

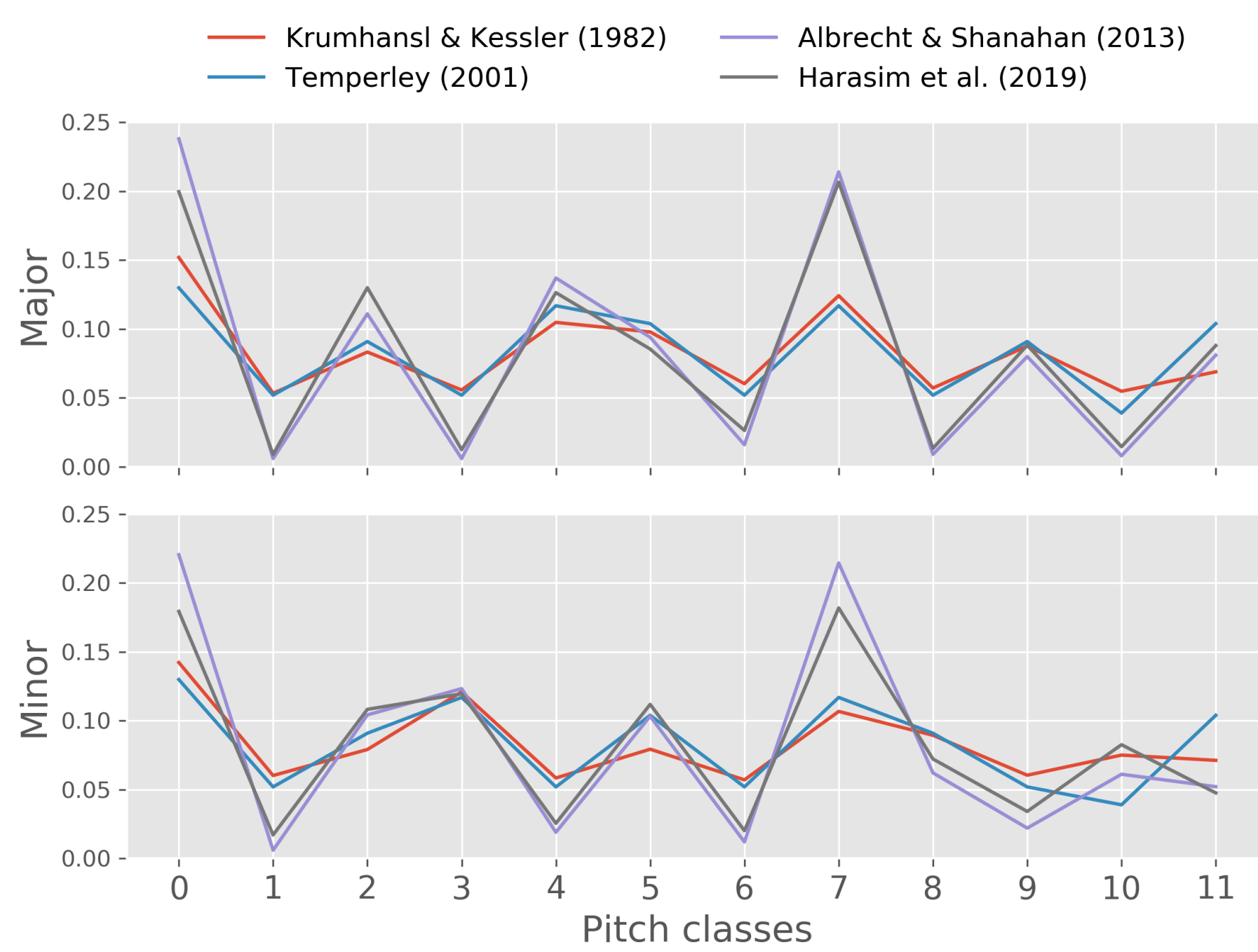
# Inferring Tonality from Note Distributions: Why Models Matter

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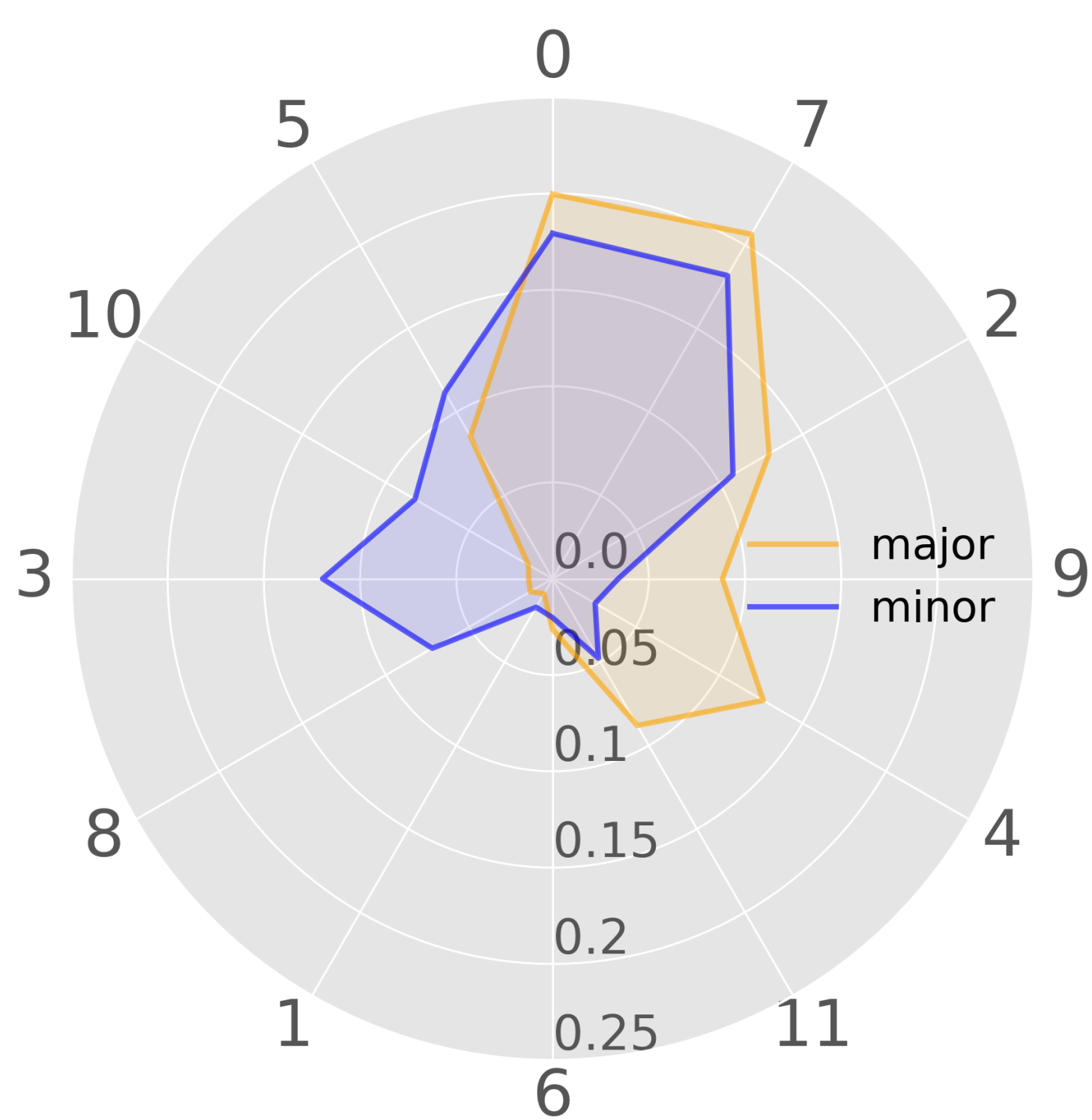
## Background

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



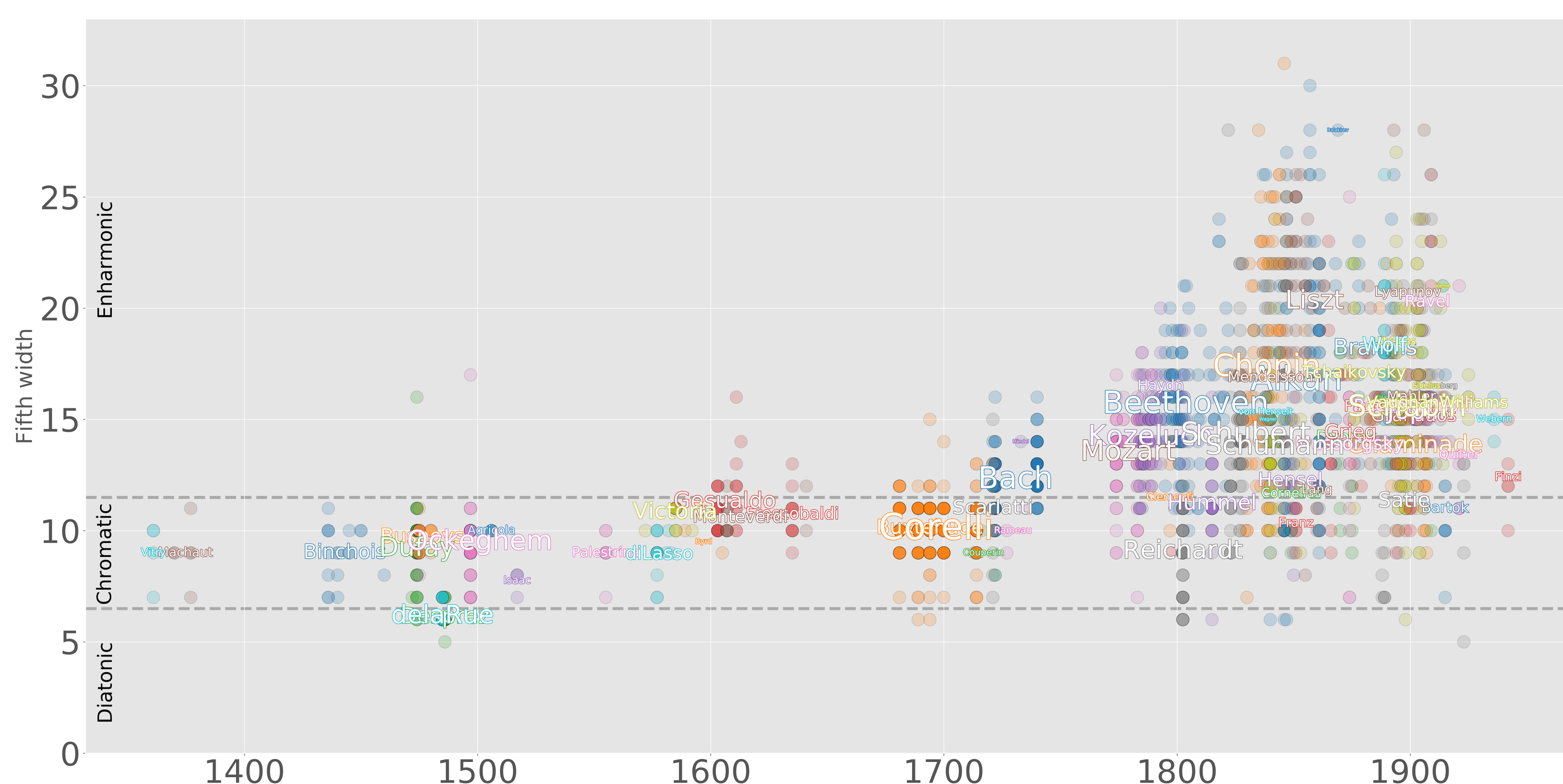
## Model 1: Circle of Fifths

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



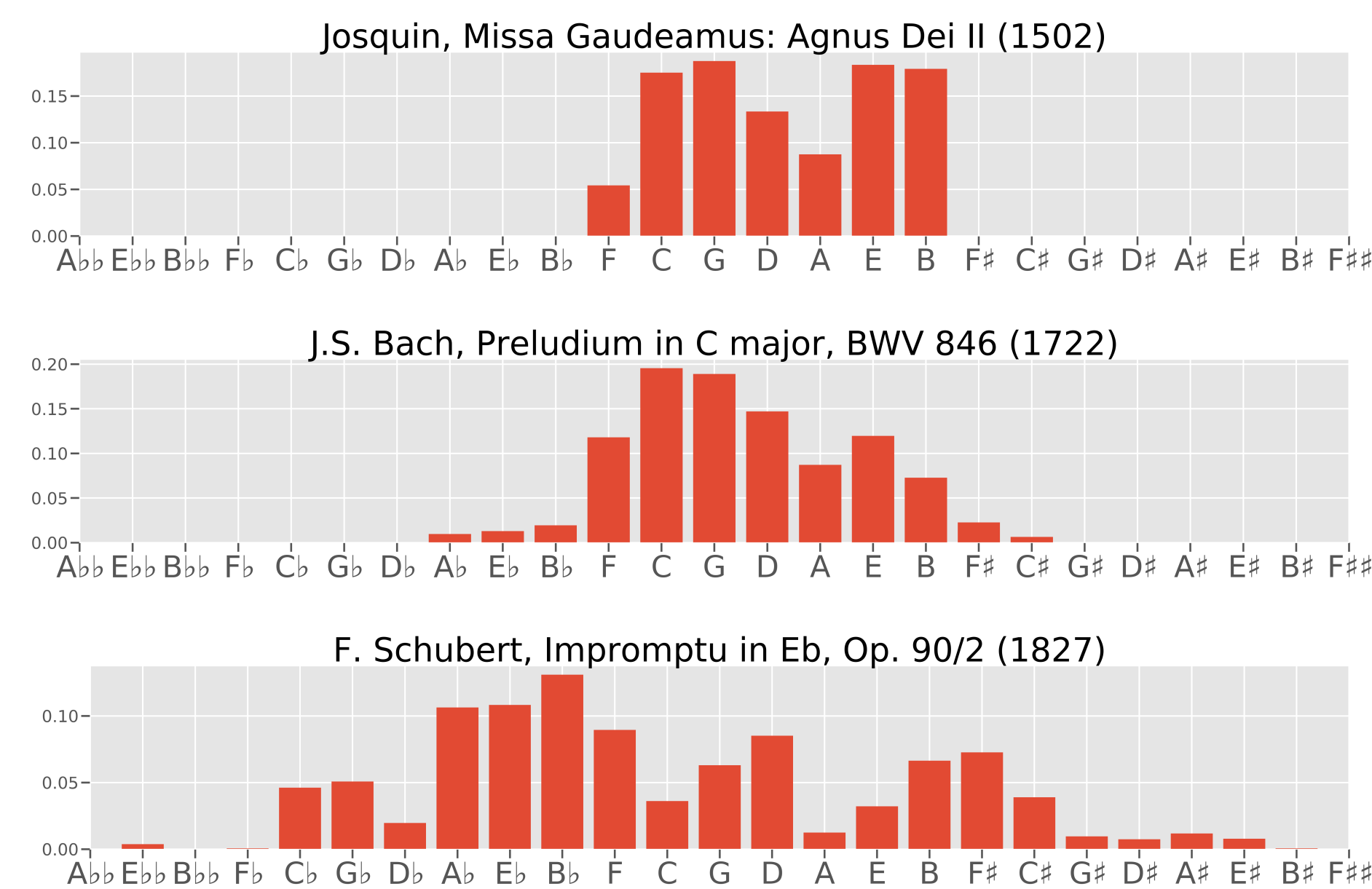
In particular, the relation between in- and out-of-scale notes becomes apparent, as well as the discrepancies between PCs 3 and 10 (minor) vs. PCs 4 and 11 (major).

## Historical Development 1340–1942



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

## Conclusion

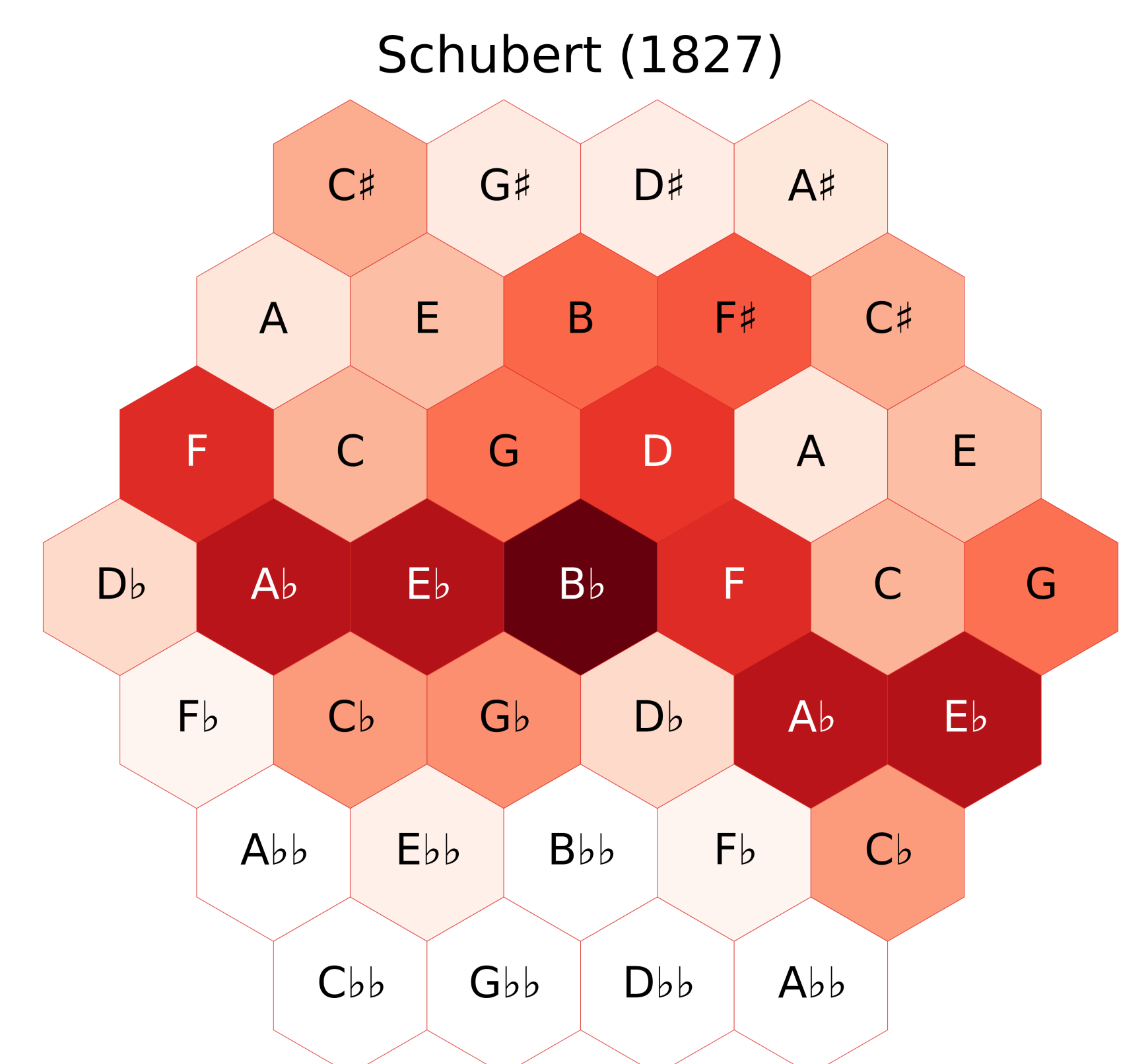
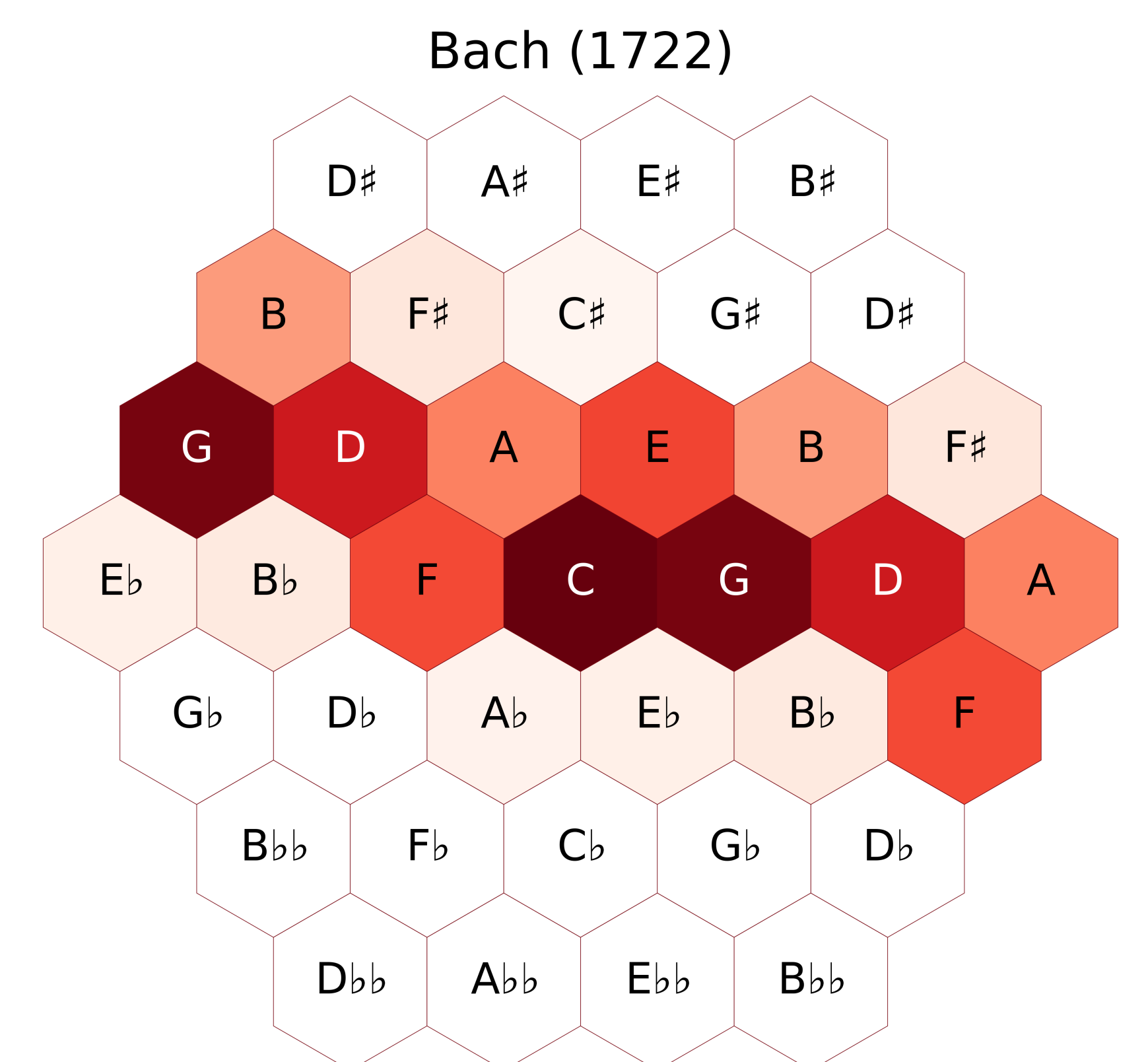
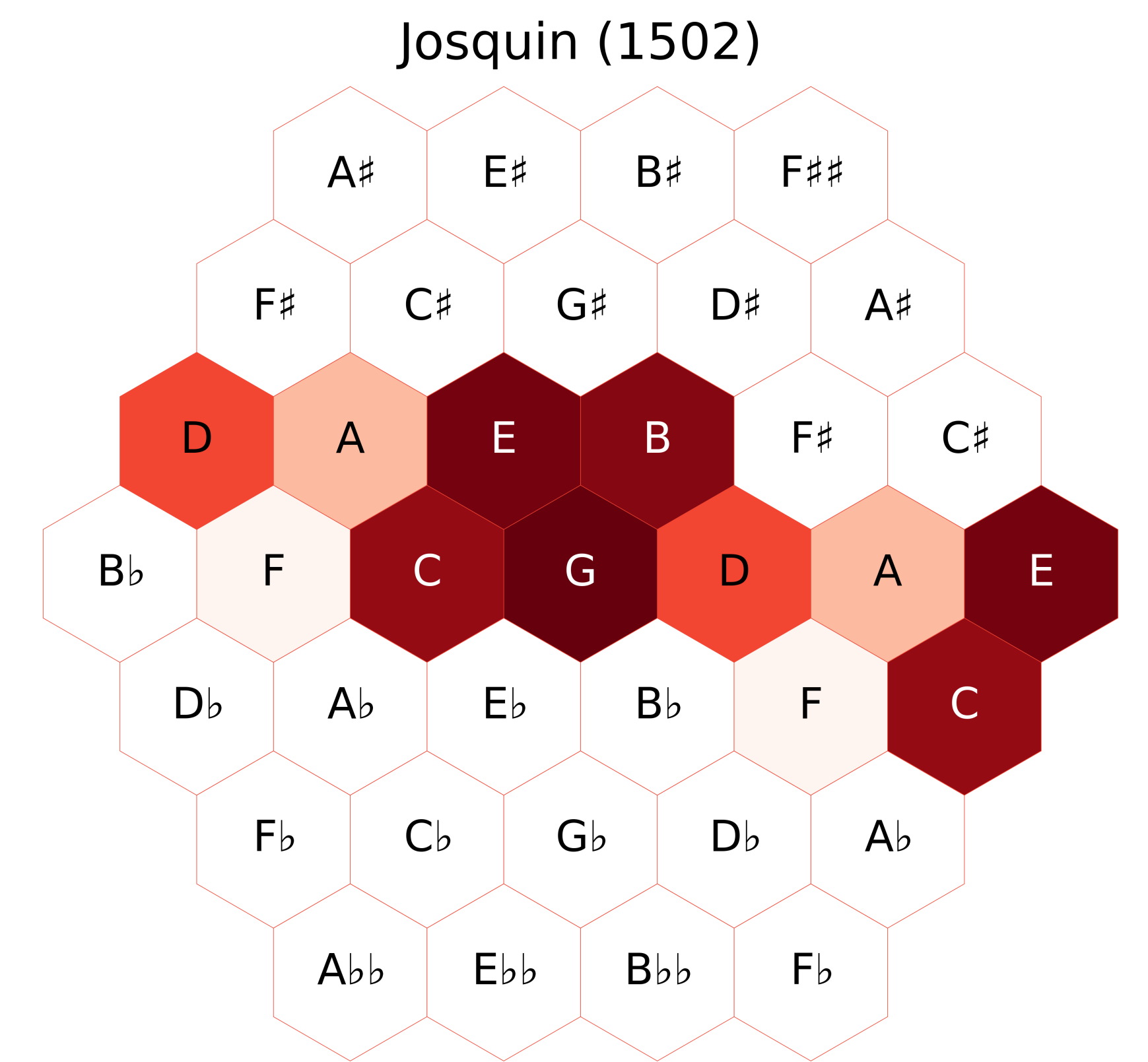
Both psychological as well as theoretical research on tonality is crucially affected by the often implicit or unconscious **assumptions** about underlying tonal spaces. Making these assumptions explicit acknowledges **modeling** as an integral part of study design. Incorporating music-theoretical knowledge 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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- [2] R. Cohn. *Audacious Euphony: Chromatic Harmony and the Triad's Second Nature*. Oxford: Oxford University Press, 2012.
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## Model 3: Tonnetz

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



## Acknowledgements & Contact



This research is generously supported by the Latour Chair in Digital and Cognitive Musicology at EPFL.