Music Theory - Why bother? On Music Theory in relation to Music Information Processing



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- My background
- What is this about?
- Why is this in the summer school?

There is no such thing as a conceptual vacuum

Agenda

- No, this will not be a full course or crash course in Music Theory
- Aim: introduce some issues, discuss basic concepts and give some overview
- Today: Introduction to approaches in the field of music theory and the possible relevance for MIR
- Thursday: Pitch and Tonality Sven Ahlbäck
- How to study a music culture: Indian Classical music, by Rafael Caro
- Friday: Rhythm & Structure Sven Ahlbäck

Topics for the workshops in afternoon sessions are connected

- Harmony
- Melodic similarity
- Rhythm

An example manual learning task: Transcription using your built-in biological system

listen

sing

notate what we sing

notate what we hear



How did it really sound?

Examples



Court music Uganda Moçambique

Studies of tuning & perception

(Cooke 1970, Wachsmann 1971 Kubik 1960, Valkare 2016 etc.)

Equidistant pentatonic pitch set



What happened?

So what's the ground truth here?

"There are only semitones and whole tones"

Our perception is influenced by music theoretical concepts

We hear what we know

How does this relate to MIR?

If models we use model human cognition, and human cognition is related to concepts originating from music theory, it might not be out of the way to be know a little about it?

You might want to contribute to knowledge about music.

What is Music Theory?*

Zbikowski: (2002)

What music theory is not:

"...for music theory is, within the rolling seas of humanistic studies, a rather strange fish. Put bluntly, it is clear that much of what music theory does, as a discipline, does **not count as any sort of theory** in modern scholarship."

Wiggins, Müllensiefen, Pearce: (2010)

What music theory is not:

"It is important to acknowledge the difference between the meanings of the word "theory" as applied in "music theory" and, on the other hand, in "scientific theory"

Instead:

Music theory is a collection of sets of rules which describe the culturally determined practice of people who create music in a particular culture during a particular period. Music theorists readily acknowledge exceptions to their rules

Why this criticism of music theory from humanistic (Zbikowski) and from Natural Science (Wiggins, Müllensiefen, Pearce)? Qualifications for scientific theory

What is Music Theory?

Why has music theory emerged? What is the purpose of music theory? Who have used it?



General topics within Music Theory

- What is the nature of music?
- How can music be conceptualized & represented?
- How does music work?
- How can it be created?
- Reveal, Represent, Explain,
- Tools for other disciplines

Music Theory - Field of tension

- What is the nature of music?
- How can music be conceptualized/represented?
- How does music work?
- How can it be created?
- **Reveal, Represent, Explain,**
- Tools









What is MIR and does it relate to music theory? ISMIR & Mirex challenge

		Culture	
Music Information Retrieval		Historical musicology New musicology Music aesthetics Organology Music anthropology Music sociology Music ethnology	
from the vie	w-point of	Culturally	
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	Speculative music theory Music lingustics Music acoustics Music informatics Music psychology Music mathematics Music perception & cognition	

Audio chord estimation task

Description

This task requires participants to extract or transcribe a sequence of chords from an audio music recording. For many applications in music information retrieval, extracting the harmonic structure of an audio track is very desirable, for example for segmenting pieces into characteristic segments, for finding similar pieces, or for semantic analysis of music. The extraction of the harmonic structure requires the estimation of a sequence of chords that is as precise as possible. This includes the full characterisation of chords – root, quality, and bass note – as well as their chronological order, including specific onset times and durations. Audio chord estimation has a long history in MIREX, and readers interested in this history, especially with respect to evaluation methodology, should review the work of Christopher Harte (2010), Pauwels and Peeters (2013), and the "Utrecht Agreement" 🗗 on evaluation metrics.

Chord sequence

Segmentation Similarity Semantic analysis

Data

Two datasets are used to evaluate chord transcription accuracy.

Isophonics

The collected Beatles, Queen, and Zweieck datasets from the Centre for Digital Music at Queen Mary, University of London (http://www.isophonics.net/ (?), as used for Audio Chord Estimation in MIREX for many years. Available from http://www.isophonics.net/ (?). See also Matthias Mauch's dissertation (2010) and Harte et al.'s introductory paper (2005). Billboard

An abridged version of the *Billboard* dataset from McGill University, including a representative sample of American popular music from the 1950s through the 1990s. Available from http://billboard.music.mogilLea.t9. See also Ashley Burgoyne's dissertation (2012) and Burgoyne et al.'s introductory paper (2011). Parsing tools for the data are available from http://hackage.haskelLorg/package/billboard-parser/ 🕾 and documented by De Haas and Burgoyne (2012).

Practice - Cognition? Application? What do we learn? Where does this practice come from? What to do with music theory?





(the Animals version)

Jean-Philippe Rameau (1683-1764)

"Treatise on Harmony, based on the principles of Nature"



Zarlino: 1588 The triad chord as a fundamental sonority

Terra Fifth Third Root

Triad chords in 16th-17th century music

Lutheran Hymns (mid 16th) Homophonic polyphony



Alfabeta guitar tablature (1590s)



Melody-Bass forms (16th c)



Passamezzo Antiqua (lute tabl)

(Guitar Pavana: Variations on the Romanesca)

Figured bass (1590s)



Praetorius: Es ist ein ros entsprungen

Chords yes, but how? Chord progressions by means of voice leading and cadence patterns (phrase endings)



17th century Chord progressions by harmonized bass lines as a fundament



C. Monteverdi (1597-1643)

"Andalusian Cadence" ex. "Lamento della Ninfa" "Hotel California"







J. Pachelbel 1653-1706

"Romanesca round" ex. "Kanon in D" "Don't look back in anger" 'the god father of pop harmony'

Rameaus contribution

What was there

- Chords as fundamental compositional units
- The inversional identity of harmonies
- A system of transposable major and minor keys mirrored in the development of equal temperament (tuning system)
- The directionality of cadential progressions
- The rise of standardized scale harmonizations
- Theories of the general fundamental

What was new?

- the consonant root-position triad and the dissonant seventh chord built by adding a note to that triad is the source of all harmonies (through inversion and other processes),
- (2) (the chordal root (son fundamental) is the generator of triads and seventh chords
- (3) motion from one chord to another is best understood as a progression of these chord roots (called the basse fondamentale, with the resulting voice leading being the proper connection of the notes or chords and
- (4) the fundamental bass constitutes directed motion that leads to a sense of key and, ultimately, tonal coherence, because of the identity or similarity between fundamental-bass motions and directionality of cadences.

"What was needed was someone to unify these notions within a single system of harmonic theory. This was to be the accomplishment of Rameau." (Lester 2002)

Functional harmony

7th chord leading tone function

Chord progressions not = bass-lines

Chord progressions gives keys

Harmonize melody

19th century - a band in a box Functional harmony becomes popular



The ideal band for a band in the box!

20th century : From chord symbols as shorthand for performing music to a new cognitive technology for making music early chord symbols

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Alternative representations: Step functions

(W. Shorter: Nefertiti)

Music theory and representation changes music



Practice

Theory



The way we try to represent the world changes the world

Some implications for MIR

- To what degree is the music really made up from chords? Instruction how to play vs music made from chord progressions
- What does ground truth mean? Is this an annotation for how to perform a chord on a particular instrument or does it relate to cognitive entity? Is the annotations formalized enough to be useful for building a model?
- Limitations? If we need to extend our data, what is relevant with regards to the data set/type? What about music not made from chords?
- What does the model trying to model? Biology? Culturally learned patterns? Playing instructions? Is all the information in the sound? Does a model need prior knowledge? What is the generality of the model?
- What about the aspects of harmonic structure that are not reflected in chord annotations voice leading, dissonance, modality? Harmonic functions?
- Alternative representations?
- Can we/you extend music theory? Extend the way we think about music?

How can MIR research contribute to music conceptualisation and musical practice?

Harmony can sound different...

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