivat eheyttävät voimat. *Voi Hyvin* (1), 82-87.
- Sloboda, J. 2000. *The Musical Mind. The Cognitive Psychology of Music*. Great Britain: Oxford University Press.
- Smith, B. (Ed.) 1988. *Foundations of Gestalt Theory*. Germany: Philosophia Verlag München Wien.
- Smolensky, P. 2001. Computational models of mind. In S. Guttenplan (Ed.) *A Companion to the Philosophy of Mind*. (8th printing) Great Britain: Blackwell Publishers Ltd, 176-184.
- Solesmes 1998. *Graduale triplex*. France: Abbaye Saint-Pierre De Solesmes.
- Strachey, J. 1989 (Ed.). Sigmund Freud. *The Ego and the Id. The Standard Edition*. Translated by J. Riviere. USA: W.W. Norton & Company.
- Sundberg, J. 1987. *The Science of the Singing Voice*. Illinois: Northern Illinois University Press.
- The Snowbird Statement on Catholic Liturgical Music, Copyright © 1995, The Madeleine Institute. <http://www.canticanova.com/articles/liturgy/art9o4.htm>, USA: CanticaNOVA Publications
- Toiviainen, P. 1999. Keinotekoiset hermoverkot ja niiden käyttö musiikin tutkimuksessa. In J. Louhivuori & A. Sormunen (Eds.) *Kognitiivinen musiikkitiede*. (3rd printing) Jyväskylä: Jyväskylän yliopiston musiikkitieteen laitoksen julkaisusarja A: tutkielmia ja raportteja 8, 127-148.
- Treitler, L. 1975. "Centonate Chant: Übles Flickwerk or E pluribus unus?" *Journal of the American Musicological Society* (28), 1-23.
- Treitler, L. 1974. "Homer and Gregory: The Transmission of Epic Poetry and Plainchant." *Musical Quarterly* (60), 333-372.

- Tresidder, J. 1999 (Ed.). *Dictionary of Symbols. An Illustrated Guide to Traditional Images, Icons and Emblems*. Singapore: Duncan Baird Publishers.
- Trochmczyk, M. 2001. From Circles to Nets: On the Signification of Spatial Sound Imagery in New Music. *Computer Music Journal* 25 (4), 39-55.
- Utriainen, J. 2003b. Review of P. Kivy. *Introduction to a Philosophy of Music*. *Musiikki* (2-3), 107-111.
- Utriainen, J. 2003a. A Performance as a Musical Gestalt. One interpretation of Iegor Reznikoff's Chant Tuuli puhaltaa [l'Esprit soufflé]. Helsingin yliopisto, Uudet tuulet musiikkitieteessä –seminaari. Abstract.
- Utriainen, J. 2002b. The Development of the Formula Theory in the Acoustical Representation. Suomen Musiikkitieteellinen Seura. Abstract.
- Utriainen, J. 2002a. New Waves in Musicology. MEGA (Multisensory Expressive Gesture Applications). Helsingin yliopisto, Uudet tuulet musiikkitieteessä –seminaari. Abstract.
- Utriainen, J. 2001b. Hahmopsykologinen musiikkianalyysiteoria ja –metodi. Helsingin yliopisto, Pro gradu in Musicology.
- Utriainen, J. 2001a. Hahmopsykoanalyttinen musiikkianalyysimetodi ja –teoria. Äänisignaali piilotajunnan representaationa. Helsingin yliopisto, musiikkitiede. Pro seminar report in Musicology.
- Utriainen, J. 2000b. Etnografinen tutkimus Iègor Reznikoffin ääniterapeuttisesta metodista synnytyksvalmennuksessa. Helsingin yliopisto, Kulttuuri-antropologia, DPPH-tutkimuskurssi. Unpublished seminar report.
- Utriainen, J. 2000a. Etnografinen tutkimus Iègor Reznikoffin ääniterapeuttisesta metodista Suomessa. Kaunista laulua vai todellista lauluterapiaa. Helsingin yliopisto. Unpublished seminar report in Musicology.
- Vikis-Freiberg, V. 1984. Creativity and Tradition in Oral Folklore or the Balance of Innovation and Repetition in the Oral Poets Art. *Cognitive Processes in the Perception of Art*, 325-343.
- Vikis-Freiberg, V. & Freibergs, I. 1978. Formulaic analysis of the computer-accessible corpus of Latvian Sun-Songs. *Computer and the Humanities* (12), 329-339.
- Vuori, H-L. 1995. Hiljaisuuden syvä ääni. Antiikin kontemplatiivinen ja gregoriaaninen laulu Iègor Reznikoffin mukaan. Helsinki: Kriittinen korkeakoulu.
- Wertheimer, M. 1912. Experimentelle Studien über das Sehen von Bewegungen. *Zeitschrift für Psychologie* (61), 161-265.
- Wiik, K. 1998. *Fonetiikan perusteet*. (2nd edition) Porvoo Helsinki Juva: WSOY
- Williams, C. E., & Stevens, K. N. 1972. Emotion and Speech. Some acoustic correlates. *JASA* (52), 1238-50.

Interviews and Other Unwritten Sources:

In: Interview ; S: Seminar; P: Performance, F: Finnish; E: English; transcripts of interviews and videotapes of performances are the property of the author.

- In1 Professor Iegor Reznikoff. University of Nanterre, Paris, France.
15. - 16.1.2001. Biography of Reznikoff' life. Paris, France. (F)
- In2 9. - 10.4.2002. Creation and composition process of Reznikoff's music.
Paris, France. (F)
- In3 25.2.2003. Biography of Iegor Reznikoff. Helsinki, Finland. (F)
- In4 Professor Jukka Louhivuori, The University of Jyväskylä.
25.11.2002 e-mail interview. Future views in cognitive musicology. (F)
- In5 Professor Ilkka Taitto. Sibelius Academy. Helsinki, Finland.
30.1.2003. Gregorian Music and Iegor Reznikoff. Helsinki, Finland. (F)
- S1 30.1.2003. Professor Marc Leman, University of Ghent, Belgium. Seminar in
Helsinki University. (E)
- P1 Iegor Reznikoff 16 - 20.6.2002 Viittakivi, Finland. (F)

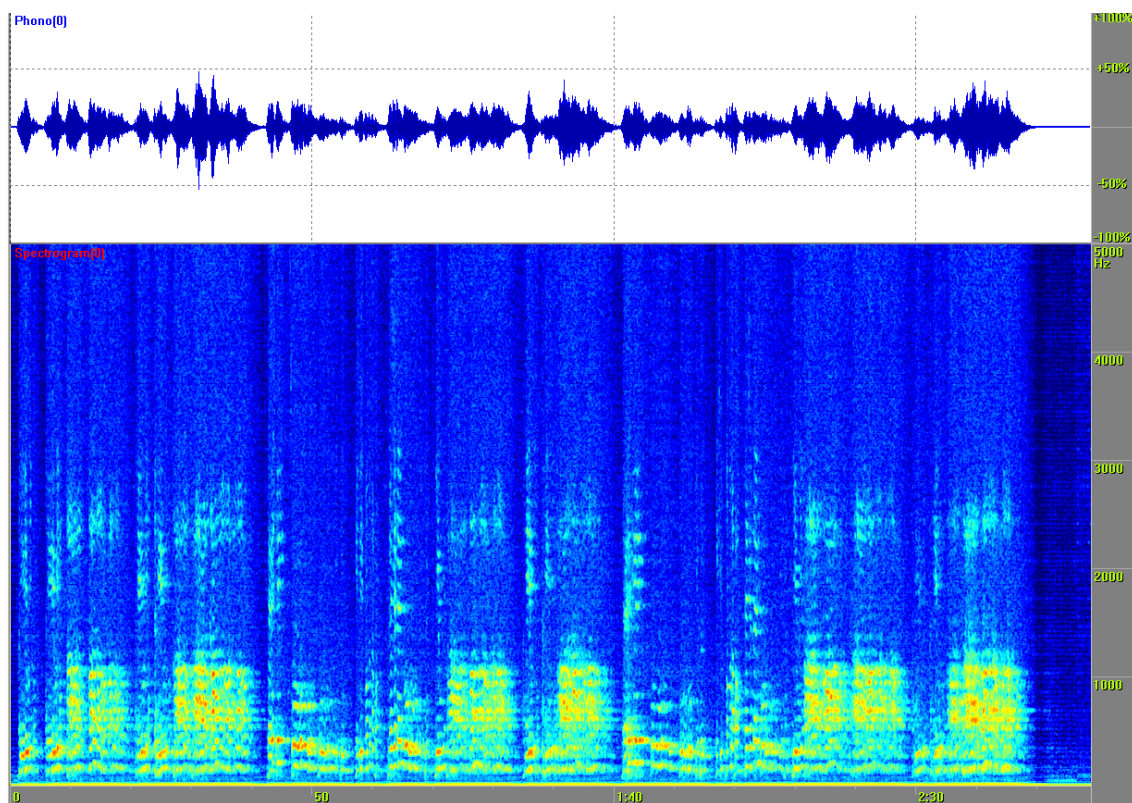
Perception Gestalt Analysis PGA: Iegor Reznikoff

- PGA1: Spring 2001. *Alleluia. l'Esprit soufflé*. In *Le Chant du Thoronet* 1989. Paris: Studio SM 3.
- PGA2: Spring 2001. *Salve*. In *Le Chant du Thoronet* 1989. Paris: Studio SM 3.
- PGA3: Spring 2001. *Une lumière a resplendi*. In *Le Chant du Thoronet* 1989. Paris: Studio SM 3.
- PGA4: Spring 2001. *Grand Magnificat. Liturgie Fondamentale*. In *Le Chant de Fontenay* 1989. Paris: Studio SM 3.

Comparison Gestalt Analysis CcGA:

- PGA1: Spring 2001. *Alleluia. l'Esprit soufflé*. In *Le Chant du Thoronet* 1989. Paris: Studio SM 3.
- PGA5: Spring 2001. *Alleluia. Dies sanctificatus*. In *Saint-Gall. Séquences et tropes du IX^e siècle*. 1997. Ensemble Gilles Binchois Dominique Vellard. France: Harmonia Mundi.

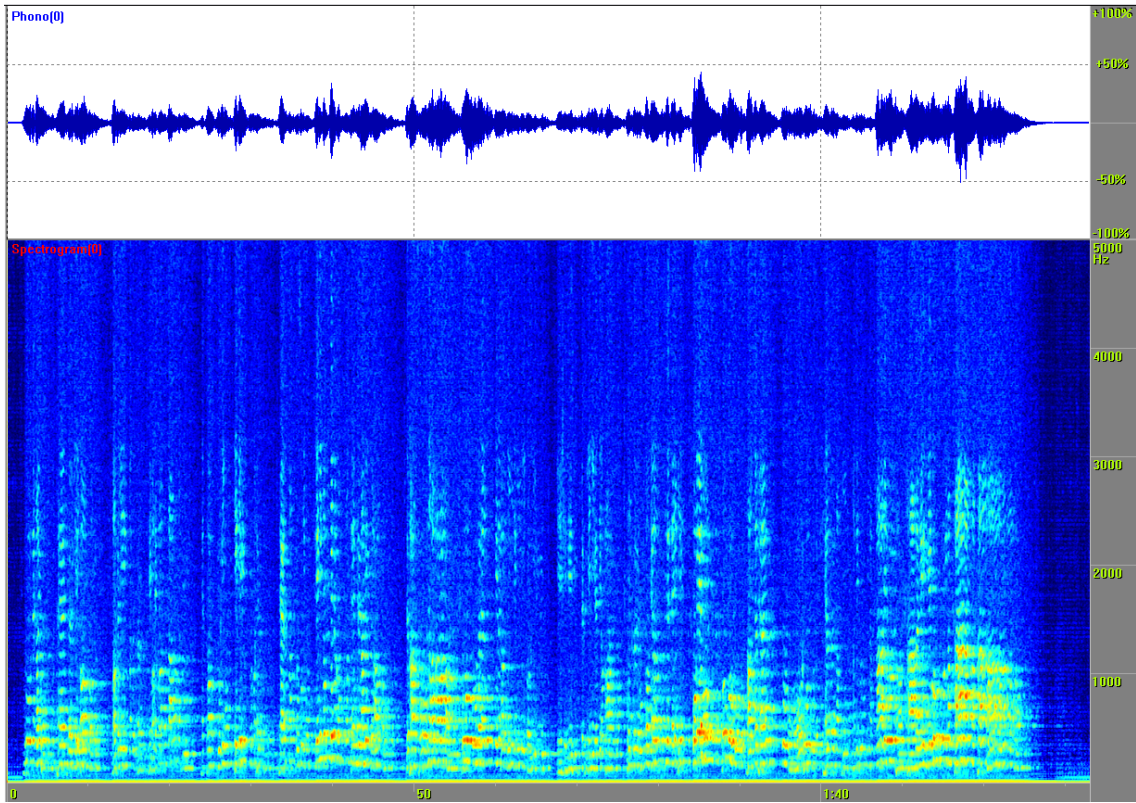
1. ALLELUIA. L'ESPRIT SOUFFLE



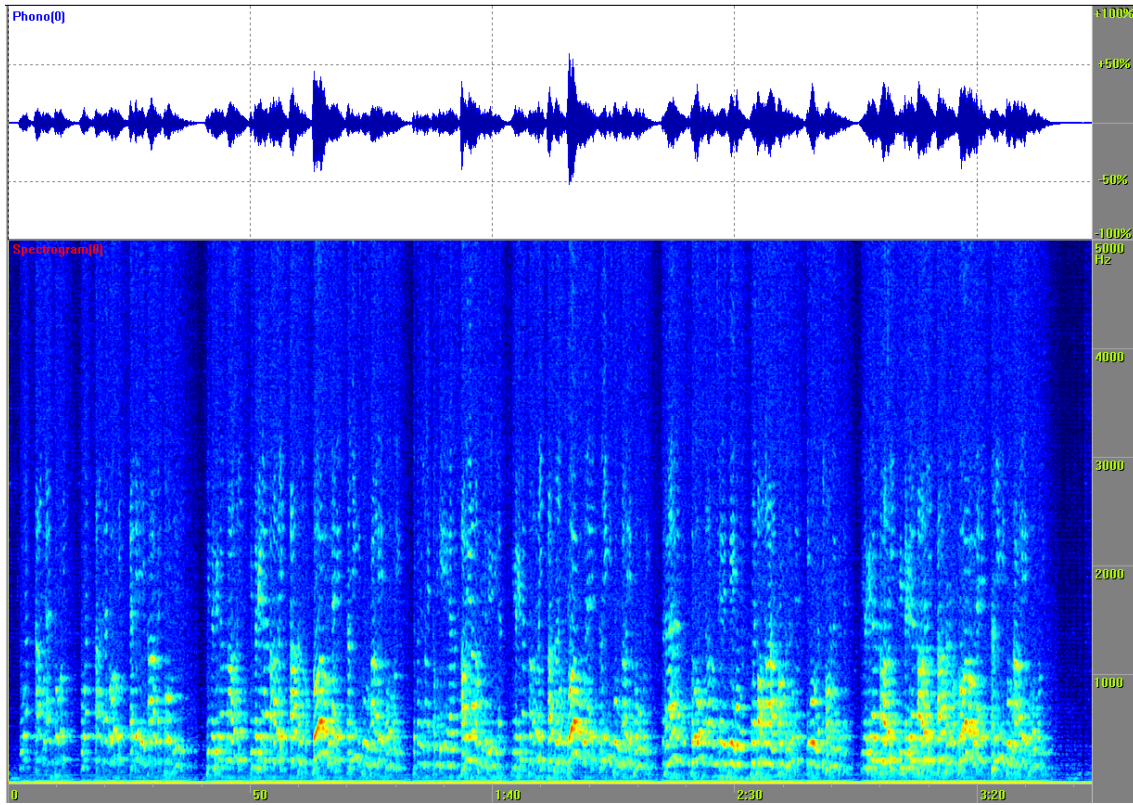
(G) - u p - a m - a l - vis ut
 Alle - lui - a
 L'Es - prit sou - ffe - on - il
 vent, et tu en - tend - es son voix - Mais tu ne sors
 d'o - u il vent ni o - u il va

9.1.2002

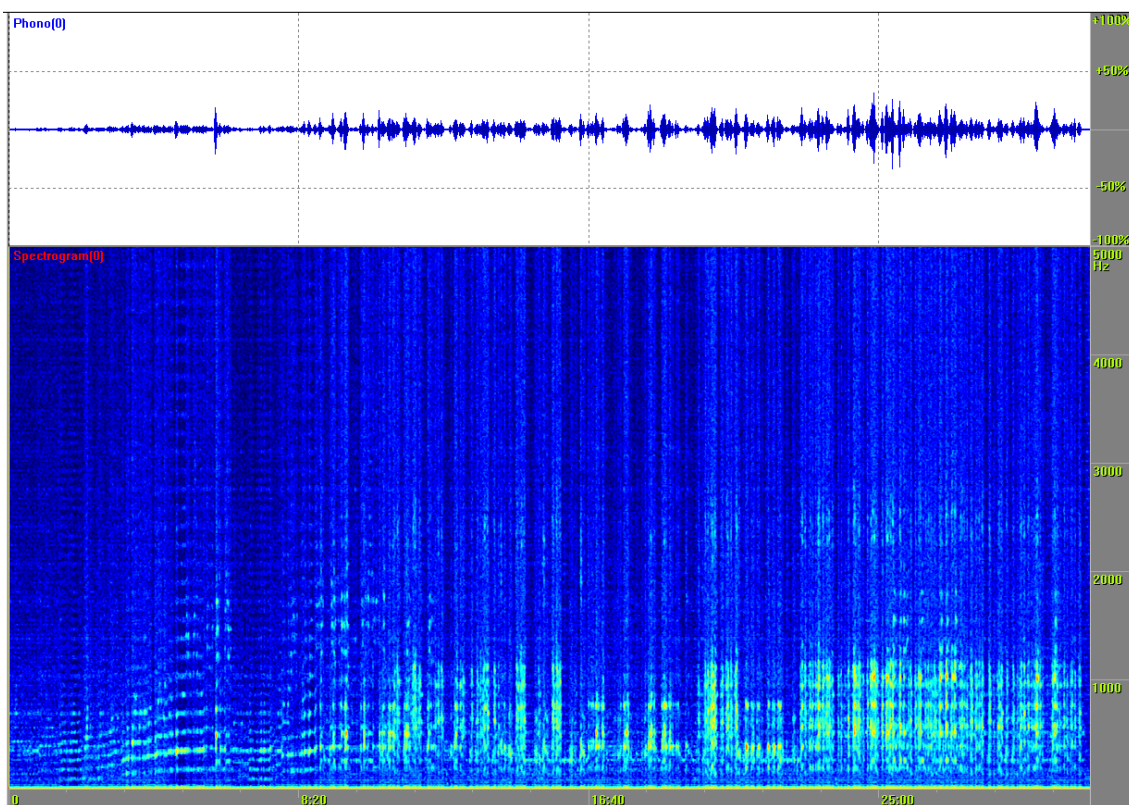
2. SALVE



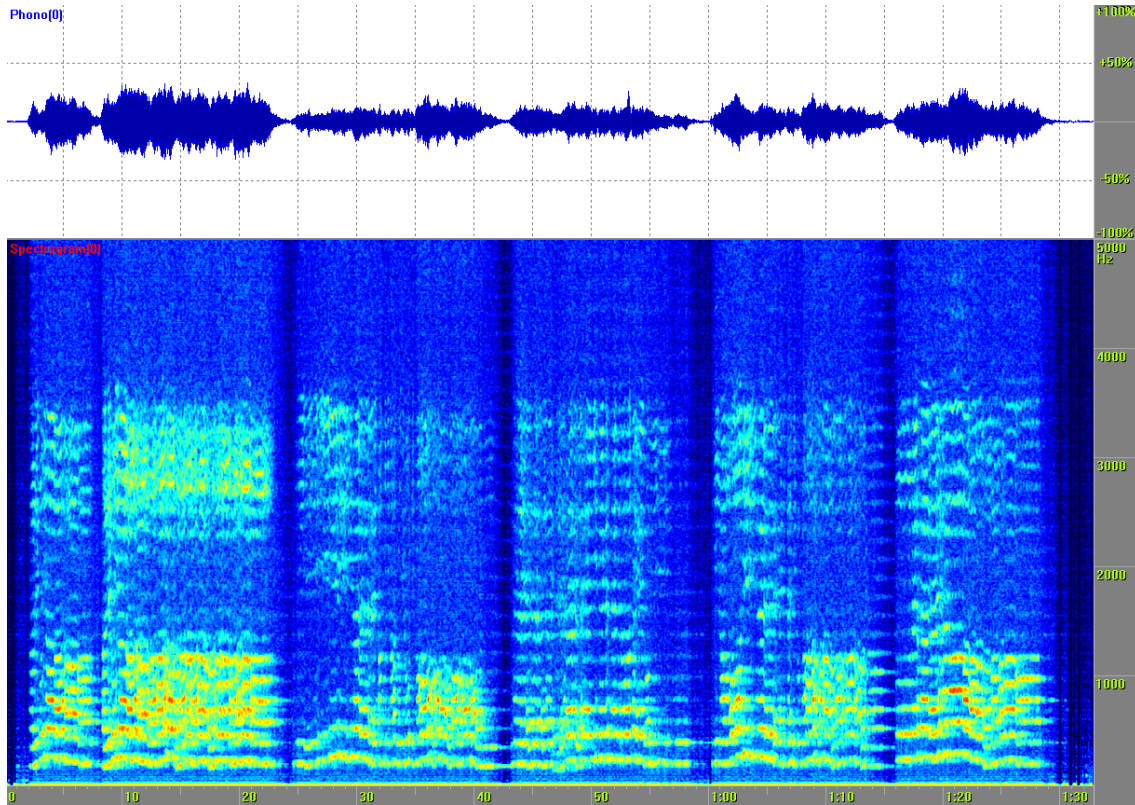
3. UNE LUMIÈRE A RESPLENDI



4. GRAND MAGNIFICAT. LITURGIE FONDAMENTALE



5. ALLELUIA. DIES SANCTIFICATUS



Handwritten musical notation for the Alleluia. The notation is on a single staff with a treble clef and a common time signature. The lyrics are written below the notes. The text is as follows:

Alleluia. X. Di-

es sancti-fi-ca-tus i-l-luxit no-

ve- ni-tes, et ado-ra-te Domi-

nium: quia ho-di-e descendit lux ma-

-gna su-per fer-ram.

Neumit C 40 (St. Gallen)