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# Theory and Background Part I

# 1 Core Aspects of Tonal Compositions

- 1.1 Structured Tonal Motion
- 1.2 Polyphony
- 1.3 Musical Time
- 1.4 Form and Repetition

# 2 Meta-languages for Abstraction and Structure

- 2.1 Description, Instantiation, and Interpretation
- 2.2 Grammar and Syntax
- 2.2.1 Grammar of Natural Languages
- 2.2.2 Grammar-Based Music Theories
- 2.3 Formal Logic and Type Theory
- 2.3.1 Combinatory Categorial Grammar

## 3 Constructive Logic and Dependent Type Theory

- 3.1 Curry-Howard Correspondence
- **3.2** Motivations For Using Type Theory
- 3.2.1 Composable and Verifiable Derivations
- 3.2.2 Abstract Context-Free Grammar as Indexed Type
- 3.2.3 Modular Constructions Beyond Context-Free
- 3.3 Generic Programming

# 4 Outlook

- 4.1 Towards a Wholistic Model of Tonal Music
- 4.1.1 A Plan for combining Modular Theories
- **4.1.2** Relating General Principles to Style Specific Constraints
- 4.1.3 A Theory Driven Approach to Algorithmic Composition
- 4.2 Thesis Outline

# A Process Algebra For Metered Part II Polyphony

## 5 Tonal Motion as Hierarchical Processes

- 5.1 Challenges in a Hierarchical Model of Tonal Motion
- 5.1.1 Are Tones the Only Entity?
- 5.2 Applicability and Inspiration From Existing Process Calculi
- 5.2.1 Algebra of Communicating Processes
- 5.2.2 Communicating Sequential Processes
- 5.2.3 Calculus of Communicating Systems
- 5.3 Stationary and Transitory Processes
- 5.4 Temporal Abstractions
- 5.5 Spatial Abstractions
- 5.6 Comparison with Existing Theories

## **6** Timely Processes

#### 6.1 Challenges in Combining Tonal Structure and Metrical Structure

Irregular proportions of the deeper levels

Passing Note in a Triple Meter

**Accented Passing Notes** 

**Suspensions** 

**Interruptions** 

#### 6.2 Schenkerian Approaches to Rhythm

- **6.2.1** Rhythmic Equilibrium
- **6.2.2** How can Arrhythmic become Rhythmic?
- **6.3** Temporal Relations of Processes
- **6.3.1** Perceived vs Interpreted Simultaneity
- 6.3.2 A Non-Linear Topology of Musical Time
- **6.3.3** Metered Processes
- **6.3.4** Syncopated Processes

#### **6.4** Connection with Existing Theories

# **General Structural Repetition Part III**

### **6.5** Various Types of Structural Repetition

- **6.5.1** Exact Repetition
- **6.5.2** Surface Variation
- 6.5.3 Reinterpretation
- 6.5.4 Transference

### **6.6** Existing Formalisms of Repetition

- **6.6.1** Without Syntactical Constraints
- **6.6.2** With Syntactical Constraints

#### 6.7 A Formal Model of Structural Repetition

- 6.7.1 Typed Holes and Arrows: A Functional Interpretation of Templates
- **6.7.2** Repetition structure as Higher-Order Templates
- 6.7.3 Repetition-Syntax-Material Decomposition
- **6.7.4** Cross-Domain Analogies of Repetition Structure

# **Computational Experiments Part IV**

## **6.8** Encoding and Generating Instances of Galant Schemata

**6.9** Sampling Metered Polyphony with Repetition Constraint

## **6.10** Compression by Exploiting Structural Repetition