# MUSICAL PATTERN EXTRACTION FOR MELODIC STRUCTURE

*Emilios Cambouropoulos*
Department of Music Studies, Aristotle University of Thessaloniki, Greece

## Background

Despite the fact that musical parallelism is considered an important factor for musical segmentation, there have been relatively few attempts to describe systematically how exactly it affects grouping processes (one main problem is that musical parallelism itself is very difficult to formalise).

## Aims

The aim of the paper is to formalise processes of musical parallelism and to examine how these affect melodic segmentation. An underlying assumption is that the beginning and ending points of 'significant' repeating musical patterns influence the segmentation of a musical surface. A computational model is built as a means to test the effectiveness of the proposed approach.

## Method

A computational model is presented that extracts melodic patterns from a given melodic surface. The discovered patterns are used as a means to determine probable segmentation points of the melody. 'Significant' patterns are defined primarily in terms of frequency of occurrence, length of pattern – additionally, the special status of non-overlapping immediatelly-repeating patterns is examined. All the discovered patterns merge into a single 'pattern' segmentation profile that signifies points in the surface that are most likely to be perceived as points of segmentation due to musical parallelism. The 'pattern' segmentation profile is compared against a 'local boundary' profile (which is based on simple Gestalt principles of perceptual organisation) and it is shown that often the two give different results.

## Results

The algorithm is tested on a number of melodies for which the musically intuitive segmentations are taken as a point of reference. Both positive and negative cases are presented; especially cases where there are conflicts between local discontinuities and pattern-relating boundaries are highlighted. Overall, the proposed model gives an efficient formal method for capturing melodic parallelism from which segmentation positions due to repetition can be inferred.

## Conclusions

Musical parallelism affects musical segmentation. Computational models of segmentation could incorporate pattern extraction components - such as the one proposed here - for better performance.

ISBN: 3-931852-66-0
ISSN: 1617-6847