Discovering Musical Patterns through Perceptive Heuristics

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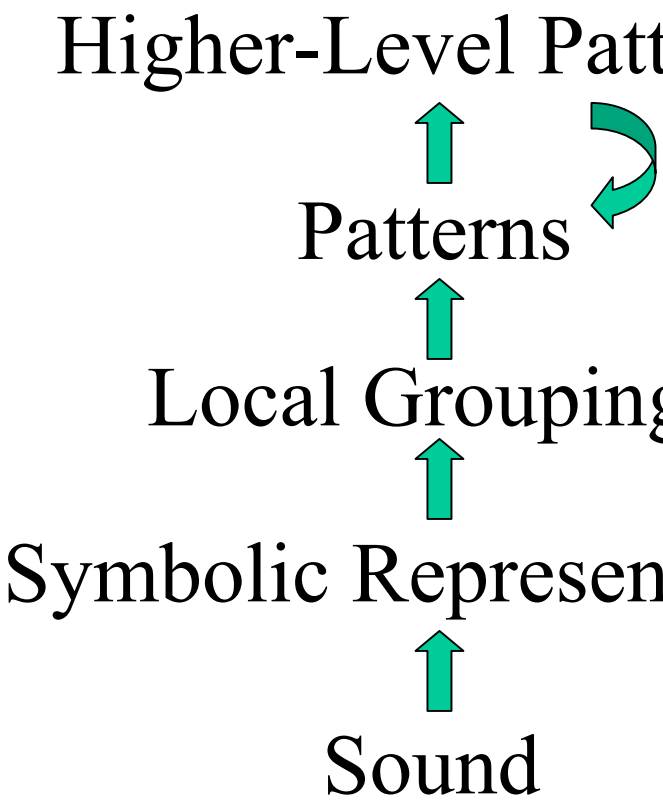
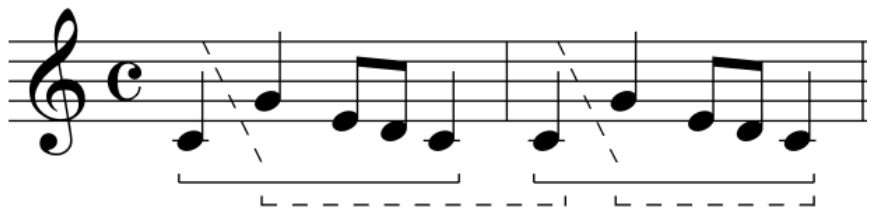
Overview

- Musical Pattern Discovery
  - Local Boundaries and **Repetition**
  - Selective vs. **Exhaustive** Analysis
  - Needs for **Perceptive** Heuristics
- Cognitive Foundations of Patterns
  - Incremental and **Contextual**
  - **Adaptive** Representation
- A Conceptual Network
  - **Logical** Foundations of Redundancy Control
  - **Meta-Pattern** Discovery

Musical Pattern Discovery: Why?





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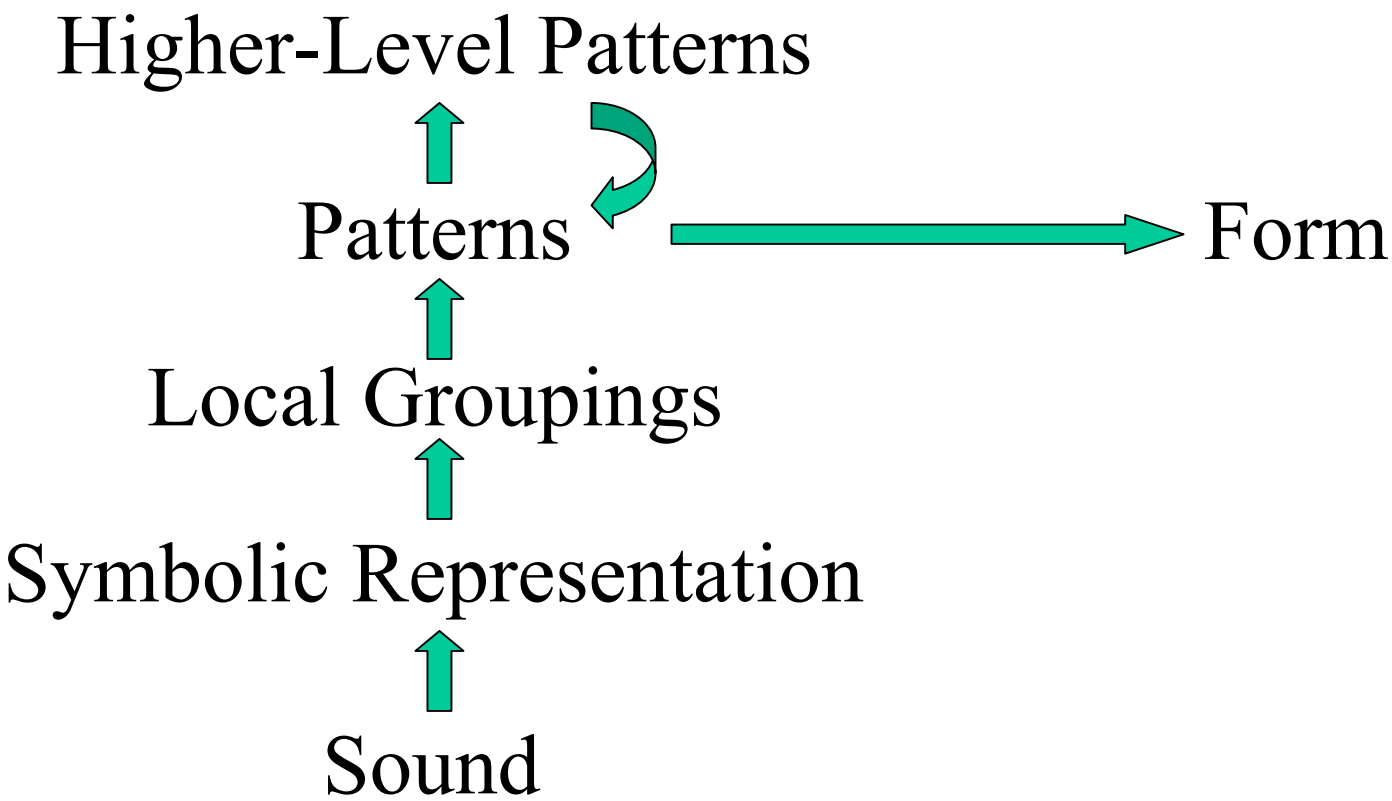
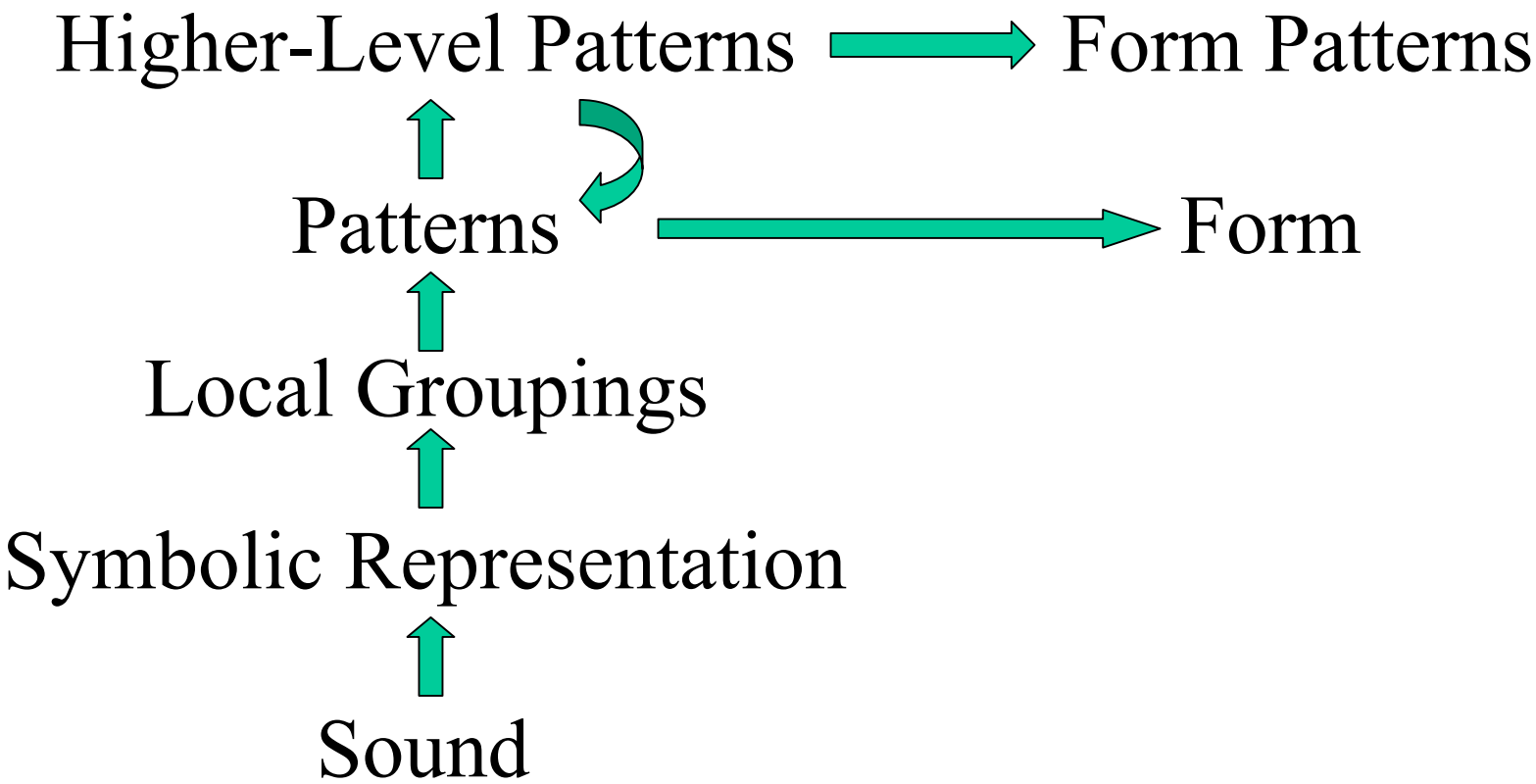


Musical Pattern Discovery: Why?



Selective vs. Exhaustive Analysis.

- Statistics, Probabilistic:
  - Global Characteristics.
- Deterministic Algorithms:
  - Local Configurations.
  - Step #1: *Non-Selective* Pattern Discovery.
  - Step #2: Result *Selection*.

➔ Selective Analysis.

➔ Exhaustive Analysis?

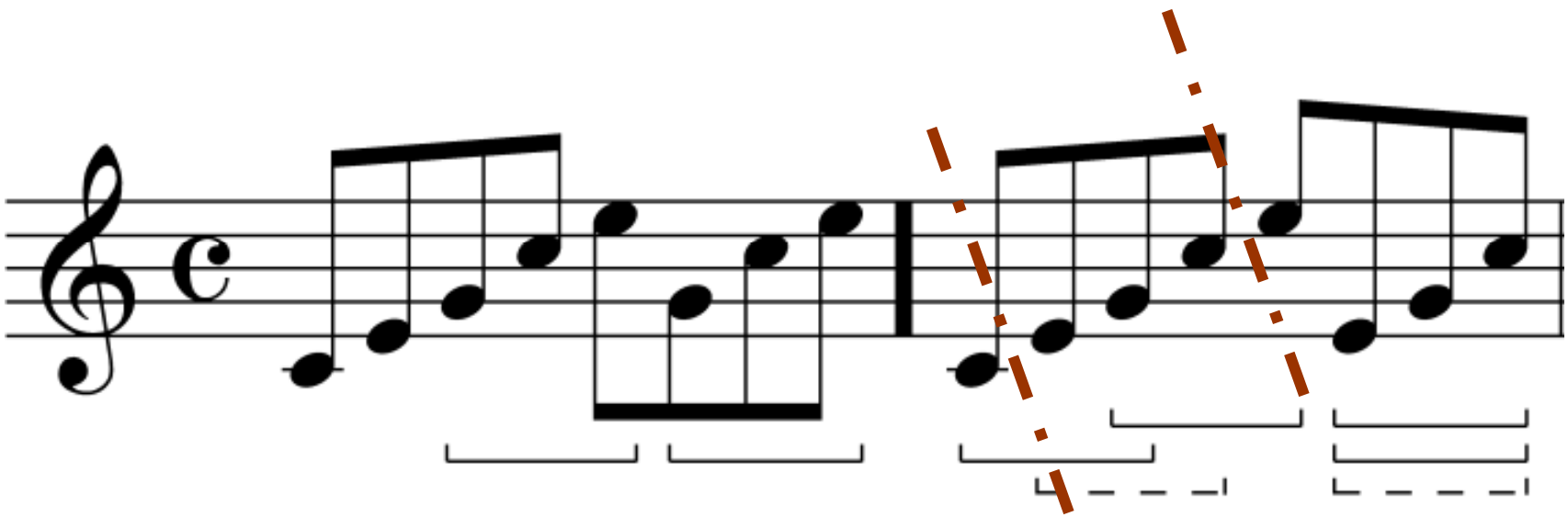
- ➔ Thematic Process: Reti
- ➔ Implication-Realisation: Meyer, Narmour
- ➔ Semiotic Analysis: Ruwet, Nattiez

➔ Careful Pattern ***Detection***.

- ➔ All selected patterns should be relevant.
- ➔ Perception-Like Detection.
- ➔ Context-Based Heuristics.

Geometrical vs. Perceptive Approach.

- Local Discontinuities.



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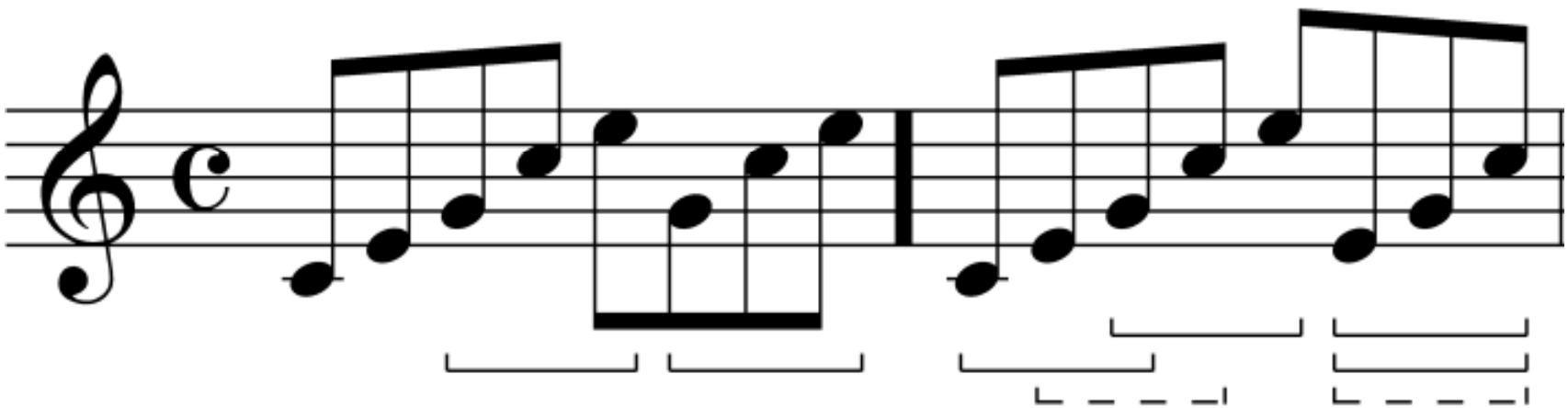
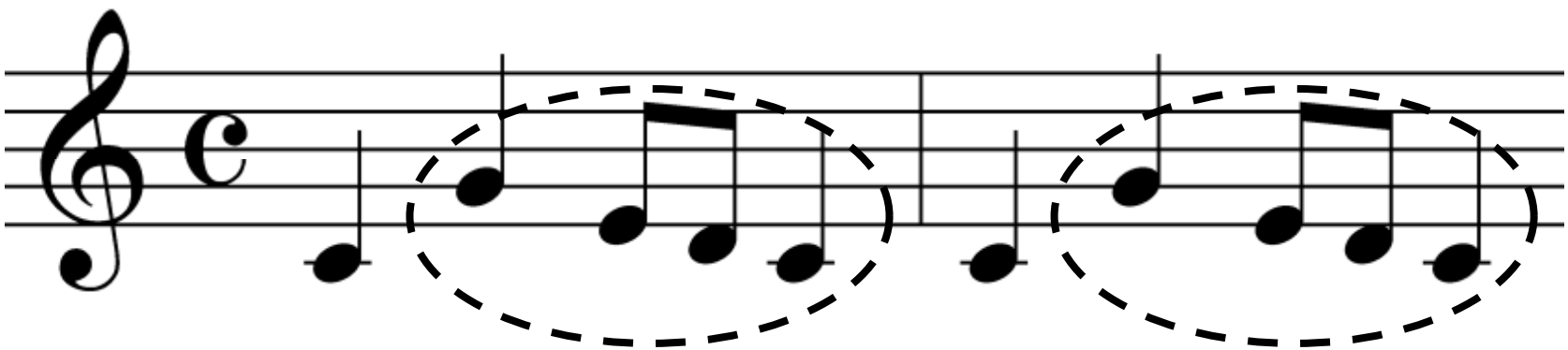


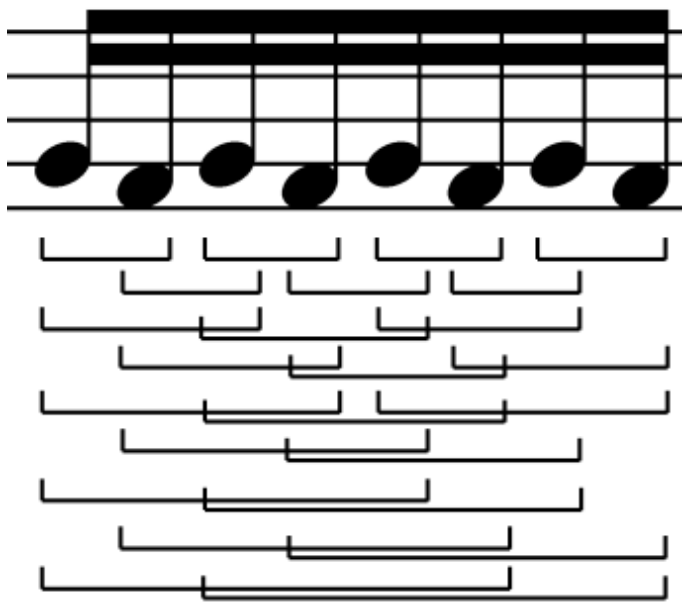
Geometrical vs. Perceptive Approach.

- Local Discontinuities.
- Pattern Suffixes.



Geometrical vs. Perceptive Approach.

- Local Discontinuities.
- Pattern Suffixes.
- Pattern Overlapping.



Geometrical vs. Perceptive Approach.

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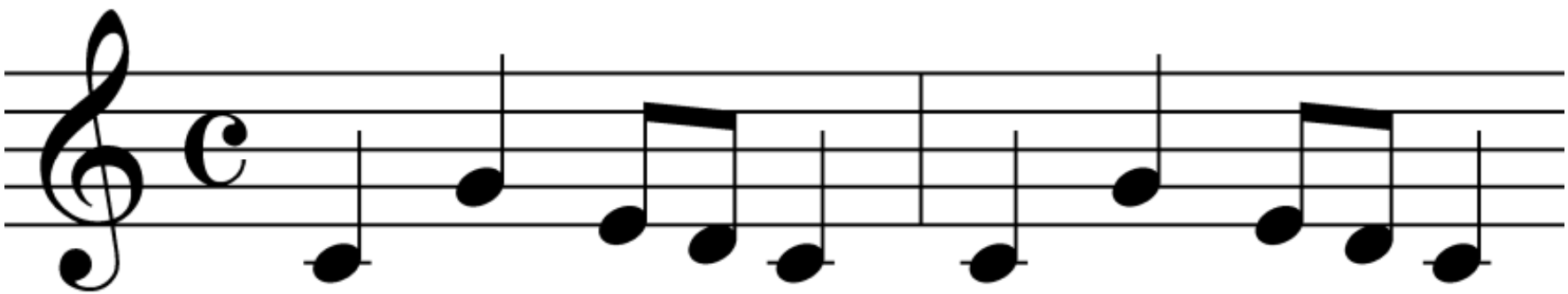
➔ Perceptive Heuristics?

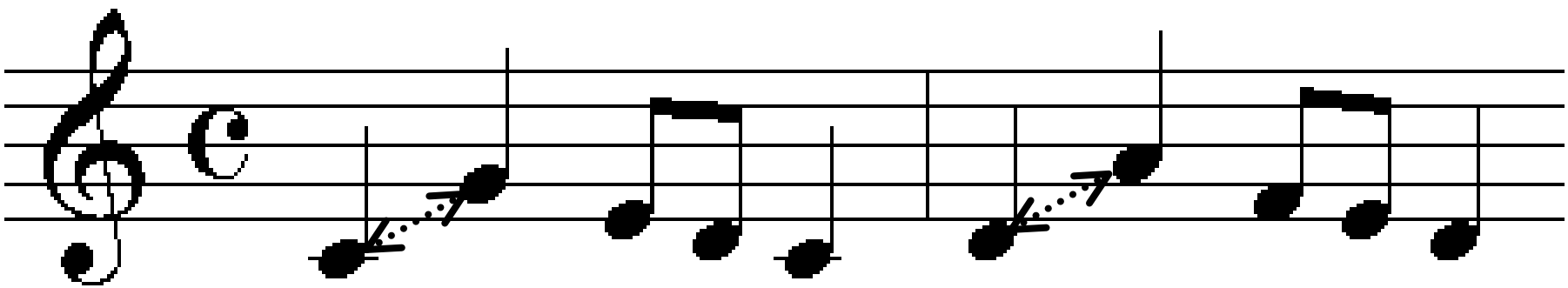
Music Viewpoints

- Pitch



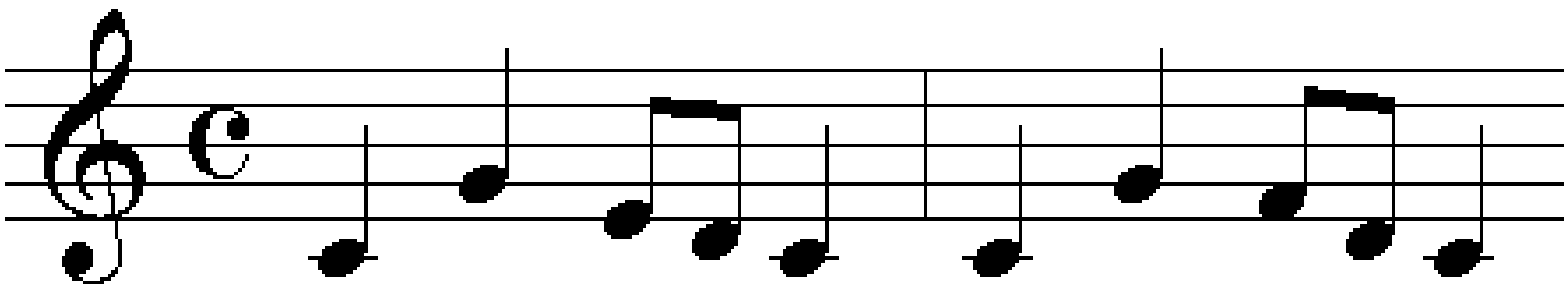
Music Viewpoints

- Pitch
- Interval



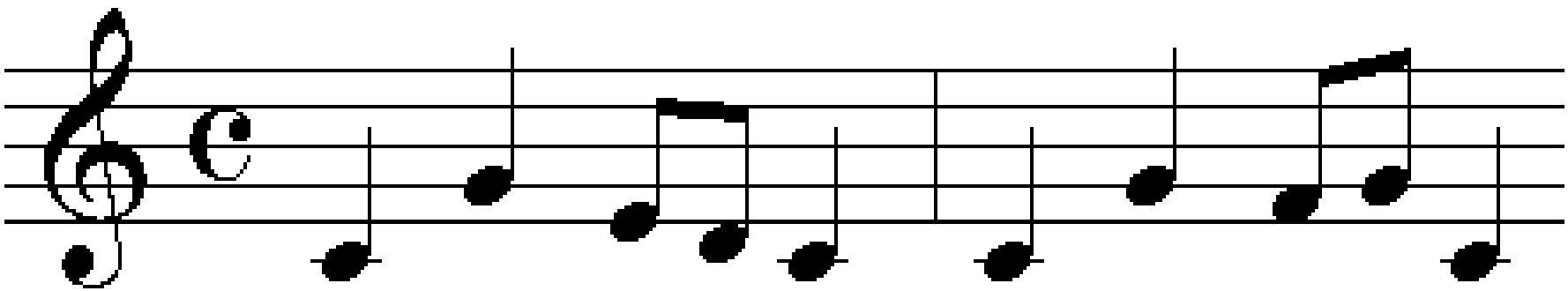
Music Viewpoints

- Pitch
- Interval
- Contour

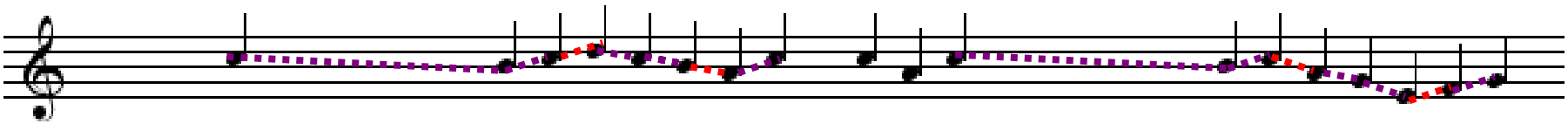


Music Viewpoints

- Pitch
- Interval
- Contour
- Rhythm!

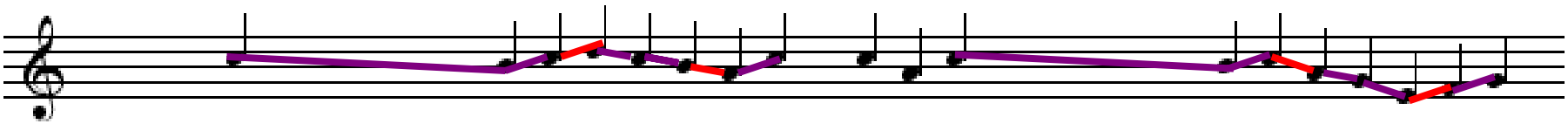


Adaptive Representation



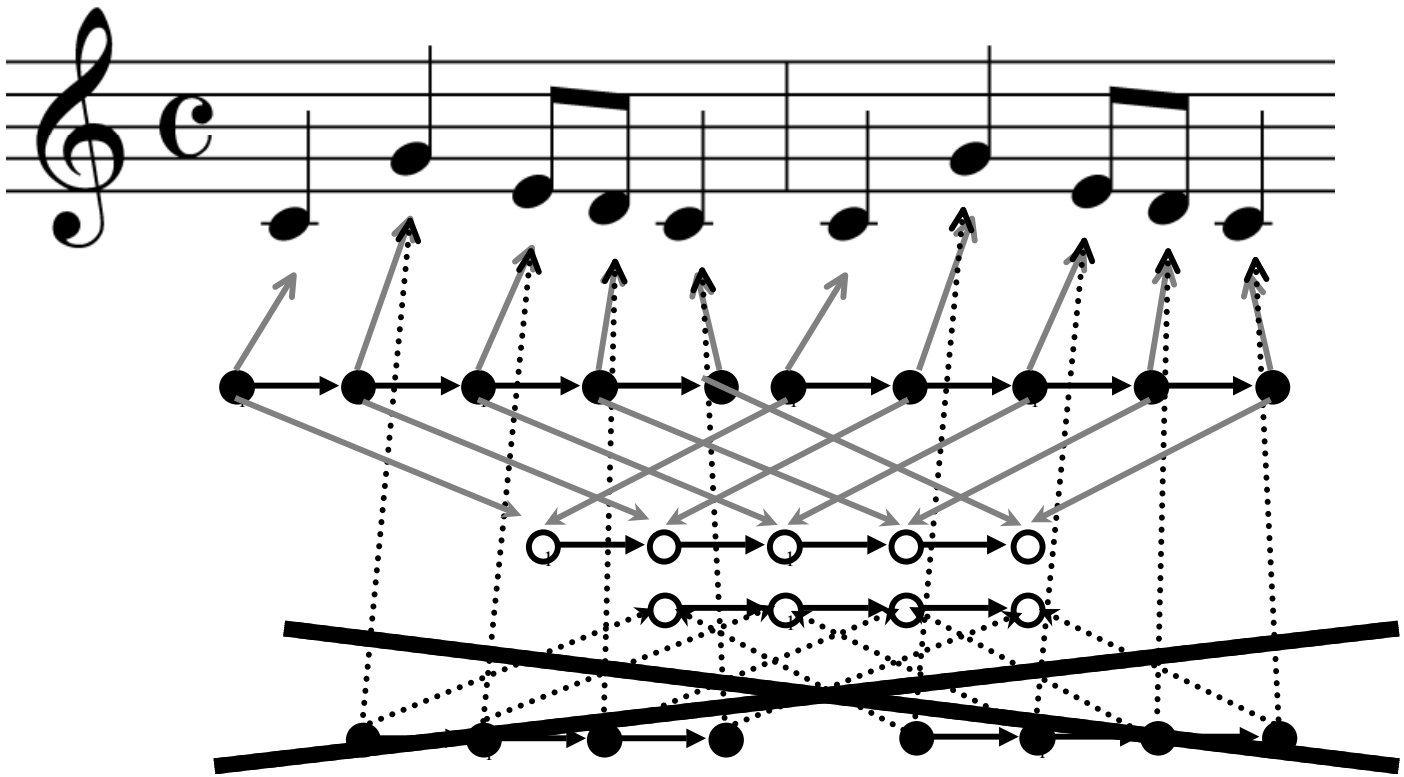
- 2 Parallel Tracking Strategies:
  - Pitch Tracking: Exact InterPitchInterval
  - Rhythm Tracking: InterOnsetIntervalRatio
- Contour Tracking: btw PT and RT.

Adaptive Representation

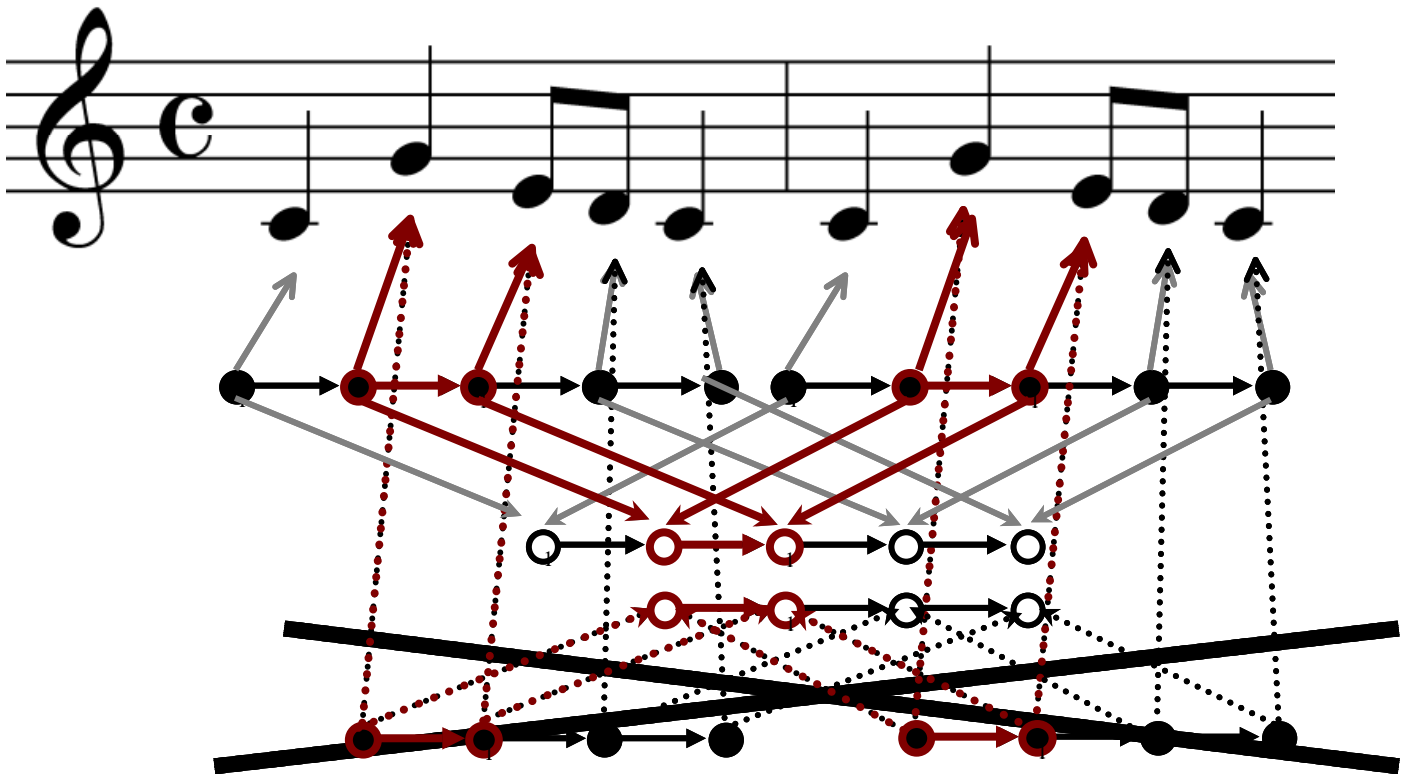


- 2 Parallel Tracking Strategies:
  - Pitch Tracking: Exact InterPitchInterval
  - Rhythm Tracking: InterOnsetIntervalRatio
- Contour Tracking: btw PT and RT.
- Scale Distortion:
  - ΔInterPitch $\leq$ 1 Semi-Tone

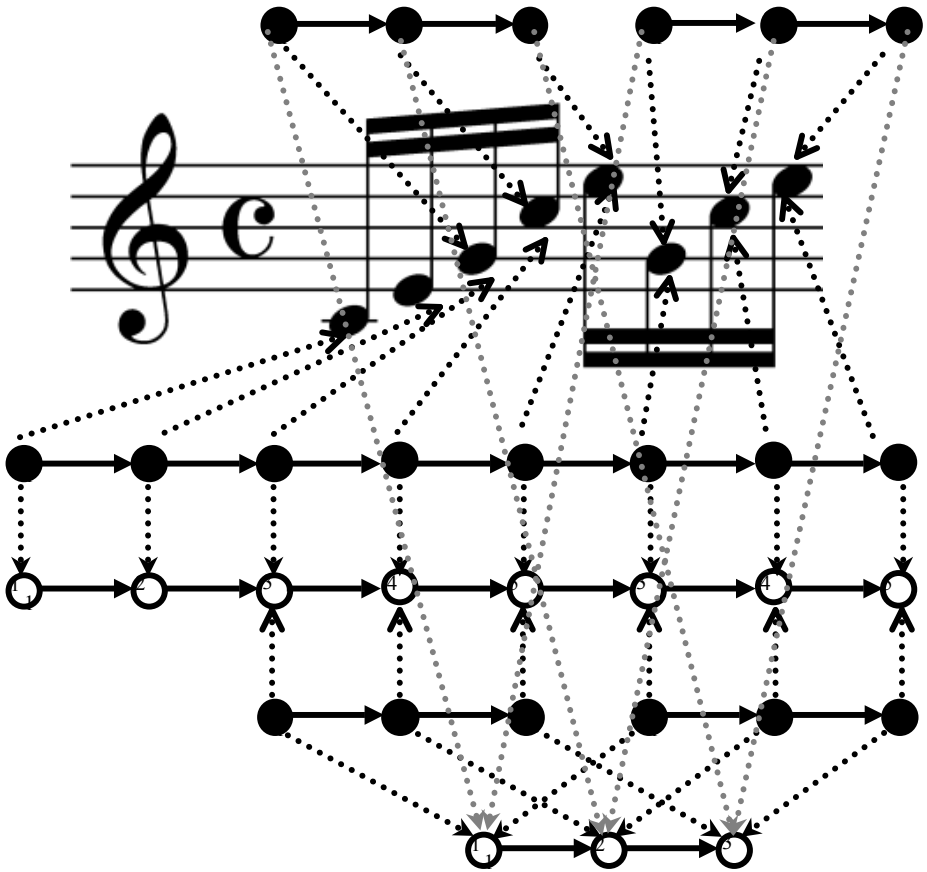
Pattern Logics



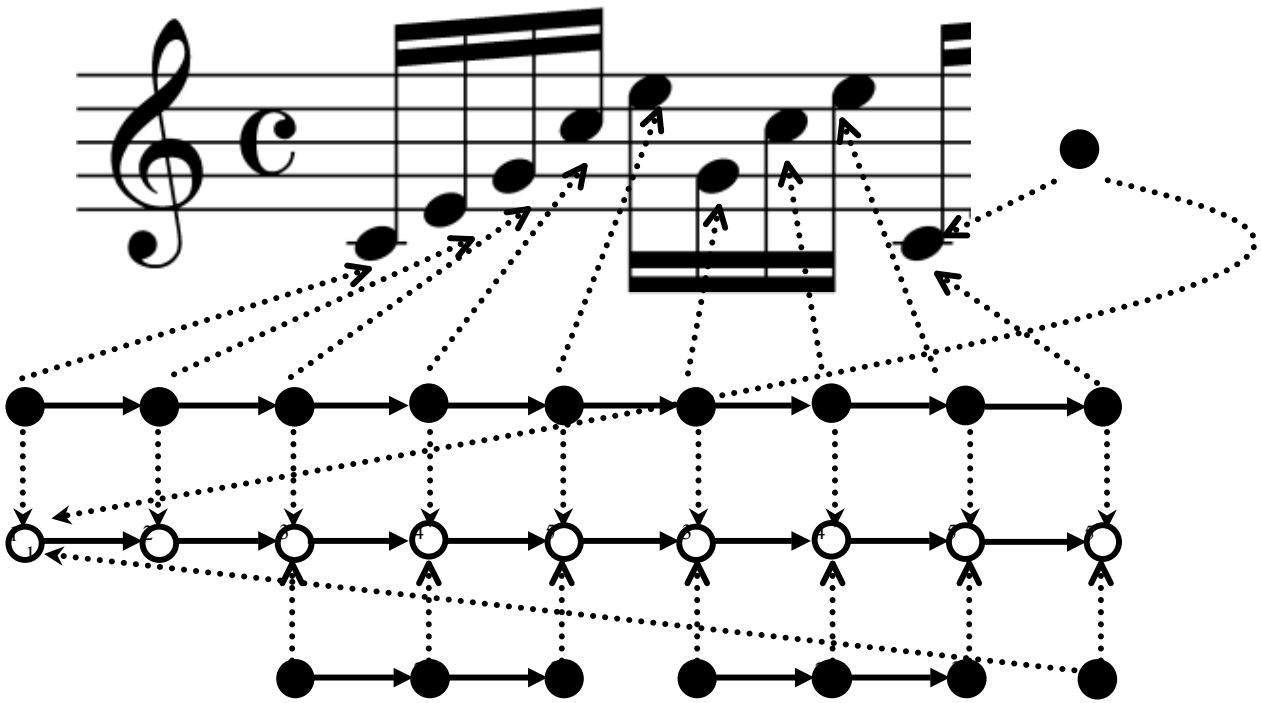
Pattern Logics



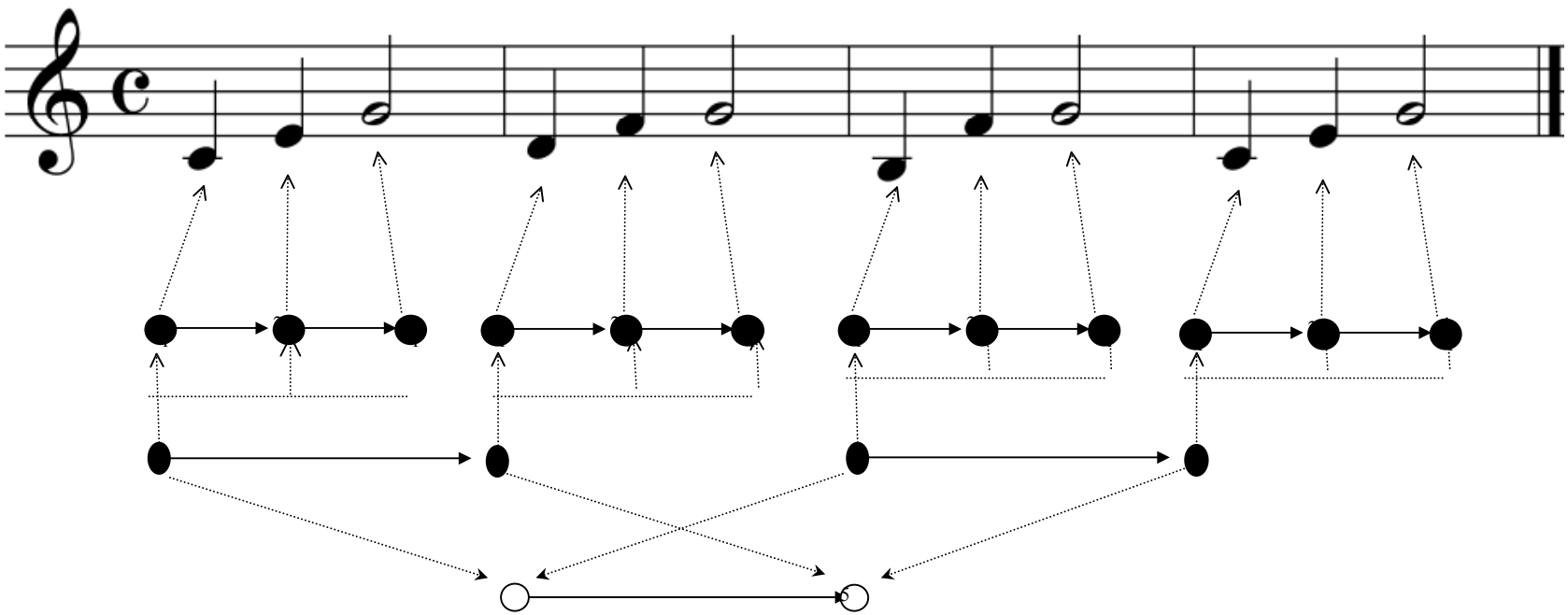
Pattern Association



Successive Repetitions



Meta-Pattern of Patterns



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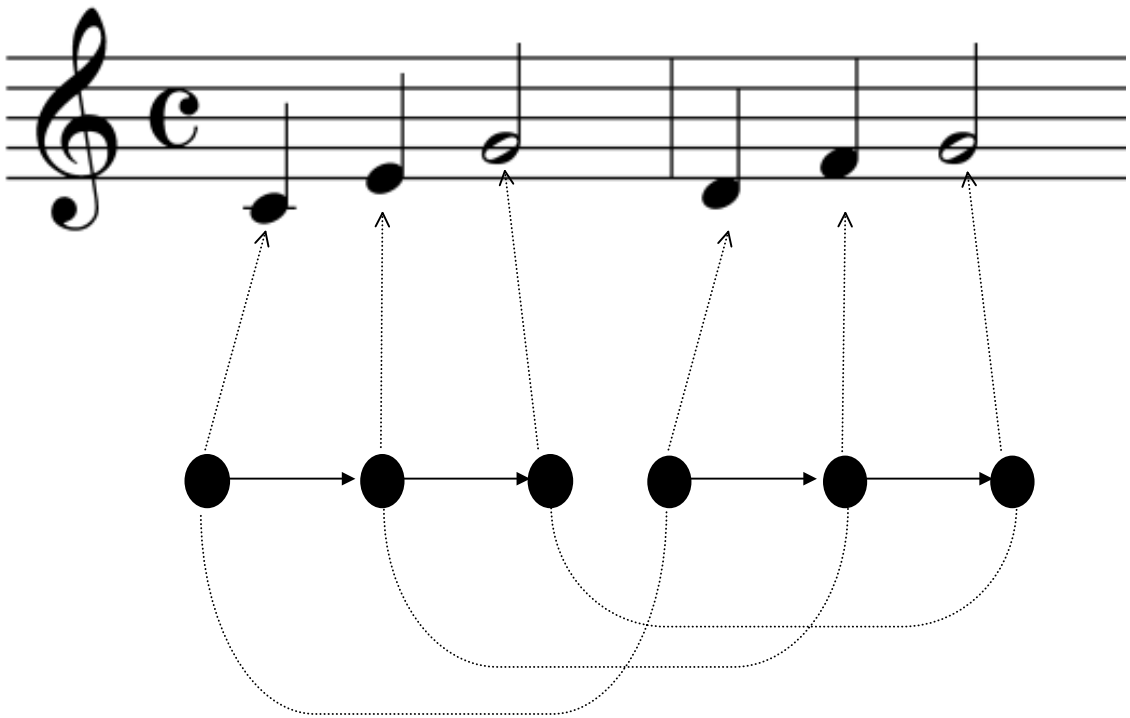

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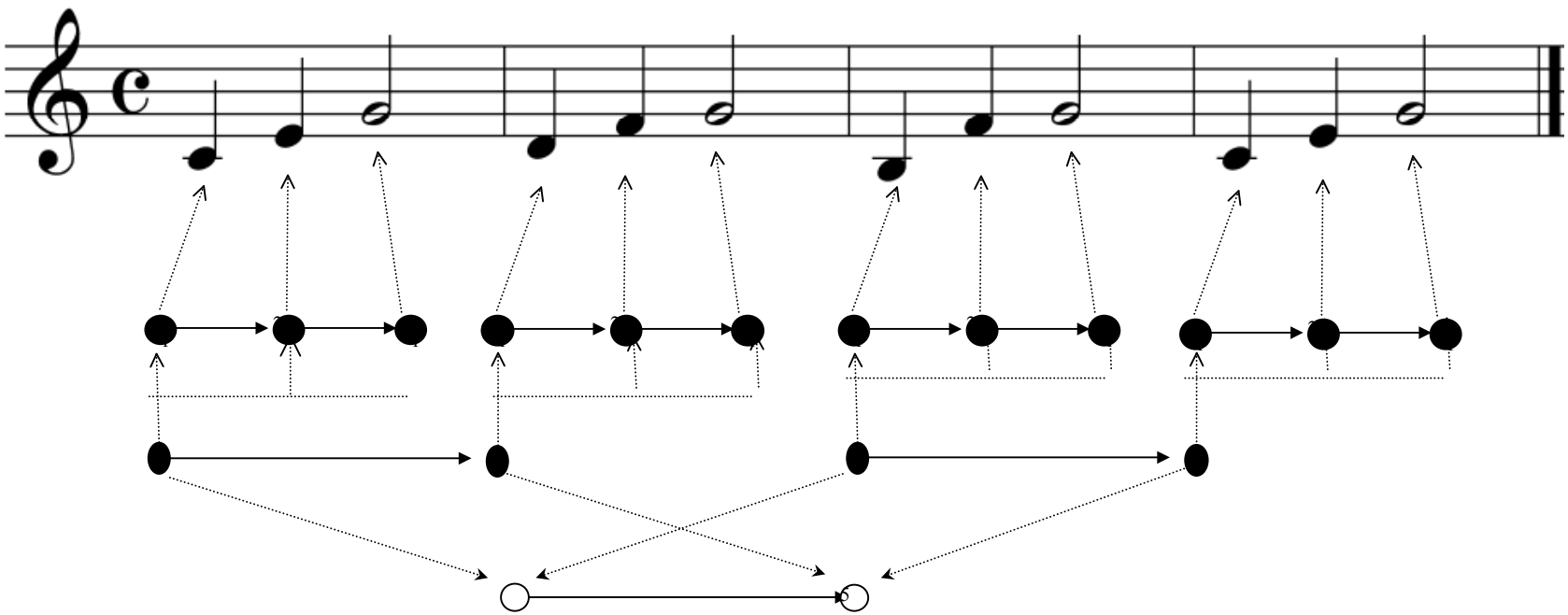

Implementing a *Parallel* Network in a *Sequential* Computer

- Parallel Network:
  - Immediate Propagation
  - Parallel Tests
- Sequential Computer:
  - Sequential Implementation of Propagation
  - Successive Tests

⇒ Optimization

Current Results

OM*kanthus* 0.2.1

Future Works

- Local Classes.
- Chords
- Large-Scale Intervals
- Towards Polyphony
- Music Theory Discovery:
  - Scale
  - Degree
  - Etc.