

Computational Music Science

Series Editors

Guerino Mazzola
Moreno Andreatta

For further volumes:
www.springer.com/series/8349

Guerino Mazzola • Joomi Park • Florian Thalmann

Musical Creativity

Strategies and Tools in Composition
and Improvisation

Prof. Dr. Guerino Mazzola
School of Music
University of Minnesota
Minneapolis, MN, USA
mazzola@umn.edu

Department of Informatics
University of Zurich
Zurich, Switzerland

Dr. Joomi Park
McNally Smith College of Music
Saint Paul, MN, USA
parkx302@gmail.com

Florian Thalmann
School of Music
University of Minnesota
Minneapolis, MN, USA
thalm007@umn.edu

ISSN 1868-0305
Computational Music Science
ISBN 978-3-642-24516-9
DOI 10.1007/978-3-642-24517-6
Springer Heidelberg Dordrecht London New York

e-ISSN 1868-0313
e-ISBN 978-3-642-24517-6

Library of Congress Control Number: 2011942218

ACM Classification (1998): H.5.5, J.5

© Springer-Verlag Berlin Heidelberg 2011

This work is subject to copyright. All rights are reserved, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilm or in any other way, and storage in data banks. Duplication of this publication or parts thereof is permitted only under the provisions of the German Copyright Law of September 9, 1965, in its current version, and permission for use must always be obtained from Springer. Violations are liable to prosecution under the German Copyright Law.

The use of general descriptive names, registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Printed on acid-free paper

Springer is part of Springer Science+Business Media (www.springer.com)

*Every
act of creation
is
first of all
an
act of destruction.*

(Pablo Picasso)

*Yes,
but always
with
a
constructive intention.*

(Guerino Mazzola, Joomi Park, Florian Thalmann)

Preface

Writing this book was a special challenge because we knew that creativity is a core but quite mysterious topic in music. We had many ideas about creativity in theory, and we had also been working creatively as composers, improvisers, and music software programmers. But there was one very special and demanding part of the book that we wanted to write, namely the practical tutorial.

We planned to complement theoretical and other high-end perspectives with a really concrete, practical, and teachable contribution. The result of this effort is the hundred-page tutorial, Part II. It significantly precedes the theoretical Part III because we wanted to offer a presentation that works for undergraduate students or for any reader who wants to see how the theory works when you apply it, without having to go through long and annoying theoretical discourses, also called “general nonsense”¹.

Writing the tutorial was in no way a replication of known material. In each unit of the tutorial, we had to break through the standards of that theme and develop creative extensions of the *status quo*. We are by no means claiming that our solutions are unique or even optimal ones, but we hope that they demonstrate the validity of our general method for working creatively in music theory, technology, and performance. All tutorial chapters have been written as an exchange of ideas between Joomi Park (as a composer and pianist) and Guerino Mazzola (as a scientist). Joomi’s practical and musical contributions have strongly enhanced the value of the tutorial chapters as a model for a future course syllabus, as well as the case studies and the theoretical chapters of this book.

¹ “General nonsense” is a well-known qualification of utterly abstract and general mathematical theories, in particular category theory. It was a style developed in the 1970s following Alexander Grothendieck’s success in algebraic geometry, which was achieved in this style, but then used by not-so-creative mathematicians. Around 1980, this style was strongly criticized, also relating to teaching abstract set theory in elementary school.

This book's approach to creativity is a bit different from others since it follows less a psychological method than a semiotically shaped procedure. Of course, psychology is extremely important in individual and collective creative dynamics. But we wanted to present a method that can be taken as a backbone for any given challenge in musical creativity and that is operational, i.e. one can start working without first having to go through psychotherapeutic warm-ups. And although this approach is applied to musical creativity in this book, we believe that its generic character enables you to apply it in many creative environments and problem fields.

Because our approach is so specific, we felt obliged to include a short review of what has been done in creativity research in the past and present times. Florian Thalmann has been charged with this delicate subject, and we are very grateful for his diligent presentation.

We hope that our present contribution may help demystify the mysterious perspective in the popular creativity discourse, moving to a relaxed understanding of the term and following Albert Einstein's statement, "Creativity is knowing how to hide your sources."

As in the previous book of this Springer series on performance theory, Emily King has been an invaluable help in transforming our text to a valid English prose; thank you so much for your patience with non-native English. We are pleased to acknowledge the strong support for writing such a demanding treatise by Springer's science editor Ronan Nugent.

Minneapolis, August 2011 Guerino Mazzola, Joomi Park, Florian Thalmann

Contents

Part I Introduction

1	What the Book Is About	3
2	Ontology: Realities, Communication, Semiotics, and Embodiment of Music	5
2.1	Realities	6
2.2	Communication	7
2.3	Semiotics	7
2.4	Embodiment	8
2.5	The Baboushka Principle	9

Part II Practice

3	The Tutorial	15
4	The General Method of Creativity	17
5	Getting Off the Ground	21
6	Motivational Aspects	23
6.1	What Is Your Open Question?	23
6.2	Let Us Describe the Context!	24
6.3	Find the Critical Concept!	24
6.4	We Inspect the Concept's Walls!	25
6.5	Try to Soften and Open the Walls!	25
6.6	How Can We Extend Opened Walls?	26
6.7	Final Step: Testing Our Extension	27

7	Rhythmical Aspects	29
7.1	What Is Your Open Question?	29
7.2	Let Us Describe the Context!	30
7.3	Find the Critical Concept!	31
7.4	We Inspect the Concept's Walls!	33
7.5	Try to Soften and Open the Walls!	34
7.6	How Can We Extend Opened Walls?	34
7.7	Final Step: Testing Our Extension	35
8	The Pitch Aspect	37
8.1	What Is Your Open Question?	37
8.2	Let Us Describe the Context!	38
8.3	Find the Critical Concept!	38
8.4	We Inspect the Concept's Walls!	39
8.5	Try to Soften and Open the Walls!	42
8.6	How Can We Extend Opened Walls?	43
8.7	Final Step: Testing Our Extension	45
9	The Harmonic Aspect	47
9.1	What Is Your Open Question?	48
9.2	Let Us Describe the Context!	48
9.3	Find the Critical Concept!	49
9.4	We Inspect the Concept's Walls!	49
9.5	Try to Soften and Open the Walls!	51
9.6	How Can We Extend Opened Walls?	53
9.7	Final Step: Testing Our Extension	55
10	Melodic Aspects	57
10.1	What Is Your Open Question?	58
10.2	Let Us Describe the Context!	59
10.3	Find the Critical Concept!	60
10.4	We Inspect the Concept's Walls!	61
10.5	Try to Soften and Open the Walls!	63
10.6	How Can We Extend Opened Walls?	66
10.7	Final Step: Testing Our Extension	67
11	The Contrapuntal Aspect	73
11.1	What Is Your Open Question?	74
11.2	Let Us Describe the Context!	76
11.3	Find the Critical Concept!	77
11.4	We Inspect the Concept's Walls!	77
11.5	Try to Soften and Open the Walls!	77
11.6	How Can We Extend Opened Walls?	79
11.7	Final Step: Testing Our Extension	82

12 Instrumental Aspects	85
12.1 What Is Your Open Question?	85
12.2 Let Us Describe the Context!	86
12.3 Find the Critical Concept!	87
12.4 We Inspect the Concept's Walls!	88
12.5 Try to Soften and Open the Walls!	88
12.6 How Can We Extend Opened Walls?	89
12.7 Final Step: Testing Our Extension	90
13 Creative Aspects of Musical Systems: The Case of Serialism	93
13.1 What Is Your Open Question?	96
13.2 Let Us Describe the Context!	97
13.3 Find the Critical Concept!	98
13.4 We Inspect the Concept's Walls!	98
13.5 Try to Soften and Open the Walls!	100
13.6 How Can We Extend Opened Walls?	101
13.6.1 Another Extension	104
13.7 Final Step: Testing Our Extension	105
14 Large Form Aspects	107
14.1 What Is Your Open Question?	109
14.2 Let Us Describe the Context!	110
14.3 Find the Critical Concept!	110
14.4 We Inspect the Concept's Walls!	111
14.5 Try to Soften and Open the Walls!	112
14.6 How Can We Extend Opened Walls?	113
14.7 Final Step: Testing Our Extension	115
15 Community Aspects	117
15.1 What is Your Open Question?	118
15.2 Let Us Describe the Context!	118
15.3 Find the Critical Concept!	119
15.4 We Inspect the Concept's Walls!	120
15.5 Try to Soften and Open the Walls!	120
15.6 How Can We Extend Opened Walls?	121
15.7 Final Step: Testing Our Extension	121
16 Commercial Aspects	123
16.1 What Is Your Open Question?	123
16.2 Let Us Describe the Context!	124
16.3 Find the Critical Concept!	124
16.4 We Inspect the Concept's Walls!	125
16.5 Try to Soften and Open the Walls!	125
16.6 How Can We Extend Opened Walls?	126
16.7 Final Step: Testing Our Extension	126

Part III Theory

17	Historical Approaches	131
17.1	The Concept of Creativity through (Western) History	132
17.2	Creativity in Early Psychology	135
17.3	Creativity Research in Recent Years	137
18	Present Approaches	141
18.1	The Creative Process Today	141
18.1.1	The Four P's of Creativity	141
18.1.2	The Creative Process	142
18.2	Musical Creativity	145
19	Our Approach	149
19.1	Approach to Creativity: A Semiotic Presentation	149
19.1.1	The Open Question's Context in Creativity	149
19.1.2	Motivation for a Semiotic Extension	150
19.1.3	The Critical Sign	151
19.1.4	Identifying a Concept's Walls	152
19.1.5	Opening a Wall and Displaying Its New Perspectives	154
19.1.6	Visual Representation of the Wall Paradigm	155
19.1.7	Evaluating the Extended Walls	157
19.2	Approach to Creativity: A Mathematical Model	157
19.3	The List of the Creativity Process	159
20	Principles of Creative Pedagogy	161
20.1	Origins of Creative Pedagogy	161
20.2	Applying Our Concept of Creativity to Creative Pedagogy	163
20.3	Creative Pedagogy for Musical Creativity	164
20.3.1	Conceiving Our Tutorial in Creative Pedagogy for Musical Creativity	166
21	Acoustics, Instruments, Music Software, and Creativity	169
21.1	Acoustic Reality	169
21.1.1	First Sound Anatomy	171
21.1.2	Making Sound	172
21.1.3	Fourier	176
21.1.4	FM, Wavelets, Physical Modeling	180
21.2	Electromagnetic Encoding of Music: Audio HW and SW	185
21.2.1	General Picture of Analog/Digital Sound Encoding	185
21.2.2	LP and Tape Technologies, Some History	190
21.2.3	The Digital Approach, Sampling	191
21.2.4	Finite Fourier Analysis	193
21.2.5	Fast Fourier Analysis (FFT)	196

21.2.6	Compression	201
21.2.7	MP3, MP4, AIFF	202
21.2.8	Filters and EQ	209
21.3	Symbolic Formats: Notes, MIDI, Denotators	214
21.3.1	Western Notation and Performance	214
21.3.2	MIDI: What It Is About, Short History	217
21.3.3	MIDI Networks: MIDI Devices, Ports, and Cables	219
21.3.4	MIDI Messages: Hierarchy and Anatomy	220
21.3.5	Time in MIDI, Standard MIDI Files	222
21.3.6	Short Introduction to Denotators	224
21.4	Creativity in Electronic Music: Languages and Theories	231
22	Creativity in Composition and Improvisation	233
22.1	Defining Composition and Improvisation	233
22.2	Creativity in Composition	236
22.2.1	Composition by Objectivation	236
22.2.2	Creativity in Composition with Symbolic Objects	237
22.3	Creativity in Improvisation	239
22.3.1	Improvisational Creativity in the Imaginary Time-Space	241
22.3.2	Improvisational Creativity with Gestural Embodiment	243
22.4	Instant Composition and Slow-Motion Improvisation	245
<hr/>		
Part IV Case Studies		
<hr/>		
23	The CD <i>Passionate Message</i>	251
23.1	The General Background of This Production	251
23.1.1	The Overall Strategy	251
23.1.2	Joomi's Compositional Approach	252
23.1.3	Guerino's Improvisational Approach	256
23.2	Softening One's Boundaries in Creativity	258
23.2.1	Embodied Creation and the Crisis of Contemporary Composition	259
23.3	The Problem of Creativity in a Dense Cultural Heritage of Compositions	262
23.3.1	First Wall: Composition, an Object?	262
23.3.2	Second Wall: Originality	263
24	The Escher Theorem	267
24.1	A Short Review of the Escher Theorem	267
24.1.1	Gestures and Hypergestures	267
24.1.2	The Escher Theorem	270
24.2	The Escher Theorem and Creativity in Free Jazz	273
24.3	Applying the Escher Theorem to Open Walls of Critical Concepts	276

25	Boulez: <i>Structures</i> Recomposed	279
25.1	Boulez’s Idea of a Creative Analysis	279
25.2	Ligeti’s Analysis	282
25.3	A First Creative Analysis of <i>Structure Ia</i> from Ligeti’s Perspective	283
25.3.1	Address Change Instead of Parameter Transformations	284
25.3.2	The System of Address Changes for the Primary Parameters	285
25.3.3	The System of Address Changes for the Secondary Parameters	286
25.3.4	The First Creative Analysis	288
25.4	Implementing Creative Analysis on RUBATO®	288
25.4.1	The System of Boulettes	290
25.5	A Second More Creative Analysis and Reconstruction	292
25.5.1	The Conceptual Extensions	294
25.5.2	The BigBang Rubette for Computational Composition	297
25.5.3	A Composition Using the BigBang Rubette and the Boulettes	299
25.5.4	Was This “Creative Analysis” a Creative Success?	302
26	Ludwig van Beethoven’s Sonata opus 109: Six Variations	305
26.1	Uhde’s Perspective Metaphor	306
26.2	Why a Sixth Variation?	307

Part V References, Index

References	313
Index	319