Partitional Analysis and Melodic Texture

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Partitional Analysis

Partitional Analysis (PA – GENTIL-NUNES and CARVALHO, 2003) is an original proposal of mediation between mathematical abstractions derived from the Theory of Integer Partitions (Euler, 1748; Andrews 1984; Andrews and Eriksson, 2004) and compositional theories and practices. Its main goal is the study of compositional games and has been used in the pedagogy of composition and creation of new pieces. The involved abstractions allow the bimodal homology between heterogeneous fields, like texture, orchestration, timbre, melodic structures and spatialization. It provides too the exhaustive taxonomy of the fields as well as its topology and metrics. The point of departure of PA, inspired in the work of Wallace Berry (1976), is the consideration of binary relations between concurrent agents of a musical plot. The relations are categorized in collaboration and contraposition types, according to a given criteria (congruence between time points and duration, belonging to a line inside a melody, proximity of timbre or orchestral group, spatial location in the stage, and so on). This categorization underlies the constitution of the partitions and at the same time leads to the establishment of the agglomeration and dispersion indices (a, d).

Fig. 1. W. A. Mozart, Eine Kleine Nachtmusik, K. 525, excerpt: a) textural analysis (blocks are formed from similar attacks and durations); b) binary relations: collaborations (full lines) and contrapositions (dotted lines), in each of the four configurations used in the excerpt – (2, 12); (1, 3) and (4); and c) the agglomeration and dispersion indices (a, d) for each configuration.

Linear Partitioning

Linear Partitioning is the application of PA to melodic texture, based on fundamental schenkerian concepts of melodic conjunction and disjunction and the concept of line as an internal complicating element of melodic structures. Although this concept has been central to the work of several authors, like Hindemith (1937), Costère (1954), Meyer (1973), Lester (1982) and Nar- mour (1992), among others, there has not been so far a quantitative and relational evaluation of lines under the framework of melodic texture. The categorization of linear types (line, arpeggiation and compound melody, for instance) in fact can be represented by partitions, following the criteria of independence, promoted by the development of adjacent conjunctsions, and interdependence, created by consecutive adjacent disjunctions.

Some functions were developed inside Matlab environment and are integrated in the author’s software Pansemar® for Windows. The module Partlin® is presented as a button in the interface and can generate graphs (partitogram and indexogram) and tables. The research also covers some sub-projects including the reassessment of melodic analysis of other authors, mainly Meyer and Narmour; analysis of solo pieces from Darmstadt period; expansion of the proposal to analysis of contour in general.

Partition and Indexogram

Two graphs are constructed from the indices. The partitogram, where the indices are plotted one against the other, constitutes a phase space and generates a graph called Partitional Young Lattice (PYL), where all the adjacency relations are categorized and assessed. The indexogram arises from plotting both indices against a time axis and presents the temporal progression of partitions, in a wave-like representation.

Fig. 2. W. A. Mozart, Eine Kleine Nachtmusik, K. 525, excerpt: a) partitogram; b) indexogram

Fig. 5. J. S. Bach, Sonata BWV 1034, first phrase: changes in the number of lines (linear density) and active pitches at articulation points (inventor)

Fig. 6. Categories of melodic interaction between pitches and lines, vector produced by real conjunctions, virtual conjunctions and intersections.

Fig. 8. J. S. Bach, Sonata BWV 1034, first phrase: linear indexogram with two bubbles (B1 and B2)

References


Fig. 9. J. S. Bach, Sonata BWV 1034, first phrase: changes in the number of lines (linear density) and active pitches at articulation points (inventor)