Orchestral texture and musical tension in post-tonal repertoires

Scientific context

The concept of musical tension pervades much of the discourse on Western music and has generally been thought to capture an essential part of musical experience. Tension-release patterns have been proposed as a basis for musical emotion (Meyer 1956; Huron 2006) and have been shown to arise from both sensory and cultural factors. These include psychoacoustic features such as sensory dissonance or *roughness* (Bigand, Parncutt and Lerdahl 1996; Pressnitzer et al. 2000) and cognitive schemas acquired through exposure to a given musical environment. Such cognitive schemas allow enculturated listeners to form expectations on upcoming events, which might or might not be fulfilled, thus creating a sense of tension or release (Huron 2006). Schematic expectations have been demonstrated in tonal music through priming studies and have been shown to be affected by both local and global contexts (Bharucha and Stoeckig 1986; Tillmann, Bigand and Pineau 1998). Little light, however, has been shed on their interplay with the sensory features of musical tension. This issue is epitomized by orchestral post-tonal music, whose aesthetic realm at the edge of tonality mirrors the ever-growing importance of timbre as a compositional resource (Solomos 2013). The term *Post-tonality* is taken here in a sense akin to Richard Cohn's notion of *triadic post-tonality* (Cohn 1998), though it is also meant to include languages displaying non-triadic or non-tertian harmonic components. Through their constant play with tonal references and exploration of sonic textures, post-tonal idioms provide an ideal ground to study the interaction between syntactic processes and orchestral strategies.

Scientific aims and justification of the scientific approach

The aim of this PhD project is to investigate the effect of orchestral texture on the sensory and cognitive aspects of tension in post-tonal music. A relevant corpus may include works by Shostakovich, Mieczysław Weinberg, Stravinsky, Bartók or Hindemith. An adequate methodology will have to challenge the notion of harmony as a series of perceptually fused verticalities in order to capture horizontal motion and other perceptual phenomena associated with auditory scene analysis (ASA). In symphonic music one generally finds complex textures where simultaneously sounding events present various degrees of perceptual fusion. These events result from concurrent grouping of acoustic components and are in turn grouped sequentially into auditory streams (McAdams, Goodchild and Soden 2022). Stream formation depends heavily on trimbral and melodic continuity and is thus largely determined by voice-leading and orchestration. As a consequence, a key aspect of this research will be to determine how interaction between separate auditory streams affects musical tension and how it relates to orchestral and contrapuntal processes.

The first avenue following this line of research concerns the sensory component of musical tension. Certain sensory features have been shown to depend on the degree of perceptual fusion of an auditory scene. Roughness, for instance, seems to be computed separately for each stream rather than on the whole harmonic complex (Wright and Bregman 1987; McAdams 2019). It may thus be manipulated through orchestration to create tension-release patterns and achieve expressive ends. Such strategies will be investigated through corpus analysis, orchestral taxonomies, experimental measurements of perceived tension and study of acoustic correlates of tension via audio descriptors. A practice-based approach through dedicated compositions may also be envisioned.

Another axis concerns the influence of orchestral texture on syntax-driven tension associated with schematic expectations. Stream segregation can be expected to affect the contributions of melodic and harmonic cues to syntax processing and thus the relative strengths of melodic and harmonic expectations. Melodic expectations could be studied both in isolation and in polyphonic textures in order to show how they are affected by fusion and grouping effects. As far as harmony is concerned, one might wonder to what extent post-tonal chords acquire syntactic value through voice-leading and orchestral reinforcement. Based on an analysis of non-tertian harmonies in the corpus, it could be endeavored to examine how stream segregation affects the tension created by complex chords independently of intrinsic sensory dissonance.

These analytic and experimental results will in turn serve as an impetus for theoretical thinking. The prime focus of this reflection will be to explore the possibility and implications of a theory of musical syntax shifting from a unidimensional harmonic or melodic outlook to a transversal approach accounting for the various aspects of tension-release patterns. From these insights it should be possible to draw new perspectives for the analysis of post-tonal idioms and the study perceptual mechanisms involved in musical tension.

Supervision

This PhD will take the form of an international cotutelle between the Collegium Musicæ and McGill University. It will be co-supervised by Clément Canonne – CNRS senior researcher, head of the « Analysis of Musical Practices » team at Ircam and member of the "Concepts et Langages" doctoral school, whose work on musical aesthetics explores the interface between musicology, philosophy and cognition (Wolf, Goupil and Canonne 2023) – and Stephen McAdams – professor and head of the MPCL at McGill University, specialist of auditory perception and cognition, whose current research focus on the cognition of timbre and the development of a perceptually-grounded theory of orchestration practice.

The Collegium Musicæ's scientific environment

The interdisciplinary nature of this project strongly echoes the Collegium Musicæ's central mission to bring together knowledge from all fields of musical expertise. The core of this project lies at the crossroads of several prominent research areas within the Institute: music analysis, cognitive science and computational musicology. It is also closely related to some of its main research axes: from the topic of musical instruments – through the emphasis on the orchestra and its acoustical properties – to the building of musical knowledge – by questioning disciplinary boundaries and long-standing categories of musical discourse (harmony and melody conceived as clear-cut perceptual dimensions). For all these reasons, this project will surely insert itself most adequately in the Institute's scientific environment.

Applicant profile

Applicants should have a background in music analysis and/or music cognition and a keen interest in interdisciplinary research. Familiarity with computational tools (symbolic and audio analysis, programming environments) and experimental method is expected. Experience in orchestration, composition or *écriture musicale* will be welcome.

References

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