

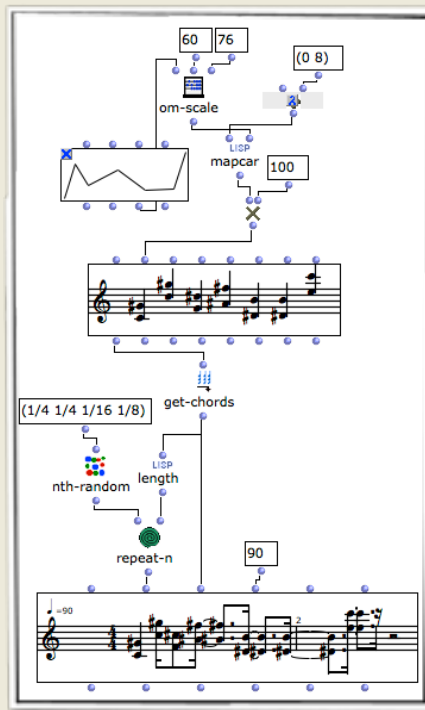
Supports pour la segmentation et l'analyse des séquences musicales dans OpenMusic

Jean Bresson

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**J. Bresson, C. Pérez-Sancho “New Framework for Score Segmentation and Analysis in OpenMusic”,
Proc. Sound and Music Computing, 2012.**



OpenMusic

➡ A computer-aided score analysis framework in the OpenMusic environment:

- Building blocks for the development of analysis processes
- Visualization and interaction in the score editors
- Support for integration of new kinds of analysis

➡ Project “harmonic analysis”



The *harmonic-analysis* project

C. Pérez Sancho, Univ. Alicante



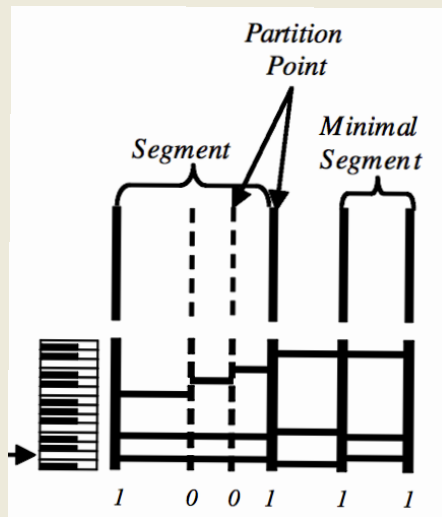
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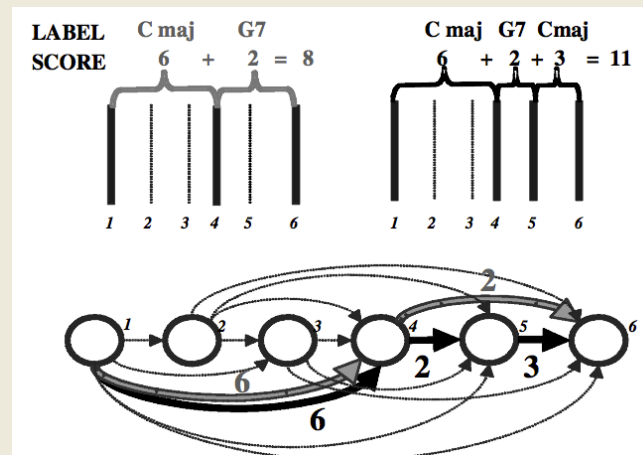
Algorithms for Chordal Analysis

Computer Music Journal, 26:2, pp. 27–49, Summer 2002

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Segmentation



Answer Key	Fmaj	Ger6	Cmaj	Gmaj	Cmaj
Program Output	Fmaj	Ab7	Cmin/Cmaj	G7	Cmaj

Points	1	1	1	-	-	-	1/2	0	0	1
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Total Points = 4.5 Graded Minimal Segment Count = 7

Final Grade = (Total Points) / (Graded Minimal Segment Count) = 4.5/7 = 64.3%

Labeling

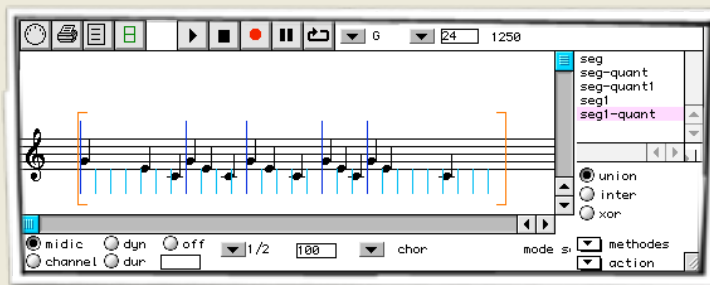
Computer-aided music analysis – A (simple) conceptual framework

1) Segmentation

Analyse transformationnelle,
D. Lewin, "Making and Using a
pcset Network for Stockhausen's
Klavierstück III", Musical Form
and Transformation: 4 Analytic
Essays, 1993.

Diagram illustrating the analysis of Stockhausen's Klavierstück III using pcset networks. The score is shown with various transformations (T₁, T₂, T₃, T₄) and pcset labels (SI, IFUNC, VI) and their corresponding pcset representations (circles with lines).

SI: (1, 1, 1, 3, 6) (6, 3, 1, 1, 1) (6, 3, 1, 1, 1)
 IFUNC: [5 3 2 2 1 1 1 1 2 2 3] [5 3 2 2 1 1 1 1 2 2 3] [5 3 2 2 1 1 1 1 2 2 3]
 VI: [3 2 2 1 1 1] [3 2 2 1 1 1] [3 2 2 1 1 1]



Kant (B. Meudic, IRCAM)

Handwritten musical score with various annotations and markings, including dynamic markings (ff, f, p, cresc.) and performance instructions (rit., a tempo, marcato).

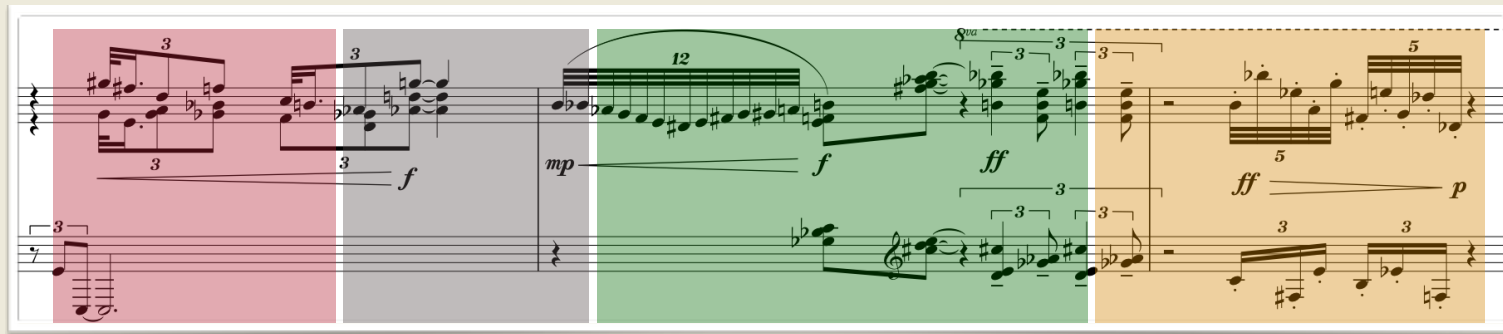
Diagram showing a musical score with various annotations and markings, including dynamic markings (f, marcato, cresc., sf) and performance instructions (why stop?, why different?, why begin here, this way?, why repeat, and get stuck here?).

John Roeder, "Constructing Transformational Signification",
Music Theory Online, 15(1), 2009.

Computer-aided music analysis – A (simple) conceptual framework

Segmentation = Set of *segments* defined in a score according to a given “rule”

- time interval
- chords/notes selection
- property, constraint satisfaction
- ...

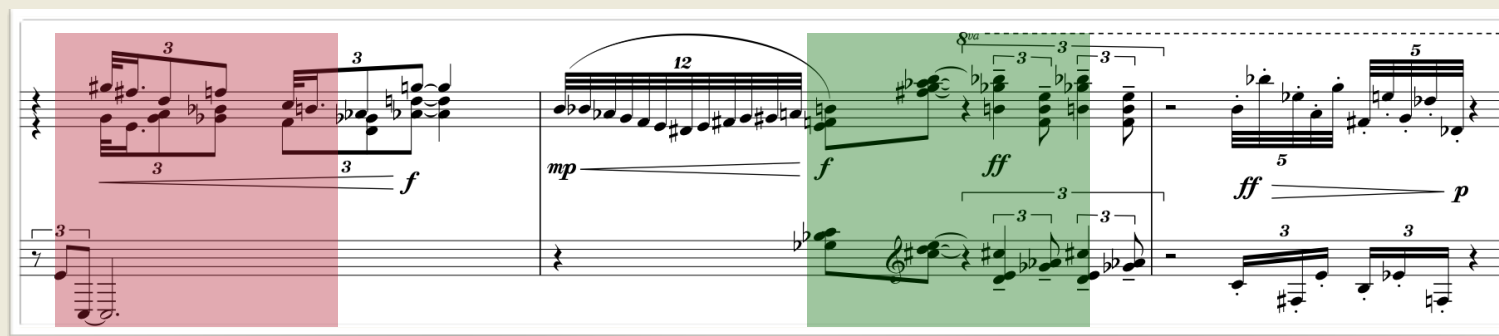


Disclaimer:

Score excerpts from *Starborg* by S. Mawhinney (2006)
[from *The OM Composer's Book 2*, Editions Delatour / IRCAM, 2008]
The segmentation and analysis graphics are for illustrative purpose only and do not reflect any analytical point of view on the work!

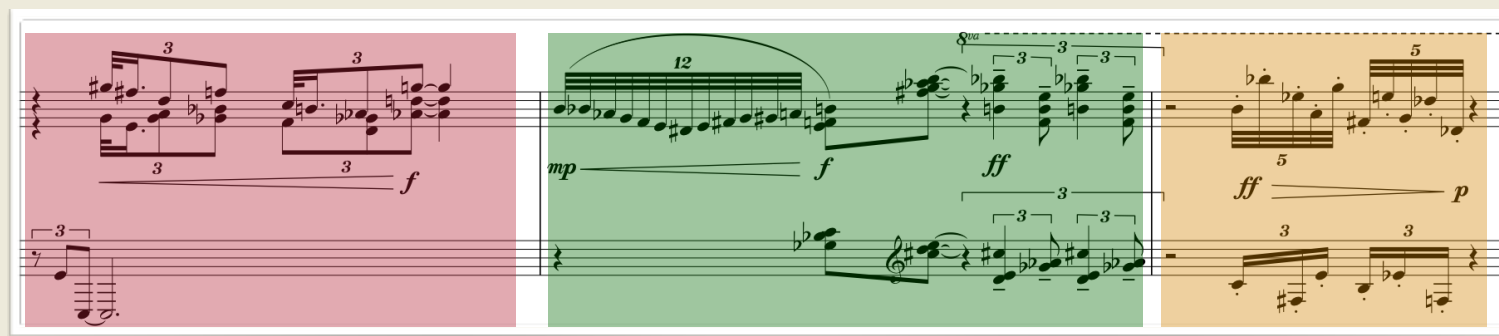
Computer-aided music analysis – A (simple) conceptual framework

Segmentation



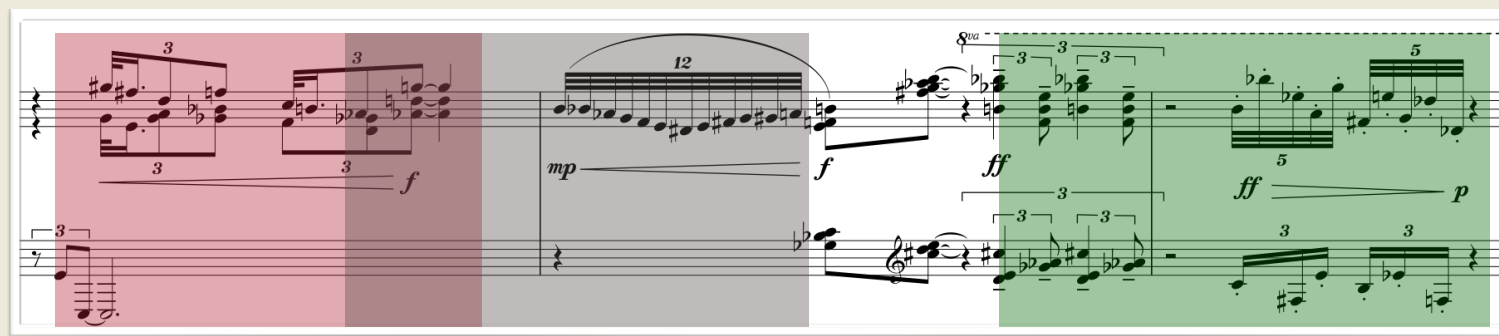
Computer-aided music analysis – A (simple) conceptual framework

Segmentation



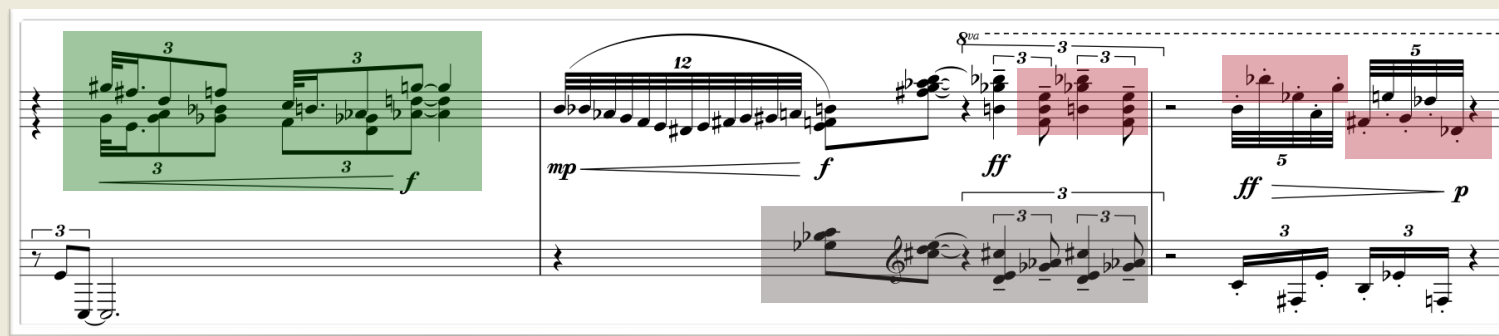
Computer-aided music analysis – A (simple) conceptual framework

Segmentation



Computer-aided music analysis – A (simple) conceptual framework

Segmentation

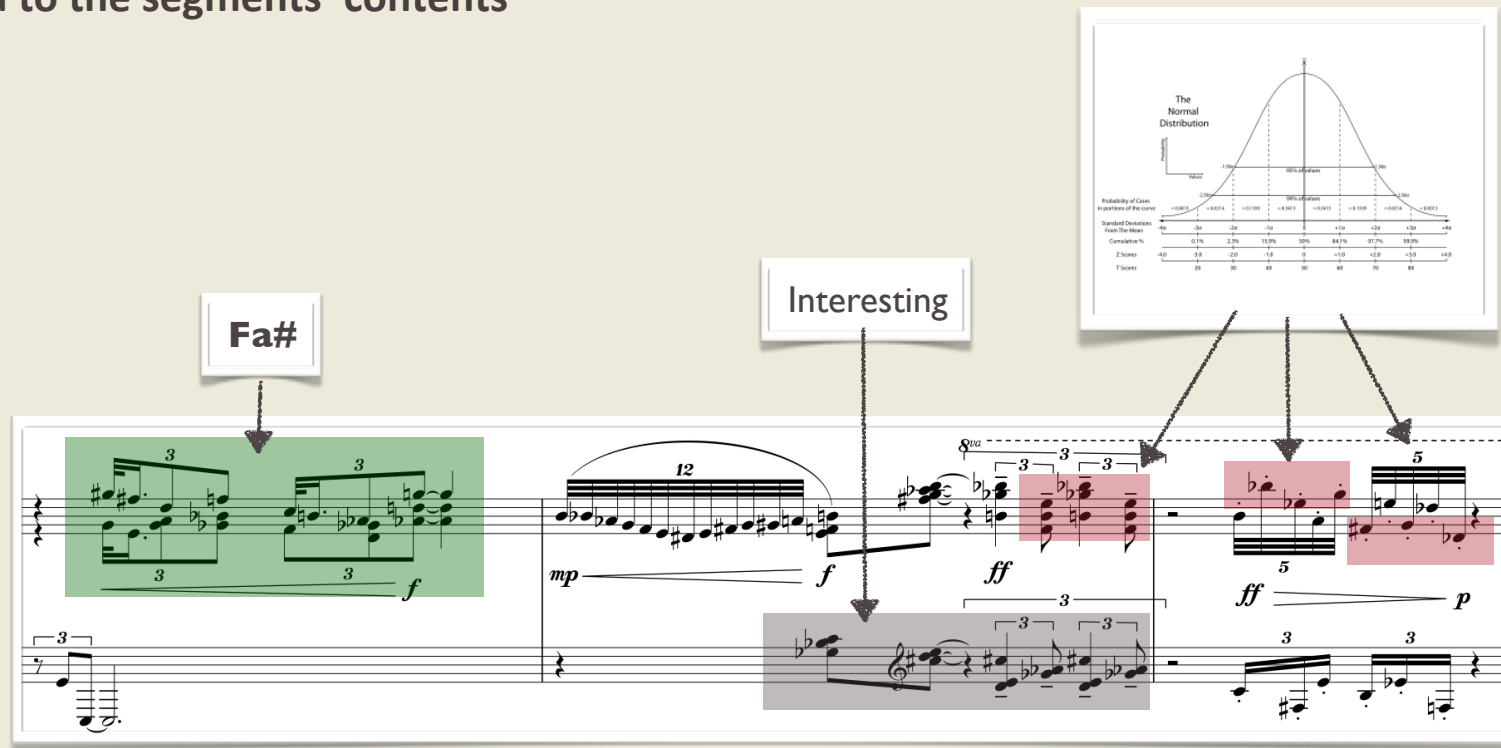


A musical score snippet illustrating segmentation. The score is written on two staves. The upper staff contains several measures, including a triplet of eighth notes marked with a green background, a 12-measure phrase marked with a purple background, and a triplet of eighth notes marked with a red background. The lower staff contains a triplet of eighth notes marked with a green background, a triplet of eighth notes marked with a grey background, and a triplet of eighth notes marked with a red background. Dynamic markings include *mp*, *f*, *ff*, and *p*. The score is segmented into measures by vertical bar lines.

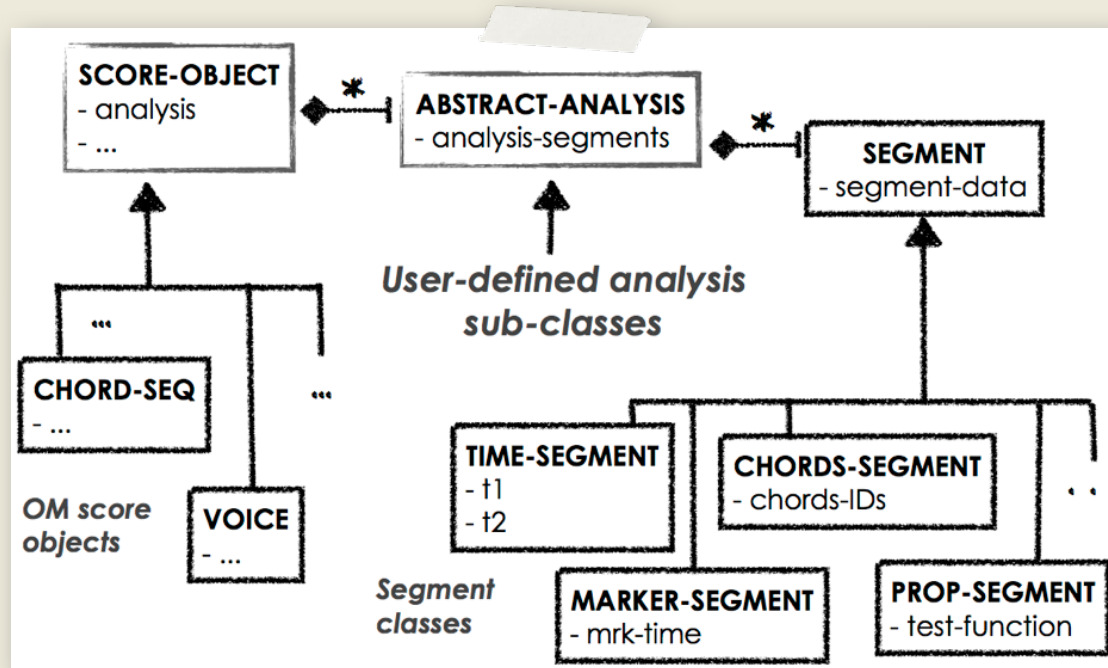
Computer-aided music analysis – A (simple) conceptual framework

Segmentation = Set of *segments* defined in a score according to a given “rule”

2) Analysis = Segments + informative data related to the segments’ contents



Architecture



OM analysis APIs

SEGMENT [segment-data]

the superclass for all segments

segment-begin [segment]	=> beginning time of the segment
segment-end [segment]	=> end time of the segment
segment-init [segment]	=> called at segment creation
segment-update [segment, object]	=> called when the 'object' is modified
draw-segment [segment, view]	=> draws the segment in the score editor
segment-clicked-p [segment, view, position]	=> is the segment selected by a click at 'position' ?

Predefined subclasses and attributes

- TIME-SEGMENT	[t1, t2]
- MARKER-SEGMENT	[t]
- CHORD-SEGMENT	[index-list]
- MEASURE-SEGMENT	[index-list]
- CHORD-MARKER	[chord-index]
- PROPERTY-SEGMENT	[test-function]

ABSTRACT-ANALYSIS [segments-list]

the superclass for all analyses

default-segment-class [analysis]	=> the class of segments used for this analysis
compatible-analysis-p [analysis object]	=> T/NIL (compatibility with different classes of score objects)
analysis-init [analysis, object]	=> called when analysis is attached to the object

analysis-key-event [analysis, view, key]	=> defines personalized actions for keyboard events
analysis-add-click [analysis, view, key]	=> defines personalized action for add-click
handle-segment-doubleclick [segment, analysis, view, position]	=> called when a segment is double-clicked

compute-segments-p, analyse-segments-p, compute+analyse-segments-p [analysis]
=> T/NIL (options available for the menus, etc.)

compute-analysis-segments [analysis, object]
=> returns the list of segments

analyse-one-segment [analysis, segment, object]
=> create 'segment-data'

analysis-init-segment [analysis, segment]	=> called when segment is added to analysis
delete-from-analysis [analysis, segment]	=> called when user removes a segment

segment-data-tostring [analysis, segment]	=> a simple string display for the segment data
draw-segment-data [analysis, segment, view]	=> personalize the drawing of the segment data

Segment creation callbacks:

segment-handle-add-click [segment, analysis, view, position]	=> if defined, called when a segment is created in this analysis by a mouse click
segment-handle-add-key [segment, analysis, view]	=> if defined, called when a segment is created in this analysis with key 's'



<http://repmus.ircam.fr/openmusic/dev-resources/analysis>