

Treatise on Musical Objects

An Essay across Disciplines

Pierre Schaeffer

Translated by Christine North and John Dack



UNIVERSITY OF CALIFORNIA PRESS

CONTENTS

<i>The Treatise on Musical Objects and the GRM, by Daniel Teruggi</i>	xv
<i>Translators' Introduction, by Christine North</i>	xxi
<i>Pierre Schaeffer's Treatise on Musical Objects and Music Theory,</i> <i>by John Dack</i>	xxix
<i>Acknowledgments</i>	xxxv
<i>Preface</i>	xxxvii

Introductory Remarks: The Historical Situation of Music	1
<i>Need for a Reappraisal, 1 · Three New Phenomena, 2 · The</i> <i>Three Dead Ends of Musicology, 4 · A Priori Music, 5 · Musique</i> <i>Concrète, 7 · Experimental Music, 8 · No-Man's-Land, 10 · Divergence of</i> <i>Disciplines, 11 · Music as Interdiscipline, 12 · Resources for Musical</i> <i>Experimentation, 14 · The Aims of Musical Experimentation:</i> <i>Objects, Structures, Languages, 15 · Musical Research, 17</i>	

BOOK ONE. MAKING MUSIC

1. The Instrumental Prerequisite	23
<i>1. Homo Faber or Homo Sapiens, 23 · 2. Neanderthal Music, 24 · 3. The</i> <i>Instrumental Paradox: The Birth of Music, 24 · 4. From the Instrument</i> <i>to the Work, 25 · 5. From the Instrument to the Musical Domain: Musical</i> <i>Civilizations, 26 · 6. Concrete and Abstract in Music, 27 · 7. Registers</i> <i>and Musical Domains, 28 · 8. Limitations of "Musical Catechisms," 30</i>	

2.	Playing an Instrument	31
	1. <i>Definition of an Instrument</i> , 31 · 2. <i>Composition of Instruments</i> , 32 · 3. <i>Simple or Multiple Instruments</i> , 33 · 4. <i>Instrumental Analysis</i> , 34 · 5. <i>Triple Nature of the Instrument</i> , 35 · 6. <i>The Electronic Instrument</i> , 36 · 7. <i>Musique Concrète</i> , 38 · 8. <i>Confusion over Instruments</i> , 39 · 9. <i>Critique of the Electronic Instrument</i> , 40 · 10. <i>Critique of "Musique Concrète,"</i> 42 · 11. <i>Faults Common to Both Musics</i> , 43 · 12. <i>Concept of the Pseudo-instrument</i> , 45	
3.	Capturing Sounds	46
	1. <i>The Paradox of Discovery</i> , 46 · 2. <i>Mystery of the Cylinder and Powers of the Ear</i> , 47 · 3. <i>The Historical Contribution of Radio Broadcasting</i> , 48 · 4. <i>The Myth of Sound Reproduction</i> , 49 · 5. <i>From One Sound Field to Another</i> , 50 · 6. <i>The Physical Object in the Transformation</i> , 50 · 7. <i>Transformations in the Sound Field</i> , 52 · 8. <i>Properties of Recorded Sound</i> , 54 · 9. <i>Fidelity</i> , 55 · 10. <i>Timbre of the Equipment</i> , 57 · 11. <i>The Sound Recordist as Interpreter</i> , 57 · 12. <i>Musicians Have No Ear</i> , 58 · 13. <i>Prose Composition and Translation</i> , 59 · 14. <i>"Radiogenicity,"</i> 60 · 15. <i>Advice from an Elder</i> , 61 · 16. <i>Nothing New under the Sun</i> , 62	
4.	Acousmatics	64
	1. <i>Relevance of an Ancient Experiment</i> , 64 · 2. <i>Acoustic and Acousmatic</i> , 65 · 3. <i>The Acousmatic Field</i> , 65 · 4. <i>On the Sound Object: What It Is Not</i> , 67 · 5. <i>Originality of the Acousmatic Approach</i> , 69	
BOOK TWO. HEARING		
5.	"What Can Be Heard"	73
	1. <i>To Hear (Entendre) According to Littré</i> , 73 · 2. <i>To Perceive Aurally (Oùir)</i> , 74 · 3. <i>To Listen (Écouter)</i> , 75 · 4. <i>To Hear (Entendre)</i> , 76 · 5. <i>To Understand (Comprendre)</i> , 78	
6.	The Four Listening Modes	80
	1. <i>The Functional Aspect of the Ear</i> , 80 · 2. <i>Littré (Cont.): The Communication Circuit</i> , 81 · 3. <i>The Individual and Objects: Perceptual Intentions</i> , 82 · 4. <i>Stages and Outcomes of Listening: Diversity and Complementarity</i> , 84 · 5. <i>Two Pairs: Subjective-Objective and Concrete-Abstract</i> , 85 · 6. <i>Two Pairs of Listening Modes: Natural and Cultural, Ordinary and Specialized</i> , 86 · 7. <i>Exclusives of Specialized Listening</i> , 88 · 8. <i>Comparison between Specialized Modes of Listening</i> , 91	
7.	Scientific Prejudice	94
	1. <i>The Prestige of Logic</i> , 94 · 2. <i>Practice: Musical Communication</i> , 95 · 3. <i>An Option for Music: A Language in Itself</i> , 96 · 4. <i>Another Option: Synthetic Music</i> , 97 · 5. <i>From Physics to Music</i> , 98 · 6. <i>The System</i> , 99 · 7. <i>Ambitions and Inadequacies of Physics</i> , 100 · 8. <i>Possible Musical Experimentation</i> , 101	

8. The Hearing Intention 103
1. *Pleonasm*, 103 · 2. *The Two Pathways*, 104 · 3. *The Hearing Intention from a Scientific Point of View*, 105 · 4. *The Stumbling Block*, 107 · 5. *Correlations*, 108 · 6. *The Hearing Intention from a Philosophical Point of View*, 109 · 7. *On Some Musical Hearing Intentions*, 110 · 8. *Musical Listening Modes*, 111 · 9. *Final Summary of Intentions*, 113

BOOK THREE. CORRELATIONS BETWEEN THE PHYSICAL SIGNAL AND THE MUSICAL OBJECT

9. Ambiguities in Musical Acoustics 119
1. *An Ambiguous Concept*, 119 · 2. *Sight and Hearing*, 119 · 3. *The "Theory of Theories,"* 121 · 4. *Traditional Doctrine: Acoustic Basis of Music*, 123 · 5. *The Acoustics of Music*, 124 · 6. *Psychoacoustics and Experimental Music*, 126 · 7. *Investigate or Use the "Black Box,"* 127
10. Correlation between Spectra and Pitches 130
1. *The Traditional Doctrine*, 130 · 2. *Helmholtz's Resonators*, 131 · 3. *Fourier's Series*, 133 · 4. *The Perception of Pitches*, 135 · 5. *Experiments on Residuals*, 136 · 6. *Experiment on Unisons*, 138 · 7. *Musical and Psychoacoustic Calibrations*, 139 · 8. *Pitch Differentiation Thresholds: Importance of Context*, 140 · 9. *Conclusions: The Various Pitch Structures*, 142 · 10. *Sound Mass and Filtering*, 144 · *Appendix: Experiment on Unisons*, 146
11. Thresholds and Transients 150
1. *Transient Phenomena*, 150 · 2. *Physicists' Musical Postulates*, 151 · 3. *Critique of the Approach to Music through Transients*, 152 · 4. *The Ear as a Device*, 154 · 5. *Temporal Thresholds*, 155 · 6. *Mechanical Time Constant of the Ear*, 156 · 7. *Time Constant of the Ear's Physiological Power of Integration*, 157 · 8. *Pitch, Articulation, and Timbre Recognition Thresholds*, 158 · 9. *Comparison between Time Thresholds and Duration of Transients*, 160 · 10. *Spatialization*, 161 · 11. *Mechanism and Function*, 162
12. Temporal Anamorphoses I: Timbres and Dynamics 163
1. *Time Localization*, 163 · 2. *Beginnings of Sounds*, 164 · 3. *The Spliced Piano*, 169 · 4. *Scissor Attack*, 171 · 5. *Cutting Sounds Other Than Percussive*, 173 · 6. *General Interpretation of These Findings*, 174 · 7. *Laws of Perception of Attack*, 175 · 8. *Effect of Dynamic on the Perception of Timbres*, 179
13. Temporal Anamorphoses II: Timbre and Instrument 180
1. *Timbre of an Instrument and of an Object*, 180 · 2. *Timbre of Piano Notes*, 181 · 3. *Concept of a Musical Instrument: Law of the Piano*, 182 · 4. *Experiments on the Timbre of the Piano: Transmutations and Filtering*, 183 · 5. *Timbres and Causalities*, 185 · 6. *Causalities and Harmonic Structures: Functional Anamorphoses*, 187 · 7. *Causality and Music*, 189

14.	Time and Duration	190
	1. <i>A Long Digression</i> , 190 · 2. <i>Rhythms and Durations</i> , 191 · 3. <i>Experiment on the "Seven Dissymmetrical Sounds,"</i> 192 · 4. <i>Duration and "Information,"</i> 194 · 5. <i>Sound Played Backward</i> , 195 · 6. <i>Temporal Symmetry and Dissymmetry: Aspects of Temporal Anamorphosis</i> , 196 · 7. <i>Hearing Time</i> , 197 · 8. <i>Musical Durations</i> , 199 · 9. <i>Duration and Information</i> , 200	

BOOK FOUR. OBJECTS AND STRUCTURES

15.	Reduction to the Object	205
	1. <i>From Experiment to Explanation</i> , 205 · 2. <i>Transcendence of the Object</i> , 206 · 3. <i>The Naive Theory of the World: Époché</i> , 208 · 4. <i>The Sound Object</i> , 210 · 5. <i>Reduced Listening</i> , 212 · 6. <i>Gestalttheorie</i> , 214 · 7. <i>Gestalt, Form, Structure</i> , 216 · 8. <i>The Object-Structure Pair</i> , 217	
16.	Perceptual Structures	220
	1. <i>The Two Infinities</i> , 220 · 2. <i>Ambition for the Elementary</i> , 221 · 3. <i>Significance of Values</i> , 222 · 4. <i>Code and Language</i> , 223 · 5. <i>Linguistic Structures, Musical Structures</i> , 224 · 6. <i>The Levels of Language: Signification and Differentiation</i> , 224 · 7. <i>Phonemes: Or Distinctive Features</i> , 225 · 8. <i>From the Phoneme to the Musical Note</i> , 227 · 9. <i>Sound Object and Phonetics</i> , 228 · 10. <i>Direction of Research</i> , 230	
17.	Comparative Structures: Music and Language	232
	1. <i>The Higher Level</i> , 232 · 2. <i>Language</i> , 233 · 3. <i>The Rules of Language</i> , 234 · 4. <i>Application of the Rules of Language to Music</i> , 236 · 5. <i>Permanence and Variation in Musical Structures</i> , 237 · 6. <i>Values and Characteristics</i> , 239 · 7. <i>Divergences</i> , 240 · 8. <i>Language Systems and Speech</i> , 241 · 9. <i>The Two Exclusives in Language Systems</i> , 242 · 10. <i>A Possible Musical Language System: Pure Music, Musical Writing</i> , 246 · 11. <i>Instrumental Music</i> , 247	
18.	The Conventional Musical System: Musicality and Sonority	249
	1. <i>A Delightful Assortment</i> , 249 · 2. <i>A Dangerous Intersection</i> , 250 · 3. <i>Musicality and (Traditional) Sonority</i> , 252 · 4. <i>Instrumental Overview</i> , 255 · 5. <i>What Is Your Favorite Instrument, and Why?</i> 256 · 6. <i>Identification and Description</i> , 258 · 7. <i>Diabolus in Musica</i> , 260	
19.	Natural Sound Structures: Musicianly Listening	263
	1. <i>The Universal Symphony</i> , 263 · 2. <i>The Repertoire of Causalities</i> , 265 · 3. <i>The Language of Things</i> , 266 · 4. <i>The Child with the Grass</i> , 268 · 5. <i>The Musical in Embryo</i> , 269 · 6. <i>The Child with the Violin</i> , 270 · 7. <i>Overview of "Sonority,"</i> 272 · 8. <i>Relationship between Musicianly and Natural Listening</i> , 273 · 9. <i>Toward a Musicianly Classification of Sound Objects</i> , 274 · 10. <i>From Sound to the Musical</i> , 274	

20.	The Reduced Listening System: Musical Dualism	276
	1. <i>Dilemma or Dualism</i> , 276 · 2. <i>Argument for a General Musicology</i> , 277 · 3. <i>Argument for Sound as Given</i> , 278 · 4. <i>Musical Activity</i> , 279 · 5. <i>Two Pitfalls</i> , 280 · 6. <i>Musicianly Invention</i> , 282 · 7. <i>Musical Invention</i> , 283	
21.	Musical Research	285
	1. <i>Fundamental Research</i> , 285 · 2. <i>Interwovenness of Levels of Complexity and Sectors of Activity</i> , 286 · 3. <i>Preparatory Exercises</i> , 287 · 4. <i>How the Experimental System Works</i> , 288 · 5. <i>Contents of the Traditional System</i> , 290 · 6. <i>Origins of the Experimental System</i> , 293 · 7. <i>Invariants in the Experimental System</i> , 295 · 8. <i>Suitable Objects</i> , 296 · 9. <i>Perceptual Field</i> , 297 · 10. <i>Object and Structures</i> , 297 · 11. <i>Meaning and Signification</i> , 298 · 12. <i>Constituent Activities: The Four Axioms of Music</i> , 299 · 13. <i>Synthesis of Musical Structures or the Invention of Musics</i> , 301 · 14. <i>Properties of the Perceptual Musical Field</i> , 303 · 15. <i>Contents of the Experimental System</i> , 304	
BOOK FIVE. MORPHOLOGY AND TYPOLOGY OF SOUND OBJECTS		
22.	Morphology of Sound Objects	309
	1. <i>Theory and Practice</i> , 309 · 2. <i>Prose Composition and Translation in Sound</i> , 310 · 3. <i>Prose Composition</i> , 311 · 4. <i>Translation</i> , 312 · 5. <i>Example of a Classification</i> , 313 · 6. <i>Morphology and Typology</i> , 315 · 7. <i>The Form-Matter Pair</i> , 317 · 8. <i>Objects with Fixed Form: Criterion of Matter</i> , 318 · 9. <i>Objects with Fixed Matter: Criterion of Form</i> , 318 · 10. <i>Evolving Sounds: The Norm</i> , 319	
23.	The Laboratory	321
	1. <i>Electroacoustic Prerequisites</i> , 321 · 2. <i>The Electroacoustic System</i> , 322 · 3. <i>Repercussions of the System on Fundamental Research</i> , 326 · 4. <i>Description and Use of Sound Bodies</i> , 327 · 5. <i>Factures: Invention of Sound Objects and Sound Recording</i> , 328 · 6. <i>Preparing the Object</i> , 330 · 7. <i>The Transpositions of the Object</i> , 332 · 8. <i>Transmutations of the Object</i> , 333 · 9. <i>Electronic Generators</i> , 334 · 10. <i>The Bare Essentials</i> , 336 · <i>Appendix A: The Time Regulator</i> , 337 · <i>Appendix B: The Form Modulator</i> , 338	
24.	Typology of Musical Objects (I): Classification Criteria	340
	1. <i>The Parable of the Attic</i> , 340 · 2. <i>The Search for Typological Criteria</i> , 341 · 3. <i>Duration and Variation</i> , 343 · 4. <i>Objects in Sheaves</i> , 343 · 5. <i>Balance and Originality</i> , 344 · 6. <i>Summary of Typological Criteria</i> , 345 · 7. <i>A Study of the Diagram Column by Column</i> , 347 · 8. <i>A Study of the Diagram Row by Row</i> , 348 · 9. <i>Foundational Schema of the Typology of Sound Objects</i> , 350	
25.	Typology of Musical Objects (II): Balanced and Redundant Objects	352
	1. <i>Balanced Objects</i> , 352 · 2. <i>Analysis Based on the Criterion of Fracture</i> , 352 · 3. <i>Analysis Based on the Criterion of Mass</i> , 355 · 4. <i>Redundant or Not Very Original Objects</i> , 356 · 5. <i>Pure Sounds</i> , 358 · 6. <i>Summary Diagram of Redundant or Not Very Original Sounds</i> , 358	

26.	Typology of Musical Objects (III): Eccentric Sounds	360
	1. <i>Eccentric Sounds</i> , 360 · 2. <i>Samples</i> , 361 · 3. <i>Accumulations</i> , 361 · 4. <i>Cells, Ostinati, and Fragments</i> , 362 · 5. <i>Large Notes and Wefts</i> , 363 · 6. <i>Unisons</i> , 365 · 7. <i>Summary Diagram of Typology</i> , 365	
27.	Working at Our Instrument	367
	1. <i>Sound Reels</i> , 367 · 2. <i>Makeup of a Translation Reel</i> , 367 · 3. <i>Study of Internal Morphology</i> , 369 · 4. <i>External Morphology</i> , 370 · 5. <i>Relativity of Analyses</i> , 371 · 6. <i>Typological Formulae</i> , 372 · 7. <i>Prose Composition: The Study of Sustained Sounds</i> , 373 · 8. <i>General Plan for a Reel of Sustained Sounds</i> , 374 · 9. <i>Comments on the Experimental Technique</i> , 375	
BOOK SIX. THEORY OF MUSICAL OBJECTS		
28.	Musical Experience	379
	1. <i>Moving toward the Musical</i> , 379 · 2. <i>The Sociological Factor in Musical Experience</i> , 380 · 3. <i>Deconditioning Exercises</i> , 382 · 4. <i>Reconditioning Exercises</i> , 383 · 5. <i>Talking about Sounds, or the "Metalanguage,"</i> 384 · 6. <i>Two Sorts of Musical Experiences</i> , 385 · 7. <i>Inventing Objects</i> , 386 · 8. <i>Experimental Reels</i> , 388 · 9. <i>Studies on Objects</i> , 389	
29.	Generalizing Music Theory	391
	1. <i>Traditional Music Theory</i> , 391 · 2. <i>The Two Scores</i> , 392 · 3. <i>Signs and Musical Thought</i> , 393 · 4. <i>Objective of a Music Theory</i> , 394 · 5. <i>Sound Architecture</i> , 394 · 6. <i>The Four Musicianship Procedures</i> , 396 · 7. <i>Typological Recapitulation (Sector 2)</i> , 398 · 8. <i>Morphological Criteria (Sector 3)</i> , 398 · 9. <i>Music Theory of Extreme Examples: Deponent Sound Objects</i> , 399 · 10. <i>Musical Analysis of the Criteria (Sector 4)</i> , 400 · 11. <i>The Three Dimensions of the Musical Perceptual Field</i> , 401 · 12. <i>Final Diagram for the Theory: Types, Classes, Genres, Species of Sounds</i> , 402 · 13. <i>Analogical Criteria</i> , 403	
30.	Theory of Homogeneous Sounds: Criterion of Mass	406
	1. <i>Experimental Material</i> , 406 · 2. <i>Analogical Criteria from Traditional Musical Experience</i> , 407 · 3. <i>Scientific Criteria: Additional Properties of Pure Sounds</i> , 408 · 4. <i>Method of Approach</i> , 411 · 5. <i>Harmonic Timbre and Mass</i> , 411 · 6. <i>Classes of Mass in Homogeneous Sounds</i> , 412 · 7. <i>Characteristic of Mass: Texture of a Sound</i> , 414 · 8. <i>Species of Mass</i> , 415 · 9. <i>The Two Pitch Fields</i> , 416 · 10. <i>Pitch Calibrations</i> , 416 · 11. <i>Temperament</i> , 417 · 12. <i>Criterion of Harmonic Timbre: Classes and Characteristics</i> , 418 · 13. <i>Species of Timbre</i> , 419 · 14. <i>Importance of the Criterion of Mass</i> , 421	

31. Theory of Fixed Masses: Dynamic Criterion 422
 1. *Concept of the Note*, 422 · 2. *Method of Approach*, 423 · 3. *Criterion of Attack: Genres of Forms*, 424 · 4. *Criterion of Profile: Classes of Forms*, 427 · 5. *Manipulations on Forms*, 431 · 6. *The Dynamic Field*, 432 · 7. *Dynamic Sound Species*, 434
32. Theory of Sustainment 436
 1. *Concrete Criteria*, 436 · 2. *Sustainment Criteria*, 437 · 3. *The Signature of Fracture*, 438 · 4. *Types of Grain*, 439 · 5. *Genres of Grain*, 440 · 6. *Species of Grain*, 441 · 7. *Analogical Criteria: Classes of Grain*, 443 · 8. *Allures*, 443 · 9. *Typomorphology of Allures*, 444 · 10. *Species of Allure*, 446
33. Theory of Variations 447
 1. *Musical Variation*, 447 · 2. *Perception of Variations*, 448 · 3. *Variation and Structure*, 449 · 4. *Typology of Variations*, 451 · 5. *Variation Criteria*, 453 · 6. *Typology of Melodic Variations*, 455 · 7. *Musical Tradition of Melodic Variations: Neumes*, 457 · 8. *Classes, Genres, and Species of Melodic Variations*, 458 · 9. *Mass Variations*, 459 · 10. *Sustainment Variations*, 459 · 11. *Structures of Variations*, 460
34. Analysis of the Musical Object as It Generally Appears 462
 1. *The Troublesome Example*, 462 · 2. *Analytical Diagram*, 463 · 3. *Summary Diagram*, 464 · 4. *Layout of the Diagram*, 468 · 5. *Evaluation of Criteria in the Perceptual Field*, 469 · 6. *Musical Scales*, 471 · 7. *Numbers and Nuances*, 472 · 8. *Object Identification Chart*, 473 · 9. *Meaning of the Analytical Diagram and How to Use It*, 474

BOOK SEVEN. MUSIC AS A DISCIPLINE

35. Implementation 479
 1. *How Should We Make and What Should We Listen For?* 479 · 2. *On the Right Use of a Music Theory*, 480 · 3. *Attempt at an Exploration of Traditional Musics*, 481 · 4. *Calibrations of Values*, 482 · 5. *Simple Relationships*, 484 · 6. *Reference Structures*, 486 · 7. *Listening to Contemporary Musics*, 489 · 8. *A Priori Musics*, 491 · 9. *Serial Genetics in Electronic Music*, 493 · 10. *Outside the Series*, 497 · 11. *The Three Tiers*, 499 · 12. *Musics*, 500 · 13. *Tablatures*, 503 · 14. *Music and Machines*, 504 · 15. *The Two Musics*, 505 · 16. *The Continuous and the Discontinuous*, 506 · 17. *Polyphony and Polymorphy*, 508 · 18. *Music and Aesthetics*, 510 · 19. *Music and the Disciplines*, 511

36. The Meaning of Music	513
1. <i>Orpheus</i> , 513 · 2. <i>Musical Consumption</i> , 514 · 3. <i>The Musical Environment</i> , 515 · 4. <i>Musicians</i> , 517 · 5. <i>The Inspiration of the Moment</i> , 518 · 6. <i>From the Scribe to the Acrobat</i> , 518 · 7. <i>The Experts</i> , 520 · 8. <i>The Role of Orpheus</i> , 521 · 9. <i>Respect for Humankind</i> , 522 · 10. <i>Orpheus in the Underworld</i> , 523 · 11. <i>A Spiritual Technique</i> , 524 · 12. <i>The Meaning of Words</i> , 526 · 13. <i>The Language of Things</i> , 527	
Penultimate Chapter: In Search of Music Itself	530
<i>Anamorphoses between Music and Acoustics</i> , 532 · <i>Return to the Object and the Musical Endeavor</i> , 535 · <i>The Four Listening Modes</i> , 539 · <i>Beyond the Mark, Short of the Mark</i> , 542 · <i>The Musical Relationship</i> , 544 · <i>Back-to-Front Music</i> , 548 · <i>The Composer's Noise</i> , 551 · <i>Typology of Contemporary Musics</i> , 552 · <i>An Undesirable Teaching Method</i> , 554 · <i>The Three Levels of the Score</i> , 556 · <i>Music as Will or Representation</i> , 558 · <i>The Target</i> , 559	
<i>Postscript</i>	561
<i>Index</i>	563