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Relational poly-Klumpenhouwer networks for transformational and voice-leading analysis.

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Summary: In the field of transformational music theory, which emphasizes the possible transformations between musical objects, Klumpenhouwer networks (K-nets) constitute a useful framework with connections in both group theory and graph theory. Recent attempts at formalizing K-nets in their most general form have evidenced a deeper connection with category theory. These formalizations use diagrams in sets, i.e. functors $\mathbf{C} \rightarrow \mathbf{Sets}$ where \mathbf{C} is often a small category, providing a general framework for the known group or monoid actions on musical objects. However, following the work of Douthett-Steinbach and Cohn, transformational music theory has also relied on the use of relations between sets of the musical elements. Thus, K-net formalizations should be extended further to take this aspect into account. The present article proposes a new framework called *relational PK-nets*, an extension of our previous work on poly-Klumpenhouwer networks (PK-nets), in which we consider diagrams in **Rexl** rather than **Sets**. We illustrate the potential of relational PK-nets with selected examples, by analyzing pop music and revisiting the work of Douthett-Steinbach and Cohn.

MSC:

00A65 Mathematics and music

18B10 Categories of spans/cospans, relations, or partial maps

Cited in **2** Documents

Keywords:

transformational analysis; category theory; Klumpenhouwer network; PK-net; relation; parsimonious voice leading

Software:

[GAP](#)

Full Text: [DOI](#) [arXiv](#) [HAL](#)

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