Inferring Tonality from Note Distributions: Why Models Matter

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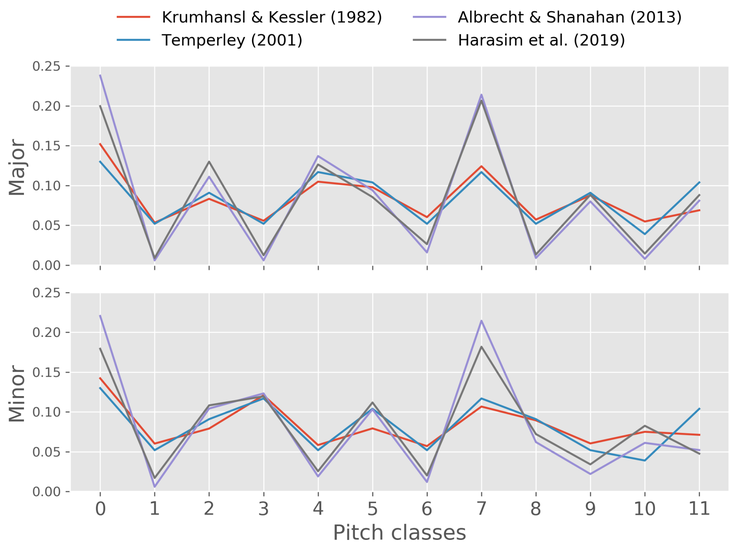
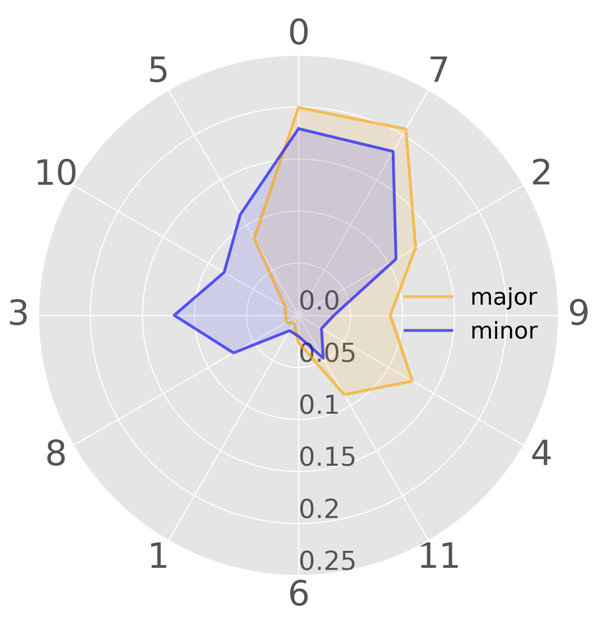
Background

Statistics of pitch classes (PCs) in musical pieces correspond to **cognitive representations** of tonality [1, 4, 5, 6] and assumed to constitute the basis for statistical learning.



Model 1: Circle of Fifths

Reordering PCs by $x \mapsto 7x \mod 12$ and arranging them on the **circle of fifths** emphasizes differences and similarities of the major and the minor mode [4].



In particular, the relation between in- and out-of-scale notes becomes apparent, as well as the discrepancies between PCs 3 and 10 (minor) vs. PCs 4 and 11 (major).

Model 2: Line of Fifths

Using **spelled PCs** enables the distinction between enharmonically equivalent notes that is not possible when using only 12 PCs.

Moreover, comparing pieces from different time periods indicates a historical trend towards expansion of the tonal material (see "Historical Development") and a transition from diatonicism to chromaticism and enharmonicism [3].

Conclusion

The often implicit or unconscious modeling **assumptions about tonal spaces** underlying pitch-class distributions in musical pieces as well as cognitive schemata crucially affect research outcomes. Making these assumptions explicit acknowledges **modeling** as an integral part of study design. Incorporating music-theoretical knowledge about the structure of tonal spaces furthermore allows to apply more apt models for the research on the **history of tonality** as well as its **cognitive representations**.

References

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[5] C. L. Krumhansl and E. J. Kessler. "Tracing the dynamic changes in perceived tonal organization in a spatial representation of musical keys.". In: *Psychological Review* 89.4 (1982), pp. 334–368.

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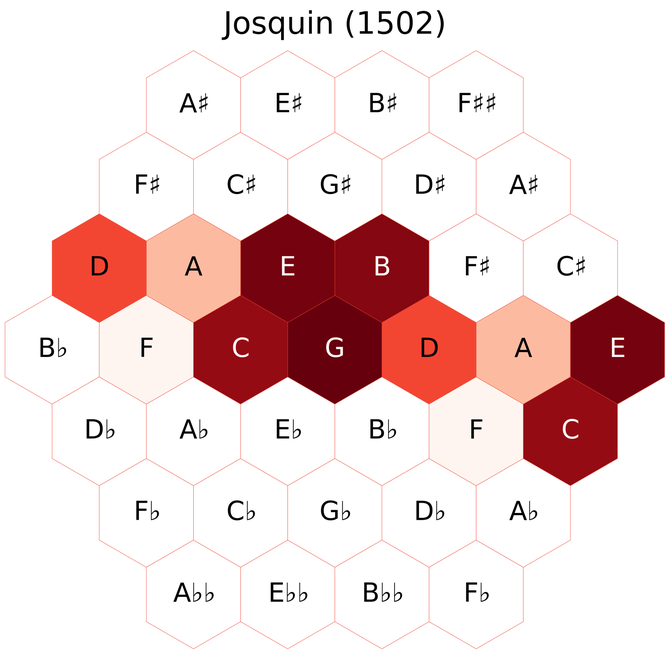
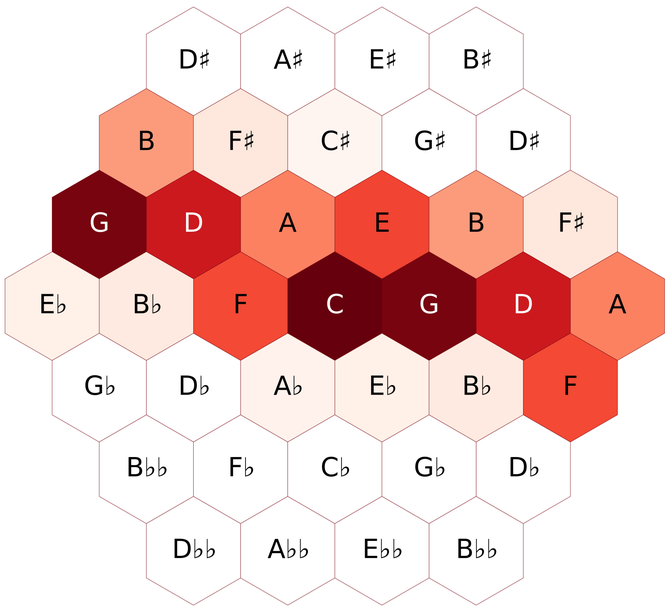
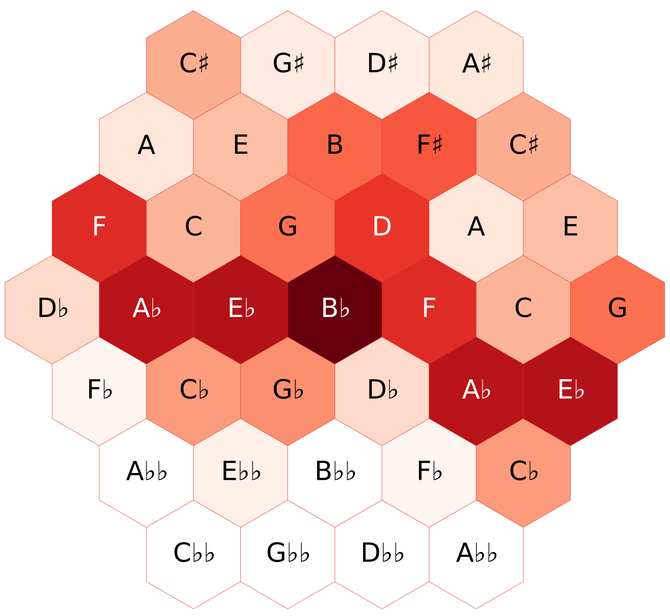
Model 3: Tonnetz

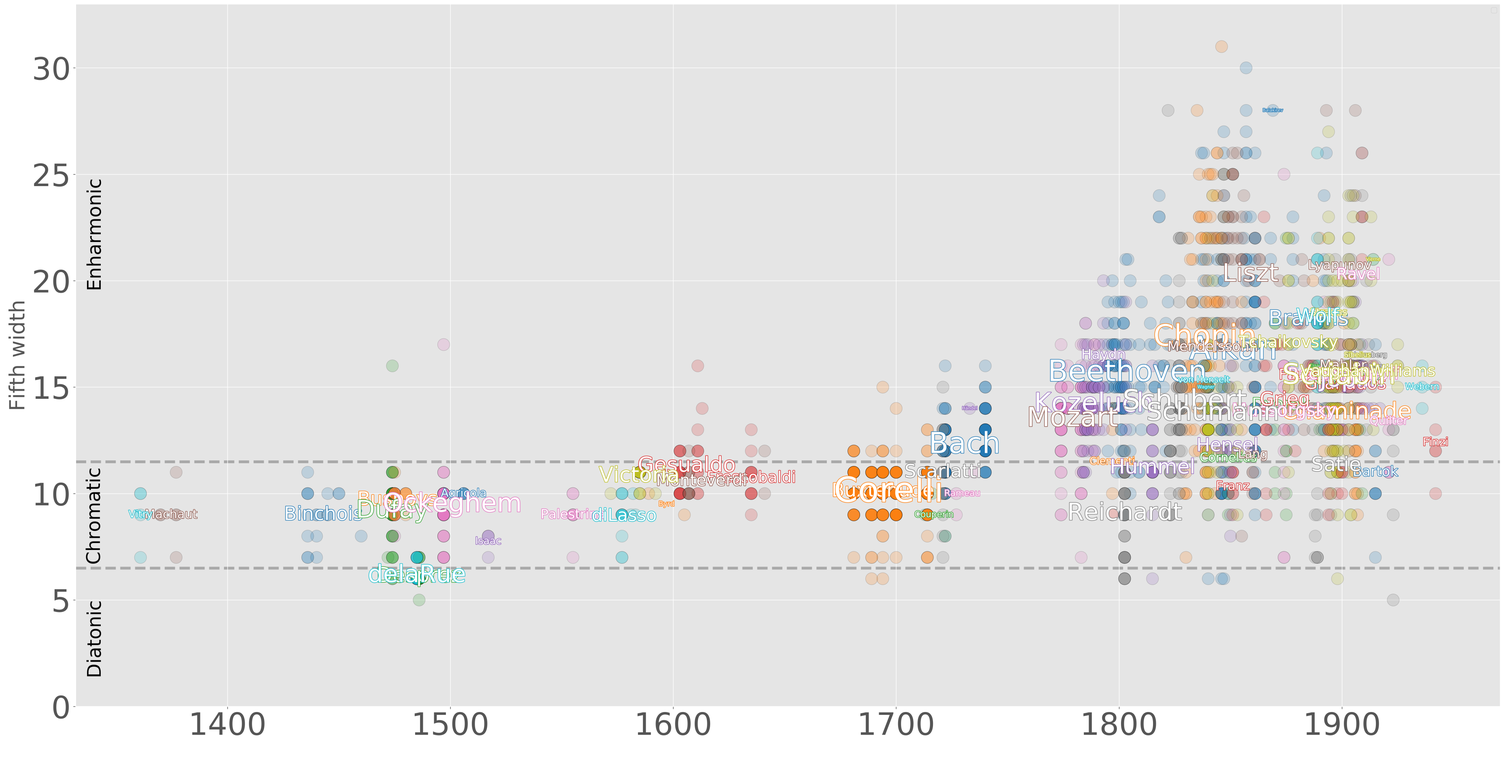
The expansion of tonal material entails also an increase in **mediantic relations**. Consequently, the usage of PCs diachronically spreads out in both the fifth and the third dimensions of the Tonnetz [2].







Historical Development



Acknowledgements & Contact

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