Prediction of chord roots in different harmonic contexts

Historical analysis and comparison of different theoretical models for the prediction of chord roots regarding the contextual ambiguity of chord structures

Exposé

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from

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1 Basic problems regarding root prediction

Since the first attempts of a comprehensive theory of chords and/or harmony, there are numerous theoretical approaches to the prediction of chord roots. However, very few models take into account that the (preferred) perceived root of a chord maybe depends on its harmonic context (here it is possible to speak of so-called "contextual ambiguity"). Therefore should be checked to what extent the chord root depends on its harmonic context, for what first a consideration of the historical development of theoretical models of harmony and chords is needed. In order to solve the chord structures that will be examined (both in theoretical models as well as musical examples) of the enharmonic and to make them mathematical accessible, the chords will be shown as in the "pitch-class set theory" (see Forte, 1973) of Forte (although this theory is not exclusively used in the prediction of chord roots). Here, frequency doublings (e.g. {c} and {c '}) are summarized as one "pitch-class" and common occurring tones are analyzed as a "pitch-class set" (see Forte, 1973) – always on the basis of equal temperament.

2 Actual scientific findings regarding „root prediction“

Ernst Terhardt establishes the "theory of virtual pitch" (Terhardt, 1998, pp. 360 f.) and applies them, based on psychoacoustic positions, on the fundamental research of roots: "[...] kann man auch die Wahrnehmbarkeit der Akkordgrundtöne in Hörversuchen nachweisen. Eine Schwierigkeit ergibt sich lediglich daraus, daß es sich bei den Akkordgrundtönen im allgemeinen um relativ schwach ausgeprägte virtuelle Tonhöhen handelt." (Terhardt, 1998, p. 399). Richard Parncutt continues Terhardts model and defines differently weighted "root supports" (Parncutt, 1988, p. 65) – pure prime / octave, perfect fifth, major third, minor seventh and major second (cf. Parncutt, 1997, pp. 181) – which he derives from the overtone scale. He also includes Terhardts theory of the "subharmonic matching" (Parncutt, 1988, p. 69) in his model, by which he tries to predict possible roots of a chord. Furthermore, Parncutt postulates the ambiguity of chord roots ("root ambiguity" (Parncutt, 1988, pp. 78 ff.)) and creates appropriate algorithms for computing the weights of different root candidates. Juan G. Roederer examines the nature of roots on a mathematical and physical basis in terms of Terhardt (cf. Roederer, 2000), while Carol L. Krumhansl speaks of tonal hierarchies in tonal scales (cf. Krumhansl, 1990, pp. 50 ff.), which dominate the perception

of western music. Ludwig Holtmeier builds on Emanuel Aloys Förster´s roman numeral analysis and on Wolfgang Buddays analysis theory and defines scales as the basis of the roman numeral analysis of the 18th and 19th century. He extends Förster´s theory as to the exact representation of the tones of a scale and introduces the term “functional ambiguity”, which refers to the possible contextual ambivalence of chords (see Holtmeier, 2011). Andreas Moraitis speaks of “harmonic ambiguity” and harmonically bound styles, although he sees the root of a chord as one of many musical variables. Furthermore, in preparing the dissertation, the current debates about the Partimento as a possible basis for a new music theory are to be observed (cf. Froebe, pp. 216 ff.). On these (and other) theoretical approaches should be tied about the exploration of possible effects of the harmonic context on the perception of chord roots.

3 Structure of the dissertation

The dissertation is divided into three (optionally four – see item 4) divided parts:

1. At the beginning will be the refurbishment of the historical development of the terms “chord” and “root” (regarding the presence, perception and provision of chord roots) by different theorists: From Rameau's introduction of chord inversions, the referring of different interval constellations on the same root and the stratification of thirds to predict the root, to Hindemith's naming of interval roots (based on the so called "Intervallwert" (Hindemith, 1940, pp. 118 ff.)) and its development of a chord prediction theory without the stratification of thirds, central theoretical approaches will be examined, juxtaposed and analyzed in a historical perspective. The focus mainly should be on the analysis of theoretical approaches regarding the harmonic context and the influence thereof on the perception of chord roots, to show a history of chord perception.
2. In the second section the findings are applied to representative examples of different styles of music, especially to classic and romantic music. At this it will be explored, whether (and if so, how) different composers regarded the perception of chord roots and how this is reflected in their compositions. The focus of the whole research is limited to tonal music, to keep the complexity of the harmonic contexts manageable.
3. The third part of the dissertation deals with psychological aspects of perception of chord roots in different harmonic contexts. It should be explored whether and to what extent

chords, which for example greatly expand the tonality and sometimes are used in very different harmonic contexts (e.g. the half diminished seventh chord or the augmented sixth chord), lead to perception of different chord roots in different harmonic contexts. In this regard, an empirical study of listening tests to verify hypotheses is not excluded.

4 Possible attempt to create a suitable theoretical model

In the course of investigations on the contextual ambiguity of chord roots, the creation of a model (section 4 of the dissertation) for the prediction of chord roots with reference to existing models is considered. Such a model could be based on different empirically verifiable parameters, which are combined into an algorithm that would enable to process and analyze chord structures.

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