

Metrically Malleable Notation

Software for exploring the notational space of metric malleability

Conventional notation consists of sequences of notes and rests that potentially fit into multiple metrical frameworks. The same rhythmic durations are however differently notated and interpreted in different metrical contexts.

The project explores this metrical ambiguity of rhythmic sequences and transforms it into a space of possible metric notations. It is based on the idea that every pulse-based rhythmic pattern is metrically malleable, i.e. it can be embedded in multiple metric frameworks. The tool currently creates Lilypond scripts to print rhythmic staves in varying meters.

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Metric malleability

The phenomenon that a melody or a rhythm changes its overall gestalt when it appears in different metric frameworks (cf. Justin London, *Hearing in Time*, 2012)

Rhythmic necklace

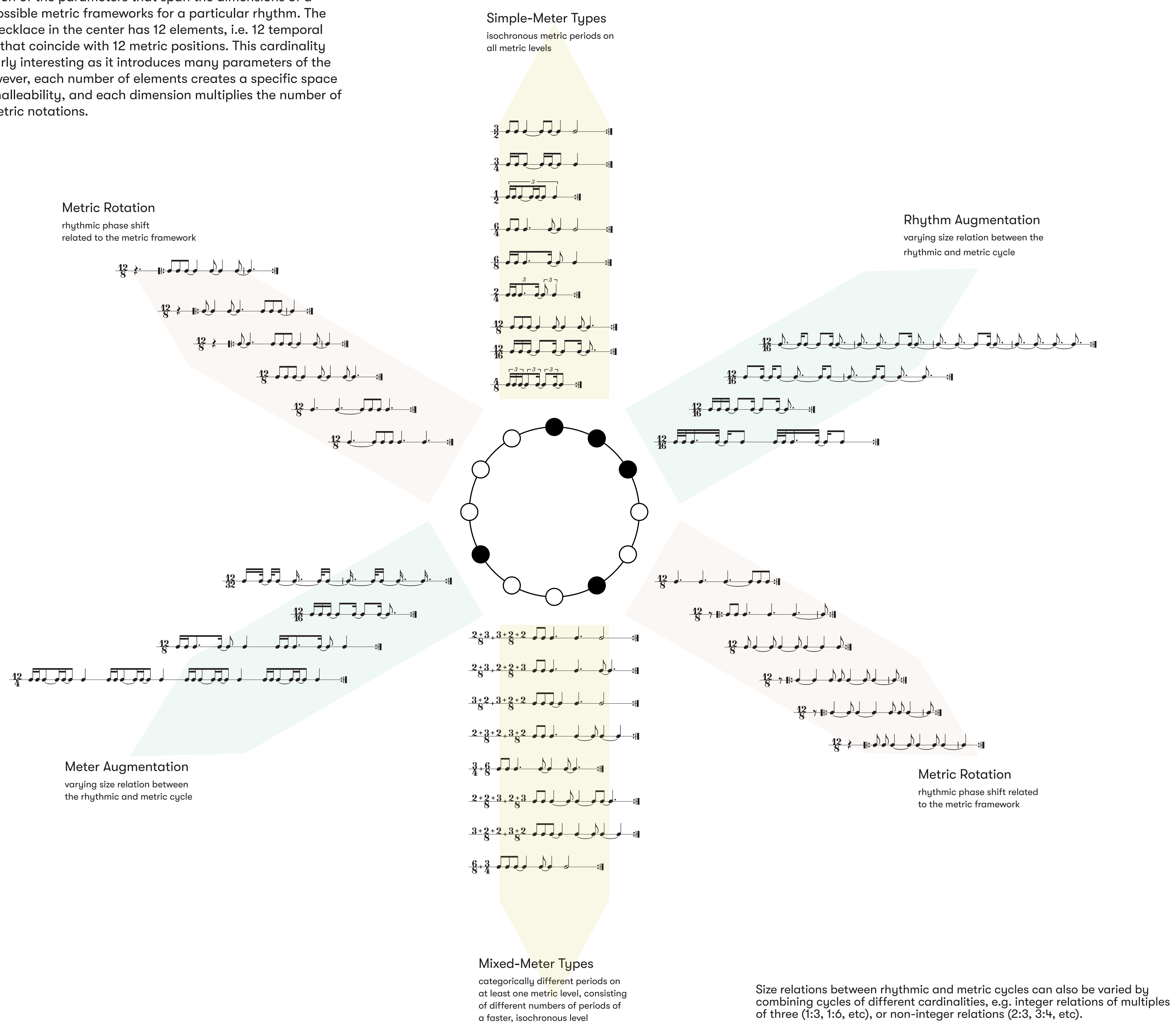
The current basis of the app's output. Necklaces are strings invariant under rotation, e.g. representing interval cycles without differentiating a starting point. All rotations of a circular rhythmic pattern are represented in one necklace, interpreted as phase shifts of a rhythm within a metric framework.

The model

I developed a quantitative heuristic model of the metric malleability of cyclic rhythms, based on analysis and categorization of its constituting aspects (wolke-verlag.de/musikbuecher/bernd-haerpfer-metric-malleability). It is not fully integrated in the notation app yet: another tool demonstrates its ability to calculate sophisticated ratings of the goodness of fit between a rhythm and a specific meter.

Dimensions in the notational space of the metric malleability of an arbitrary rhythmic necklace

An illustration of the parameters that span the dimensions of a space of possible metric frameworks for a particular rhythm. The rhythmic necklace in the center has 12 elements, i.e. 12 temporal categories that coincide with 12 metric positions. This cardinality is particularly interesting as it introduces many parameters of the space. However, each number of elements creates a specific space of metric malleability, and each dimension multiplies the number of possible metric notations.



Conclusions and Future Directions

Tempo

Metric ambiguity also results in an ambiguity of tempo. This is fully taken into account by the model and will be reflected by the notation tool, i.e. tempo is also malleable, as it is an emerging aspect of the overall rhythmic-metric structure.

Musical diversity

The variety of interaction between rhythm and meter sheds light on the potential for musical diversity within simple rhythmic patterns. While it is well known in certain styles in non-classical contexts, it is illustrated here in the context of classical notation, revealing an incredible richness of movement forms created by rhythm-meter interaction. The system includes complex non-isochronous or mixed meters, such as those found in Southeastern European, Arabic and Persian music.

Parametric control

Users will be able to parametrically control the calculation of a goodness of fit or a plausibility value for the combination of a rhythm with a meter, according to certain aspects. A range of alternatives may be generated by scattering different parameter values.