

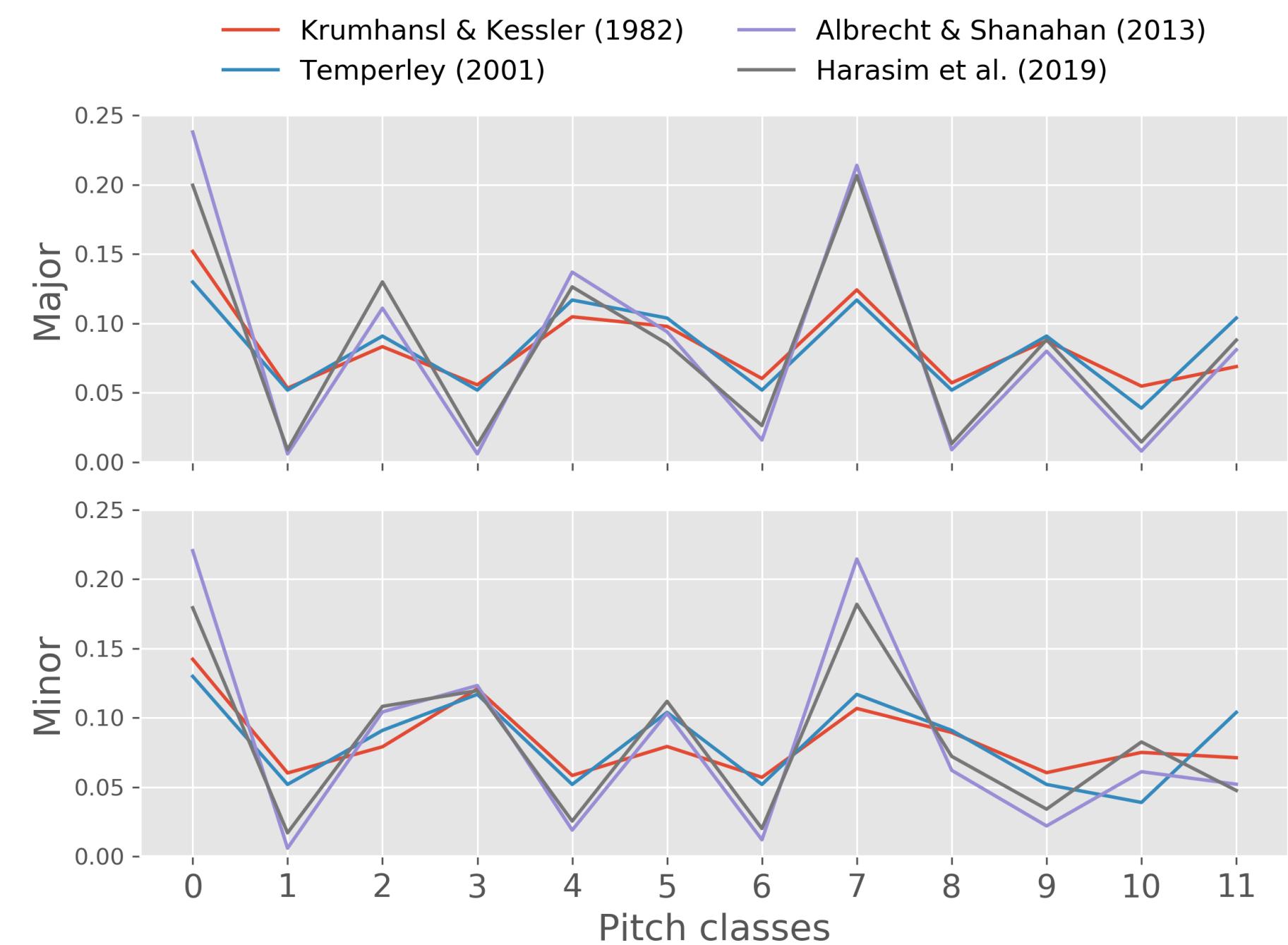
Inferring Tonality from Note Distributions: Why Models Matter

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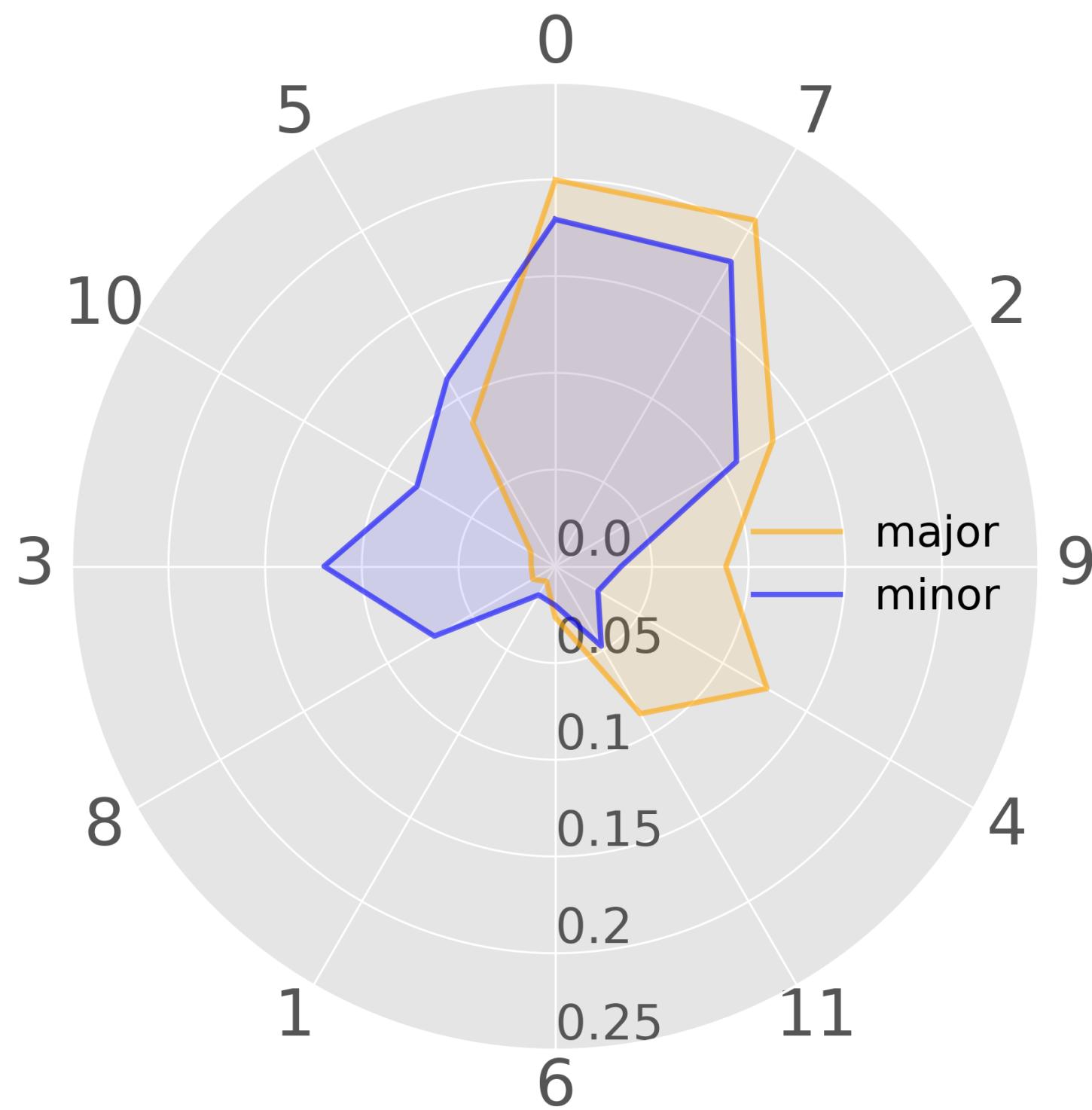
Background

Statistics of pitch classes (PCs) in musical pieces correspond to cognitive representations of tonality [1, 3, 4, 5] and assumed to constitute the basis for statistical learning.



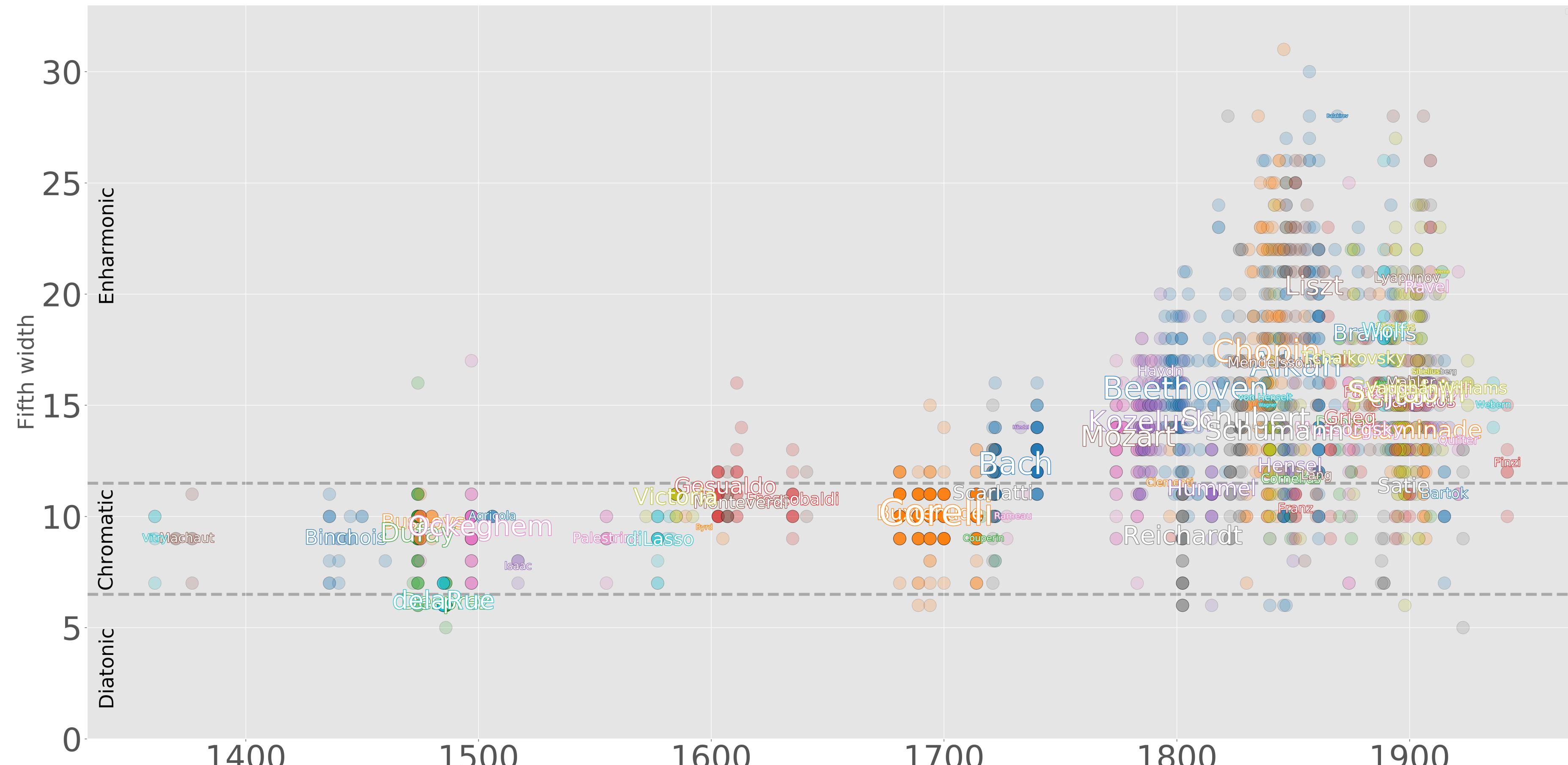
Model 1: Circle of Fifths

Reordering PCs by $x \mapsto 7x \bmod 12$ and arranging them on the **circle of fifths** emphasizes differences and similarities of the major and the minor mode [3].



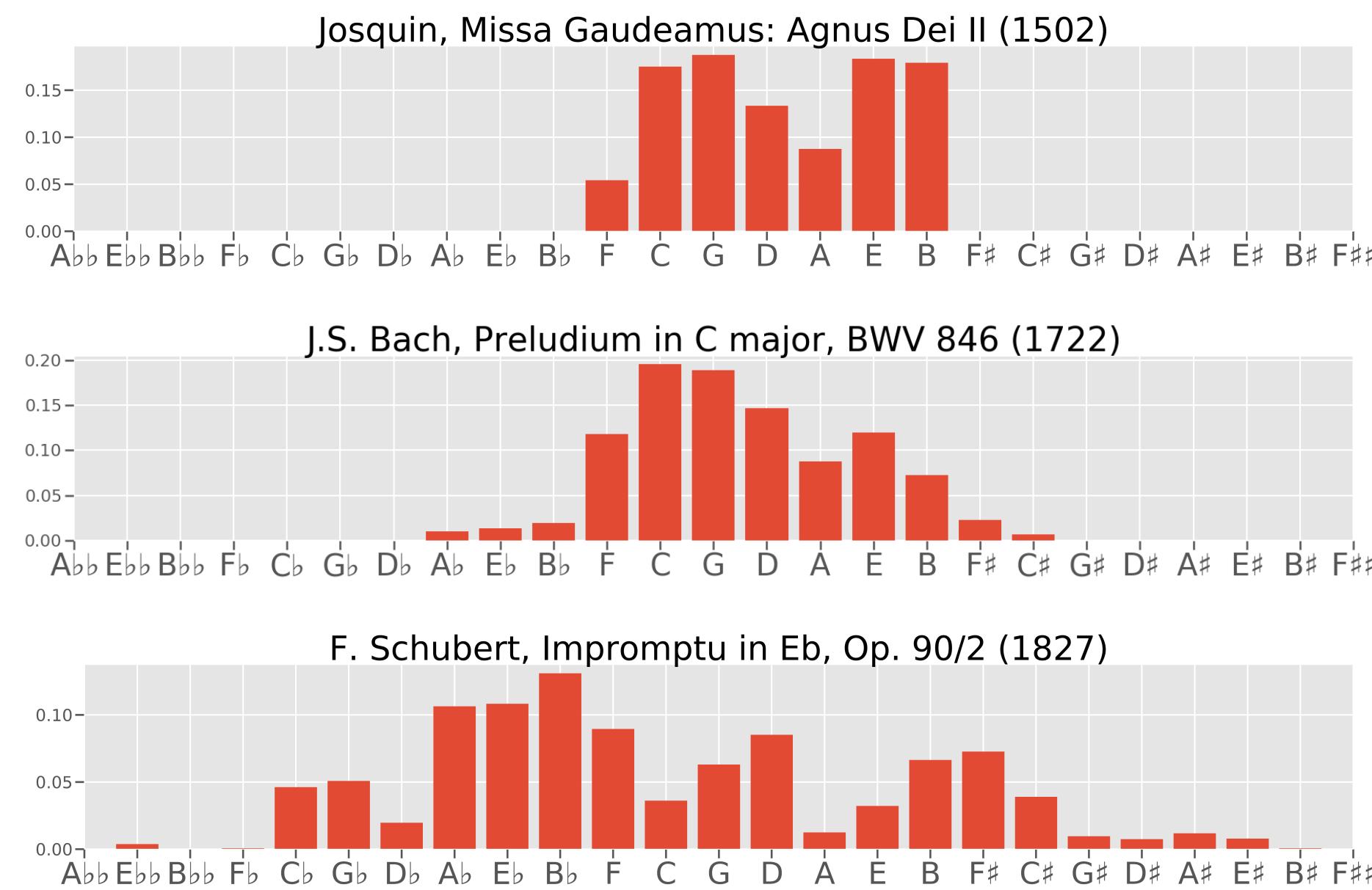
In particular, the relation between in- and out-of-scale notes becomes apparent, as well as the discrepancies between PCs 3 and 10 (minor) vs. 4 and 11 (major).

Historical Development



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 [2].

Conclusion

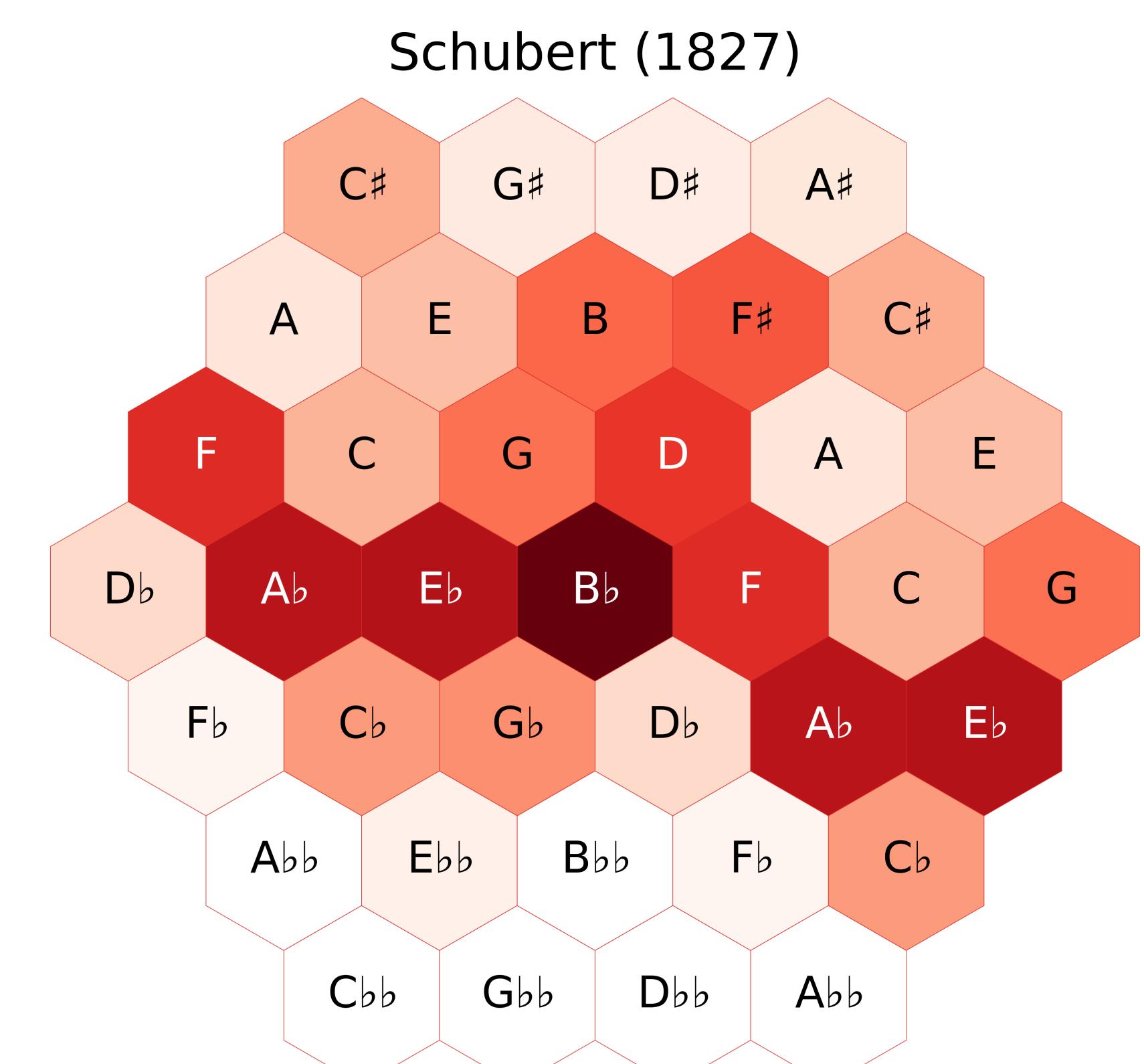
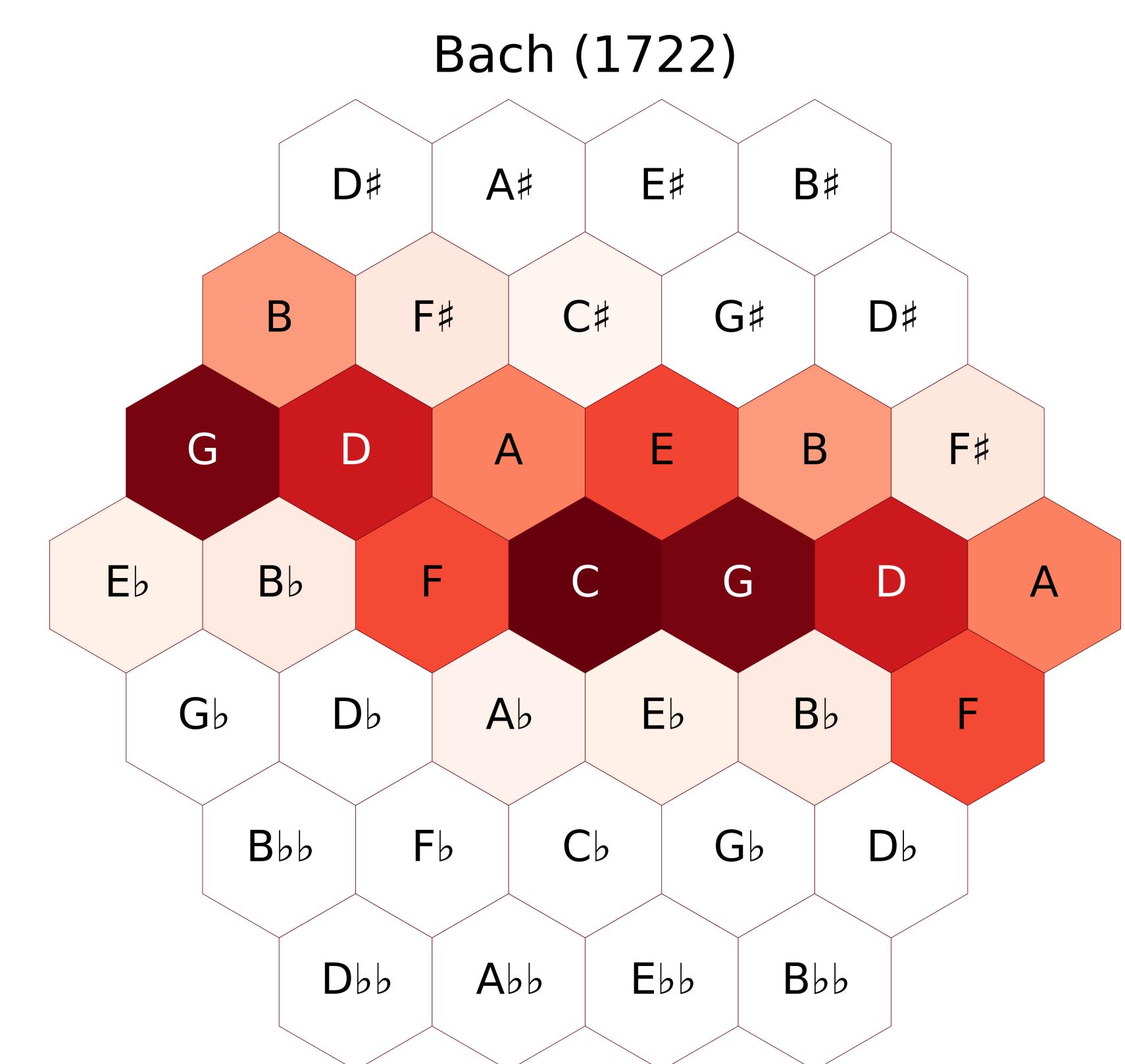
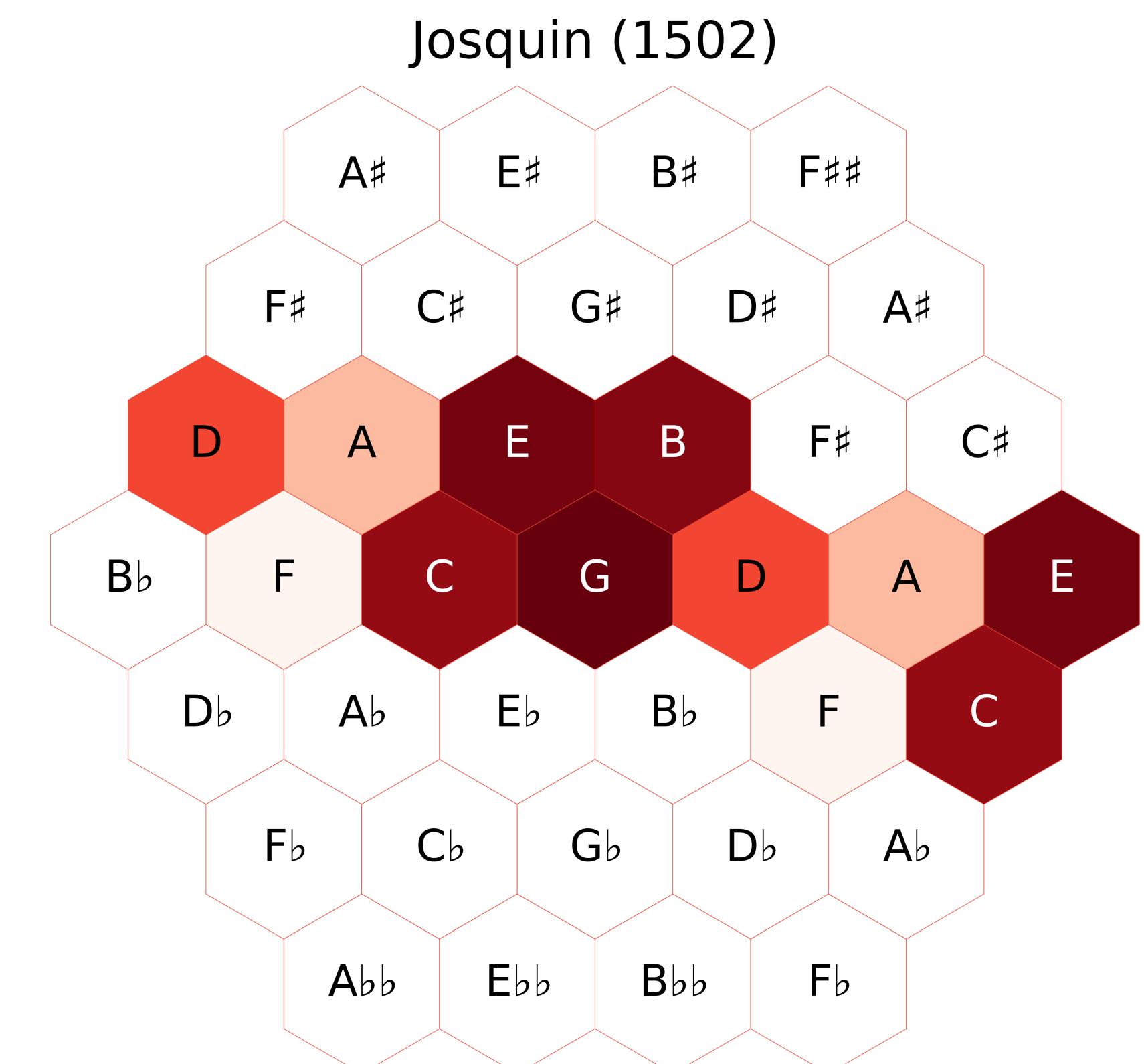
The often implicit or unconscious **modeling assumptions about tonal spaces** underlying both pitch-class distributions in musical pieces and cognitive schemata greatly affect research outcomes. Making these assumptions explicit as well as incorporating music-theoretical knowledge about the structure of tonal spaces incorporates modeling as an integral part to the research on the history of tonality.

References

- [1] J. Albrecht and D. Shanahan. "The Use of Large Corpora to Train a New Type of Key-Finding Algorithm: An Improved Treatment of the Minor Mode". In: *Music Perception: An Interdisciplinary Journal* 31.1 (2013), pp. 59–67.
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- [3] D. Harasim, F. C. Moss, M. Ramirez, and M. Rohrmeier. "Cognitive modeling reveals history of major and minor in Western classical music". Submitted.
- [4] 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.
- [5] D. Temperley. *The Cognition of Basic Musical Structures*. MIT Press, 2001.

Model 3: Tonnetz

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



Acknowledgements & Contact

