Constituent Structure and Ordering in Serial Music and Language Games

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Introduction

•Music and language are complex, abstract, human-specific systems.

•Formal similarities between the two systems have been investigated in the literature (e.g. Lerdahl & Jackendoff 1983, Lerdahl 2001, Katz & Pesetsky 2011).

•The most ambitious work on music and linguistic theory is Lerdahl and Jackendoff's Generative Theory of Tonal Music (1983).

•GTTM proposes a model of musical structure with a number of interacting components, analogous to the interacting components in generative grammar.

•**Identity Thesis for Language and Music**: "All formal differences between language and music are a consequence of differences in their fundamental building blocks (arbitrary pairings of sound and meaning in the case of language; pitch-classes and pitch-class combinations in the case of music). In all other respects, language and music are identical." (Katz & Pesetsky 2011: 3)

•Parallels are found in the manipulation of prosodic constituents in phonological language games and manipulation of pitch collections in serial music.

Language Games

•Language games involve systematic manipulation of linguistic structure; language game operations include affixation, replacement, reversal (e.g. Bagemihl 1995).

•Source of evidence relevant for theories of prosodic constituents in phonology; syllables, feet, moras, timing units, tonal melodies, etc.

Why Serial Music and Language Games?

•Strong parallels have been found between stress assignment and grouping and prominence structure in music (e.g. Lerdahl & Jackendoff 1983, Katz & Pesetsky 2011).

•The same constituents referred to in stress assignment patterns are manipulated in language games.

•Other common phonological processes (e.g. assimilation) are conditioned partly by functional factors specific to the vocal tract which have no direct parallels in music.

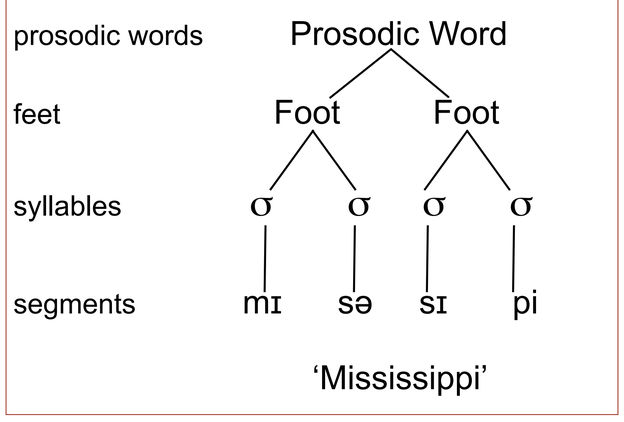
•Previous work on language and music (e.g. Lerdahl & Jackendoff 1983, Lerdahl 2001, Katz & Pesetsky 2011) primarily focus on tonal music.

•Atonal and serial music stretch the formalisms developed in previous studious (e.g. Lerdahl & Jackendoff 1983).

•Transformations of pitch events within the 12-tone rows characteristic of serial music are difficult to aurally comprehend (Lerdahl 2004).

•We address difficulties in applying previously developed formalisms to the study of serial music by focusing on smaller constituents; hexachords, tetrachords, dyads.

The Prosodic Hierarchy



Constituent Structure: Serial Compositions

•Pitches are the basic elements which are combined to form larger constituents.

•12-tone rows are central to the structure of serial compositions.

•12-tone rows can be divided into smaller constituents; hexachords, tetrachords, dyads.

Segmental Reversal

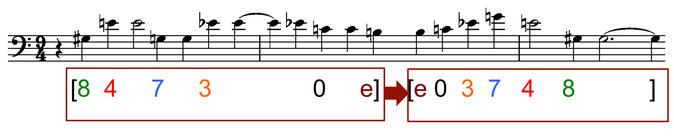
Javanese (Austronesian)

dolanan 'play' ⇒ nanalod
botʃah 'boy' ⇒ hatʃob

(Bagemihl 1989: 485)

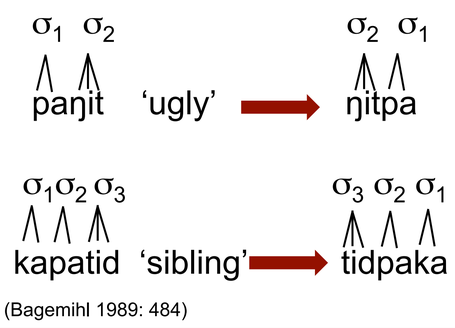
Retrograde

Schoenberg's *Modern Psalm*, op. 50c



Syllabic Reversal

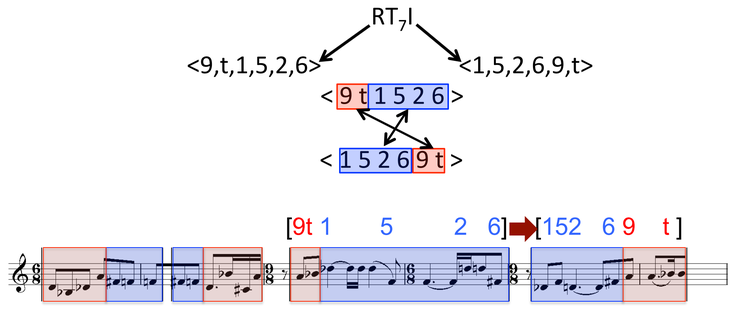
Tagalog (Austronesian)



(Bagemihl 1989: 484)

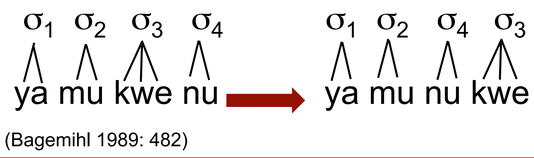
Constituent Reversal

Schoenberg's *Modern Psalm*, op. 50c



Interchange: Last Two Syllables

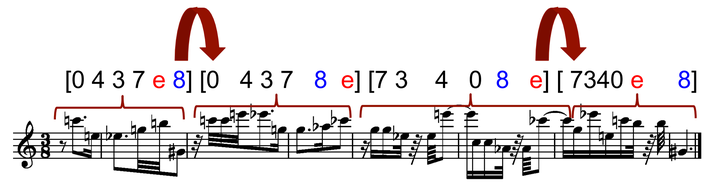
Luchazi (Bantu)



(Bagemihl 1989: 482)

Interchange: Segmental

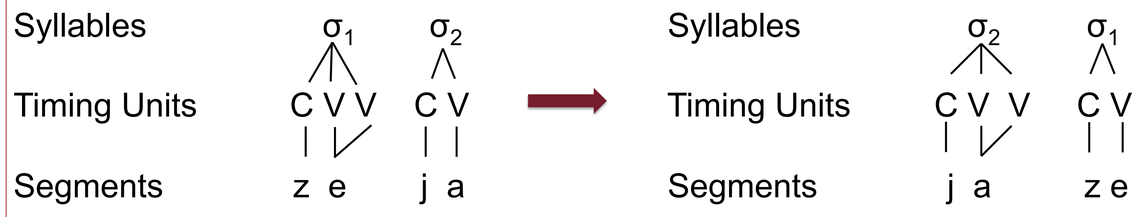
Schoenberg's *Suite*, op. 29, Overture



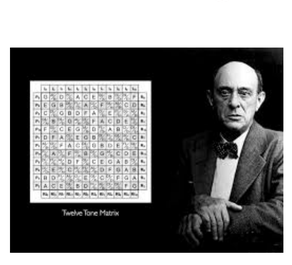
False Reversal Bakwiri (Bantu)

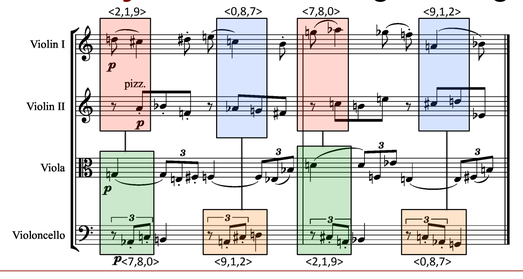
• Syllables are reversed but timing relations of consonants and vowels is maintained

zeeja 'burn' ⇒ jaaze



Retrograde with Fixed Rhythm Schoenberg's String Quartet no. 4, I





Discussion

•Manipulation of the syllabic level is most common in language games and reversal of segments is attested but relatively rare (Bagemihl 1989: 485).

•In musical composition, reversal of pitches, the smallest level of constituent structure, is extremely common, both in serialism and in other musical idioms.

•Reversals of higher level constituents, dyads and tetrachords, are found in serial composition but are less common than manipulation at the level of the pitch.

•This asymmetry between language games and musical patterns may result from restrictions on how segments can combine within syllables.

•Syllable onsets must rise in sonority whereas codas must fall. Direct reversal of segments has the potential to produce marked syllable structures.

•In line with the identity thesis, Katz & Pesetsky (2011), argue that identical formalisms be used to represent prosody and prominence relations in music.

•Katz & Pesetsky (2011) nonetheless note that representations of linguistic prosody require each level to have a distinct label; syllable, foot, etc., whereas representations of prominence developed in the analysis of music (e.g. Lerdahl & Jackendoff 1983) do not have distinct labels associated with different levels.

•Because prosodic boundaries can be affected by features of lexical items, Katz & Pesetsky (2011) argue that the need to have labeled levels in linguistic, but not musical representations, follows from the fact that language, but not music, has a lexicon.

•Comparison of sequential manipulations in language games and serial music suggests that differences between levels in linguistic prosodic structure also follow from phonological restrictions on how elements can combine within syllables.

Conclusion

•Similarities in patterning of serial music and language games support work arguing for commonalities between the representation and computation of musical and linguistic structures. These similarities are not limited to Western tonal music and formal parallels between linguistic structure and music can be found in serial music.
•The analysis of serial works as alterations in constituent ordering provides a simpler, more intuitive analysis for understanding and hearing pitch class transformations.

References: Bagemihl, B. 1989. The Crossing Constraint and "Backwards Languages." *NLLT* 7(4). 481–549. • Bagemihl, B. 1995. Language games and related areas. In J. Goldsmith (ed.), *The Handbook of Phonological Theory*, 697–712. Oxford: Blackwell. Katz, J. & D. Pesetsky. 2011. The Identity Thesis for Music and Language. Manuscript, MIT. Lerdahl, F. & R. Jackendoff. 1983. *A Generative Theory of Tonal Music.* Cambridge, MA: MIT Press. Lerdahl, F. 2004. *Tonal Pitch Space.* New York: Oxford U Press.