Visualizing Wagner: A Combined Annotational Approach to *Siegfried* Act III

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Introduction

The music of Richard Wagner has always been a challenge. In particular, the question of "form" has been subject to musicological debate (Dahlhaus, 1969; Kleinertz, 2014). Recent approaches try to understand form through the analysis of dynamic musical processes that are closely tied to the progression of the dramatic narrative (Newcomb, 1981; Janz, 2006). A particular challenge is the sheer length and structural complexity of Wagner's works.

This poster addresses questions of form with the help of computer-based analysis. Using the first scene of the third act of *Siegfried* as an example, we try to show how large-format overviews can be helpful in understanding formal progression.

1 Methodology

1.1 Musicological background

While the initial focus was on so-called leitmotifs, Alfred Lorenz's work on the "secret of form" in Wagner's tetralogy *Der Ring des Nibelungen* (Lorenz, 1924) addressed for the first time questions of large-scale harmonic organisation. He divided every work in successive periods, characterized by one tonal key. Only decades later, his analyses met with fierce criticism, not least because they neglected dramatic development alongside 'architectural' form (Dahlhaus, 1969, 1971; McClatchie, 1998; Thorau, 2003). In contrast, more detailed analyses from the 1960s onwards overlooked the large-scale development (Voss, 2003).

In 1981, Anthony Newcomb published an insightful analysis of several scenes, including the first scene of act III of *Siegfried* (Newcomb, 1981). He emphasizes the role of contrast between stable and unstable tonal passages rather than of specific tonal keys. Moreover, he points to a global view regarding not only tonality, but also other parameters such as tempo or instrumentation. As a result, Newcomb proposes an incomplete ABA form.

1.2 Technical requirements and database

For the analysis of harmony and tempo in Wagner's *Ring des Nibelungen*, we use automated methods as well as annotations available in the Wagner Ring Dataset (Weiß et al., 2023). The visualization of harmonic progressions is based on measuring spectral energies from Bernard Haitink's 1990 audio recording (Wagner, 1875/2008).

We transform the spectral information into a chromagram representation by mapping the spectral data onto 12 pitch-class bands, corresponding to the 12 chromatic pitches of the octave. Based on these chroma features, we calculate a probability value for each of the 12 diatonic scales, which is displayed across 12 bands on the vertical axis in the visualization (Figure 1). The "0" band corresponds to the diatonic scales without accidentals, i. e., the pitch content of the C major or the A minor scale (absolute diatonic scale measurement). The remaining bands are arranged with respect to the circle of fifths, e. g. -1 corresponds to F major or D minor, +1 corresponds to G major or E minor etc. (Weiß & Müller, 2021).

We calculate tempo values using measure annotations from 16 recordings of the *Ring* (Weiß et al., 2023). This results in a tempo curve representing the average tempo for each measure, providing sufficient accuracy for depicting tempo across larger sections of the work. To minimize interpretive deviations, we calculate the mean value for each measure across all

16 recordings. Additionally, speaker roles (Weiß et al., 2023) and Lorenz's periods have been annotated and integrated into the visualization of scale probabilities and tempo.

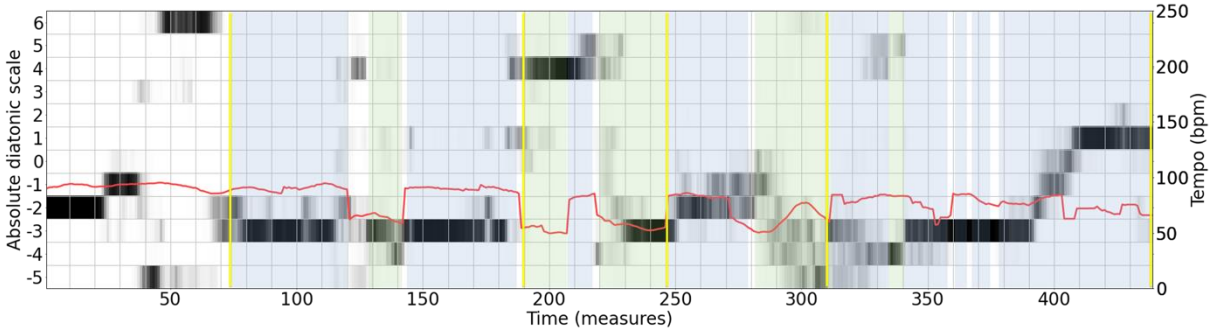

Figure 1: Visualization of *Siegfried*, Act 3, Scene 1: The probabilities for diatonic scales are represented in grayscale and overlaid with a red tempo curve (in bpm). Transparent, colored areas indicate the singer activity of the characters Wotan (light blue) and Erda (light green), respectively. The thick yellow lines refer to Lorenz's periods: mm. 1–73, prelude in G minor; mm. 74–190, 1st period in G minor; mm. 191–245, 2nd period in A♭ major; mm. 246–310, 3rd period in E♭ major; 311–439, 4th period in G minor.

2 Describing visualization

The instrumental prelude opens the scene with the tonic G minor (-2) to which it returns at Wotan's [Der Wanderer] entrance at m. 74. His wake-up call and speech to Erda moves on tonally quite stable around the -2 and -3 regions, whereas he takes over the prelude tempo at ca. 117 bpm. We observe a clear break at m. 121: The tempo abruptly slows down to about 80 bpm and tonal keys move to distant regions. These two features characterize the awakening Erda. Wotan's response (m. 143) brings back the former tempo and he returns to E♭ major. At this point Lorenz's first period ends. He defines E♭ major as tonal centre for his second period. We observe a clear concentration on the -3 region around m. 230, but this and the following passages are hardly defined tonally. In the ongoing dialogue, Wotan adapts Erda's unstable tonality, maintaining however the faster tempo. Erda instead reaches at some points tonally stable regions (e. g. +4 around m. 200) and abandons her slow tempo firstly after m. 291. Due to Wagner's fermata ("long silence") such interactions come to an abrupt end at m. 351. Then, beginning in E♭ major, Wotan's final speech regains its tonal clarity.

Conclusion

Despite his preliminary considerations, Newcomb discusses the scene nearly exclusively regarding harmonic progressions and dramatic interactions between the protagonists Erda and Wotan. Neither tempo nor references to Lorenz's periods are taken into account. Our combined visualization of different annotations is meaningful from both points of view: 1. It confirms Newcomb's observation on the importance of stable and unstable tonal passages. Such a contrast characterizes the two speakers as well as the overall form. Newcomb's suggested ABA form (A: mm. 74–189, B: mm. 190–356, A: mm. 357–439) is reflected in the -3 black zones (E♭ major) framing the A parts. 2. The visualization shows that the same is true

for the tempo contrast as well between Wotan and Erda as between the sections. A comparison with Lorenz's periods, however, is difficult: Only his first period corresponds to section A, the other periods have no correspondences and are less convincing from the visualization perspective.

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