Rhythmic Intelligence: AI’s Impact on Music and Health

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Global Observation

Music listening is the most preferred activity compared to sports, TV, books, movies, radio, and magazines or newspapers (e.g., people spend more money on music than other activities.)

Music in Technology
Entrainment Overview

Entrainment is a therapeutic approach that uses pulsed frequencies of sound or light to induce the brain to harmonize with the target frequency. Recent studies have shown entrainment can have significant positive effects on neurological and other health conditions (reduce stress and anxiety.)
Auditory Beat Stimulation

Binaural beats are auditory illusions that occur when you listen to two tones with slightly different frequencies in each ear simultaneously. These beats are not actual sounds but are created by your brain's perception when it processes the two distinct frequencies. The phenomenon is based on the concept of beat frequency, as explained in acoustics.

Binaural beats have been found to synchronize brain activity, which means they can influence the brain's electrical patterns, potentially affecting mental states.
Beethoven X, AI Project

CREATING THE 10TH SYMPHONY
Beethoven meets Robbie
Model Structure and Training

Methodology

Inspired by natural language processing models that are designed to predict the next word, based on previous words, to generate realistic sentences.

We convert piano music into a sequence of music events (notes + duration)
Ask the model to predict the next music event based on previous events
Composer’s style - Mathematically

![Pitch Class Histogram](image)

**Dissimilarity: Interval Step Size (blue), pitch class (orange)**

![Graph showing dissimilarity](image)
Beethoven’s sketches

Scherzo  24 bars  Trio
Fuge
6/8
Herr Gott wir loben Dich
Gratulations Menuett
Pathétique

Letters, scribbles
Corpus

7 bars
Dux, 3 bars
8 bars
preexisting
preexisting
preexisting

raise your hand when...
Scherzo 24 bars
Trio 7 bars
### Calculate Statistics for All Bars in Current Score

<table>
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<th>Category</th>
<th>Count</th>
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<tr>
<td>Systems</td>
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<td>Irregular Bars</td>
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<td>Tuplets</td>
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<tr>
<td>Rests (includes bar rests)</td>
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<tr>
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### Other objects by style or type:

- 0 Highlights
- 0 Slurs
- 0 Other Lines
- 0 Technique Text
- 0 Other Staff Text
- 0 Tempo Text
- 0 Metronome Marks
- 0 Other System Text
- 0 Lyrics
- 0 Legacy Chord Symbols
- 0 Other Chord Symbols
- 0 Hidden Objects

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Beethoven 10 – The AI Project
IV

Calculate Statistics for All Bars in Current Score

- 63 Pages
- 63 Systems
- 26 Staves
- 502 Bars per Staff
- 13092 Bars in All Staves
- 7709 Empty Bars (No Notes)
- 8 Non-Bar-Rest Empty Bars
- 5836 Bars Containing Notes
- 0 Irregular Bars

19304 Total Noteheads

518 Hairpins
- 0 Highlights
- 1634 Slurs
- 0 Other Lines
- 1795 Expression Text
- 239 Technique Text
- 552 Other Staff Text
- 64 Tempo Text
- 0 Metronome Marks
- 8 Other System Text
- 0 Lyrics
- 0 Legacy Chord Symbols
- 0 Chord Symbols

168 Key Signature Changes
- 19 Time Signature Changes
- 132 Clef Changes
- 0 Rehearsal Marks
- 0 Bar Number Changes
- 0 Instrument Changes
- 0 Symbols
- 0 Graphics
- 8 Special Barlines
- 288 Other Objects

'Other objects by style or type:
- 7479 Chords
- 17512 Single Notes *or* Chords
- 0 Grace Notes
- 38 Tuplets
- 10824 Rests (includes bar rests)
- 4 Hidden Objects
MYTHOS MOZART!

Refik Anadol
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