Abstract for ICCCM2025

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Modelling the Evolution of Tonal Complexity

A Statistical Analysis from Renaissance to Baroque

Studying musical evolution is a nearly impossible task with time-consuming traditional methods, as it necessitates a large dataset. A tool that makes such research easier is the multiple f0-extraction tool, created by Cuesta et al. (2020), which has been proven to perform well (Visscher & Wiering, 2025). The current study made use of this multiple pitch estimation tool in order to grasp tonal complexity, a fifth-based measure that quantifies how pitch class content is distributed along the circle of fifths (Weiß & Müller, 2014). Building on the work of Weiß et al. (2019), who quantified tonal complexity from the Baroque to 20th century classical music, this study investigated the evolution of tonal complexity from the Renaissance to the Baroque period (c. 1450–1750), an era marked by the transition from modality to tonality, which gave rise to an increased importance of chords, key centres, and modulations. Based on a dataset of 469 compositions from 1450 to 1750, regression analysis with Beta Generalized Linear Mixed Models was employed, in which a distinction was made for musical function (sacred versus secular music), as well as for performance type (vocal versus instrumental versus mixed). The results revealed how tonal complexity evolved across different temporal resolutions, from milliseconds to entire compositions. Tonal complexity calculated over entire compositions ('global'), showed an upward trend, as well as tonal complexity calculated over 8-second sliding windows ('medium'), although less substantial (figure 1). While the distinction for musical function and performance type did not show different trends, it was revealed that secular music as well as vocal and mixed music had a higher global and medium tonal complexity, which was expected based on existing musicological knowledge (De La Motte, 1991). The consistency with established research strengthens the validity of the results and supports the robustness of the methods used.

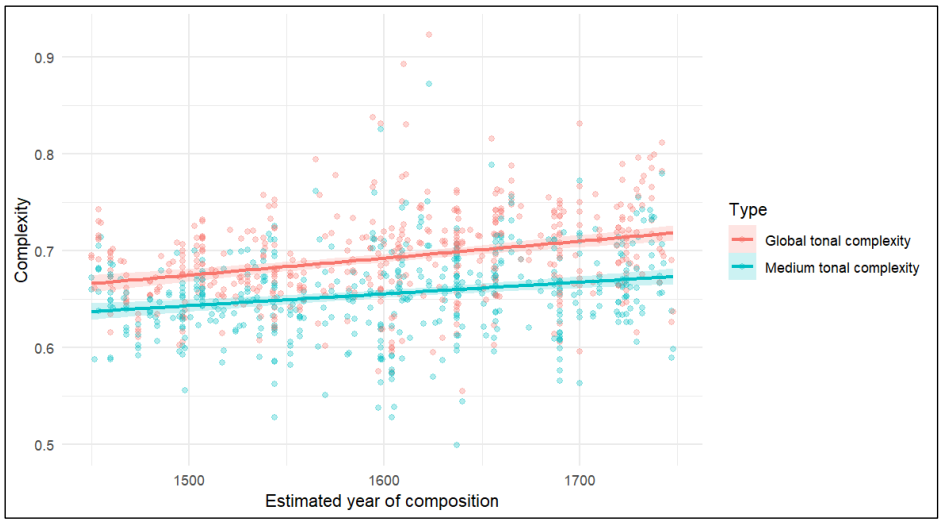

Figure 1. The trend of global tonal complexity and medium tonal complexity from 1450 to 1750.

References

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