Riemannian Harmony and The HarmoRubette Software

Summary. In music, the production of meaning is prominently described in harmony. This means that musical objects such as chords are given a signification as harmonic signs. The classical approach to this enterprise was proposed by Hugo Riemann (Figure 8.1).

In Riemann’s function theory [60], he planned to attribute to any given chord of a musical composition one of three values: tonic (T), dominant (D), and sub-dominant (S). These values depend on the tonality, or key, in which we think in a given composition—for example C-major, B minor...

Riemann’s revolutionary idea was that tonality is not described, but really defined by the values T, D or S, that any chord might be given. His planned to define such a function for every possible chord. He however never realized this idea for all chords, only simple triads (three-note chords, see Figure 8.2) and a number of tetrads (four-note chords) that could be dealt with.

In Figure 8.2 we show the standard values of the seven degree triads in C-major, together with the names of the root notes.

In B-flat major, the Riemann function of a triad chord \{B♭, D, F\} is a tonic (T). The Riemann function of \{F, A, C\} is a dominant (D) and the function of \{E♭, G, B♭\} is subdominant (S). If the tonality changes, the same chord will have a different function. For example, the function of \{F, A, C\} in the key of F-major would be tonic. Harmony deals with attributing to all chords of a composition such functions.

In general, this idea is difficult to realize for complex chords. But it is the first approach to create meaning of musical compositions. In the twentieth century, several software programs have been created to calculate such Rie-
Fig. 8.2: The standard values of the seven degree triads in C-major (also denoted by I, ii, iii, IV, V, vi, vii, capital letters for major, lower case letters for minor or diminished triads). The English names of the root notes as notes in the context of the scale are: c = tonic, d = supertonic, e = mediant, f = subdominant, g = dominant, a = submediant, b = leading tone.

mann functions. One example is the component HarmoRubette in the Rubato software.\footnote{For details, see \url{www.rubato.org}.}

Fig. 8.3: An $E^\flat$ major chord from the allegro movement of Beethoven’s \textit{Hammerklavier Sonata} Opus 106, (mm. 130-131). In this key signature, its chord’s function is tonic.

8.1 The Semiotic Structure of Music

This process relies on the semiotic structure of music. First, a chord is written as an expression in the score. For example, the circled set of notes $\{E^\flat, G, B^\flat\}$ in our example of Figure 8.3 is such an expression. Second, in Riemann theory, this expression is given a content. In our example, Riemann would say that, in $E^\flat$-major, the function of $\{E^\flat, G, B^\flat\}$ is tonic. The general formula for the function is given by

$$RiemFun_{tonality}(Chord) = function.$$  

Referring to the chord $\{E^\flat, G, B^\flat\}$, its function will change if we change the tonality, for example: