Periodicity and Continuity in Pitch and Time

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Outline

Discrete and continuous mappings in pitch and time

Fourier theory tools: Coordinate spaces and spectra

Flexibly defined tuning systems: Chromaticity, Heptatonicity, Triadicity

À la Carte:

Tuning Topics
- Persian Dastgah
- Balinese Pelog

Rhythm Topics
- Rhythmic maximal evenness (Clave patterns)

—Interaction of frequencies
  - Dave King: “You can’t say poem in concrete”
  - Ligeti: Étude 8, Piano Concerto
  - Okazaki “Box in a Box”
- Adowa, analysis of lead drum performance
- Arabic *Iqa’at* (descriptive statistics)
- Byrd/Hill “Fly Little Bird Fly” (microtiming)

Discrete mappings: Time

Music notation implies a mapping from note to timepoint.

Problems for representational use of notation:

- Real timing varies from strict isochrony.
- Attack point may be ambiguous.

These problems are more serious in some situations than others:

- Musical style (e.g. contemporary classical vs. R&B)
- Instrumentation (e.g. piano vs. voice)

Discrete mappings: Pitch

Music notation implies a mapping from note to pitch

Problems for representational use of notation:

- Sounded versions of the “same” note vary in pitch.
- Note may be ambiguous.
- Pitch of a single note may not be constant over its duration.

These problems are more serious in some situations than others:

- Musical style (e.g. contemporary classical vs. R&B)
- Instrumentation (e.g. piano vs. voice)

“Expressive” timing

Consensus definition in empirical literature:

—“Intentional deviations from strict regularity” (Sloboda 1983)

—“Intentional deviations from mechanical regularity” (Repp 1999)

—“Deviations from metronomic tempo,” “Deviations from nominal score durations and hence from small interval ratios” (Bisesi & Windsor 2018)

This concept relies upon the existence of a score to define “strict,” “mechanical,” “metronomic,” “nominal” regularity.

“Deviation”: Parametric factoring of notation-based theory (derivation of timepoints via rational divisions of time) out of actual timing (measured as a continuous quantity).

Counterexample: Fernando Benadon *Swinglines* (forthcoming)

“Expressive” intonation

Scale concept is a similar factoring of intonation:

“Scale”: small finite set of fixed pitches (e.g. 12-tET)

Intonation: deviation of real sounds from nominal pitches

Scale concept associated with regularity (evenness)

A continuous theory of periodicity

Problem with the traditional score/expressive variation paradigm:

It allows us to study timing and intonation in continuous spaces (e.g. performance measurements), but only by first factoring out concepts relating to regularity (metrical, scalar).

This precludes ***continuous*** **theories of regularity** (in pitch, time)

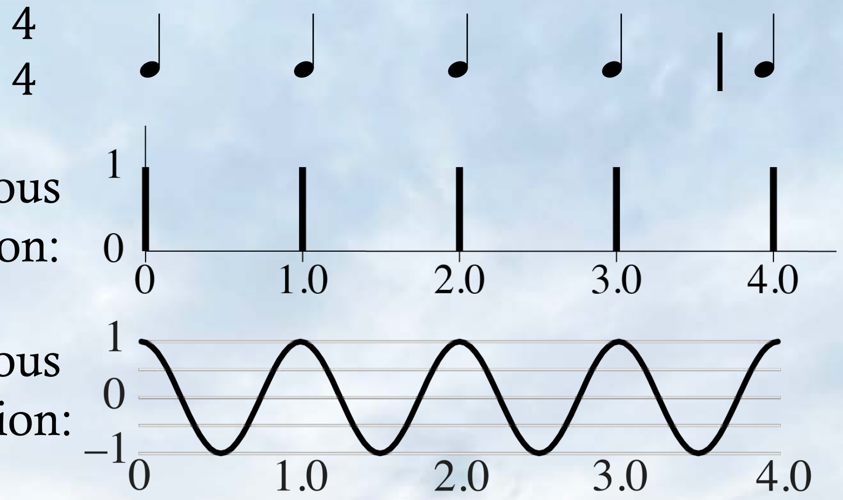
My goal here: Develop a theory of periodicity
in continuous pitch and temporal spaces

Isochrony (discrete) vs. Periodicity (continuous)

Beats of a 4/4 bar:

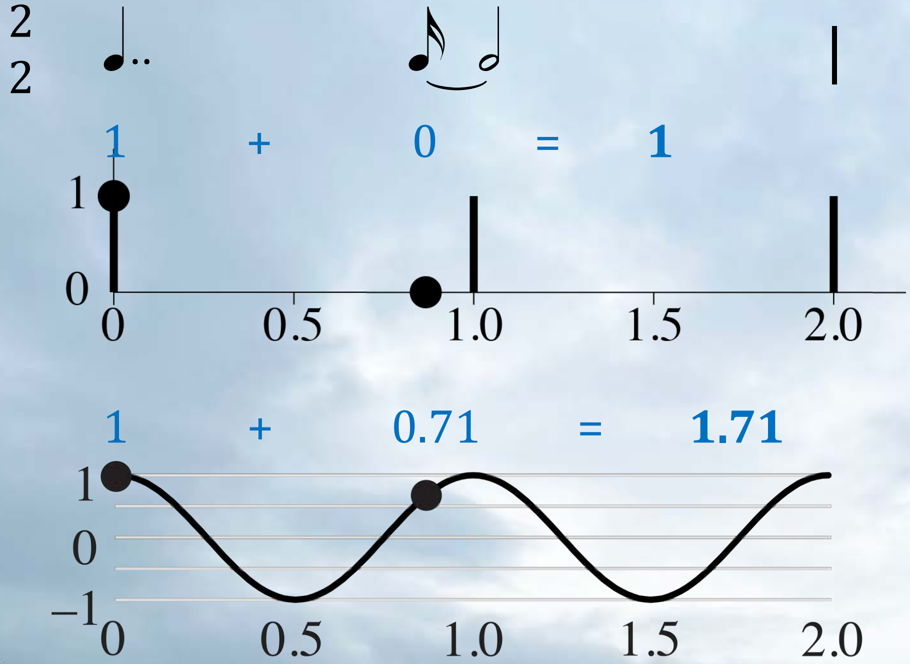
As an isochronous function:

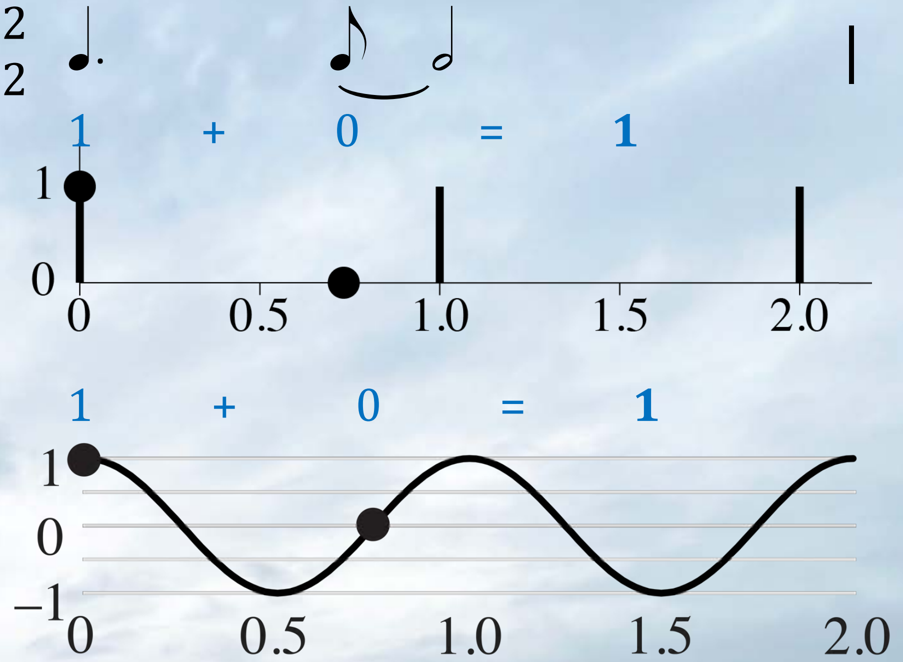
As a continuous periodic function:



Isochrony (discrete) vs. Periodicity (continuous)

Periodic functions recognize **proximity**





Fourier theory tools

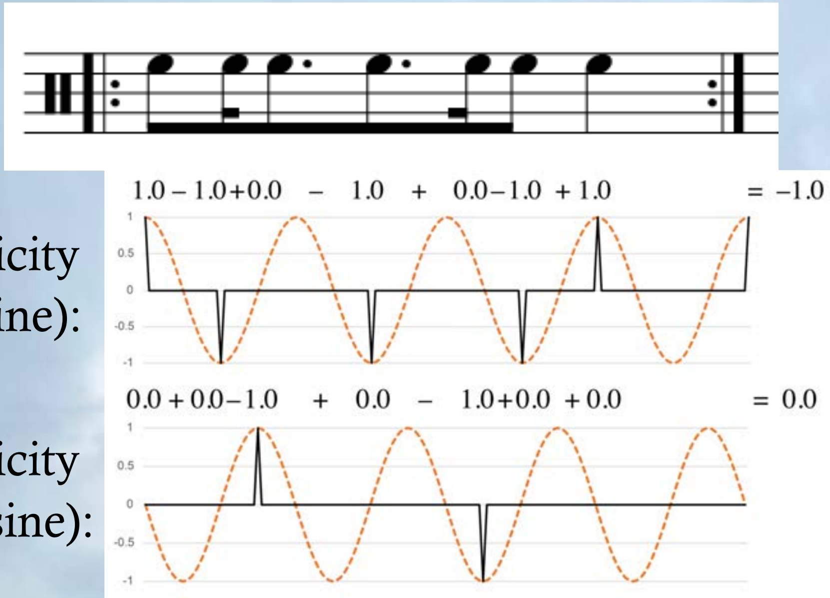
Coordinate Spaces and Spectra

Sine and Cosine functions

Periodicities are two-dimensional.

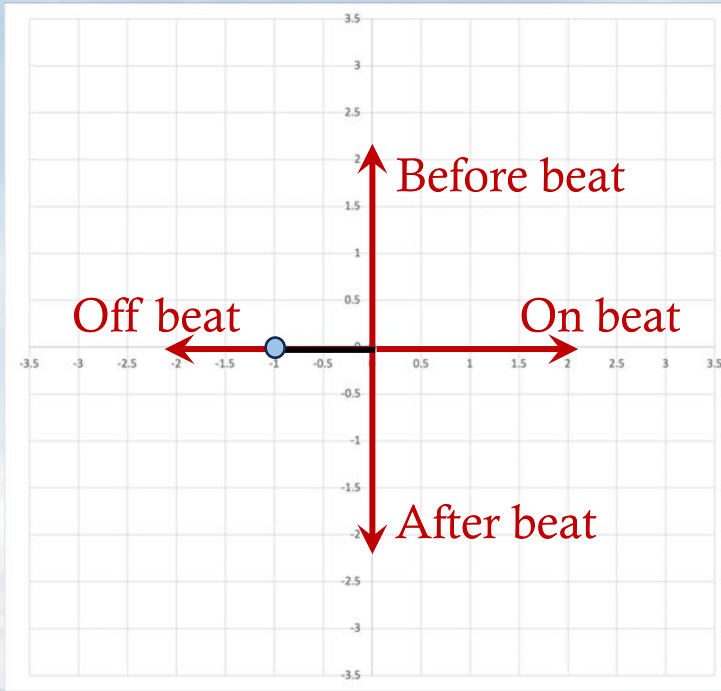
♩ periodicity (cosine):

♩ periodicity (–sine):



Frequency 4

On xy plane:

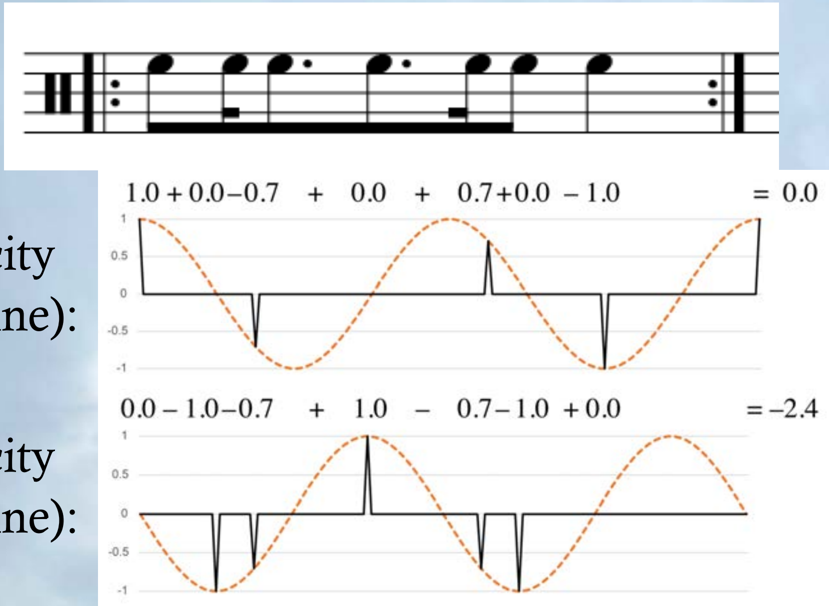


Sine and Cosine functions

Periodicities are two-dimensional.

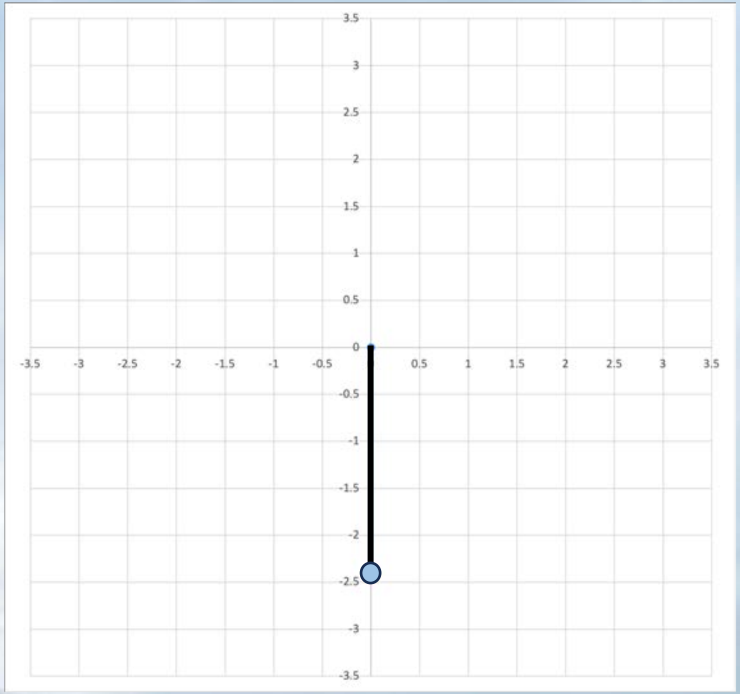
𝅗𝅥 periodicity (cosine):

𝅗𝅥 periodicity (–sine):



Frequency 2

On xy plane:

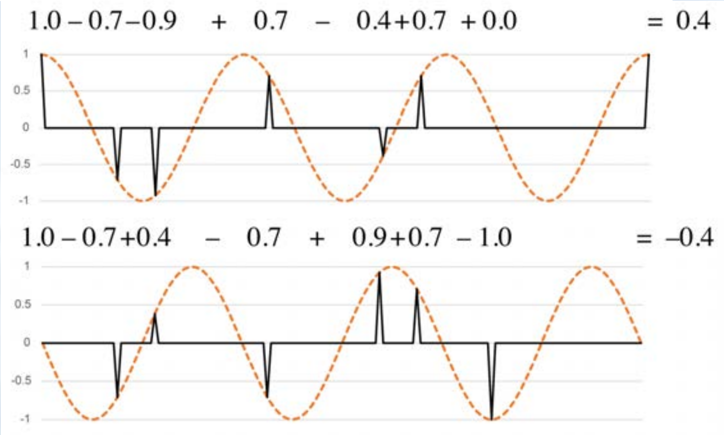


Sine and Cosine functions

Periodicities need not be integer multiples of the minimal duration.

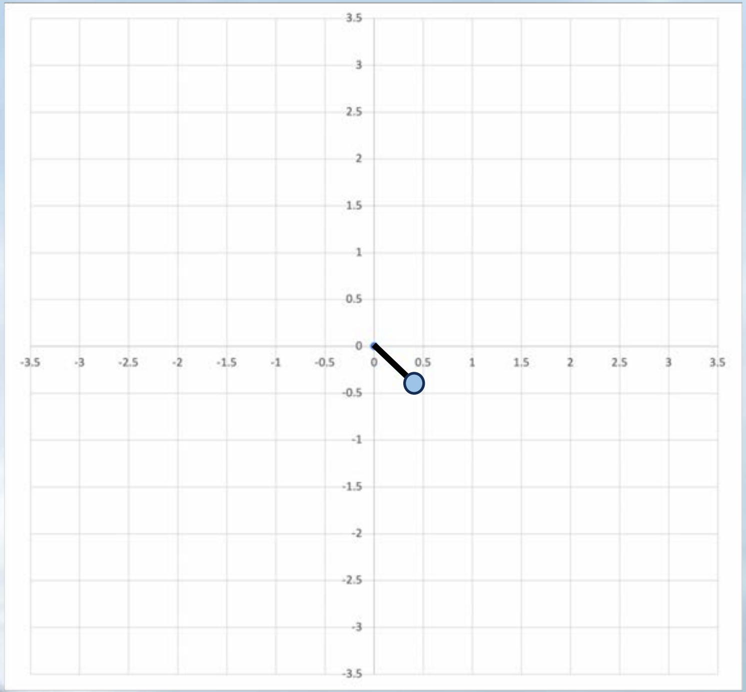
1⅓♩ periodicity (cosine):

1⅓♩ periodicity (–sine):



Frequency 3

On xy plane:

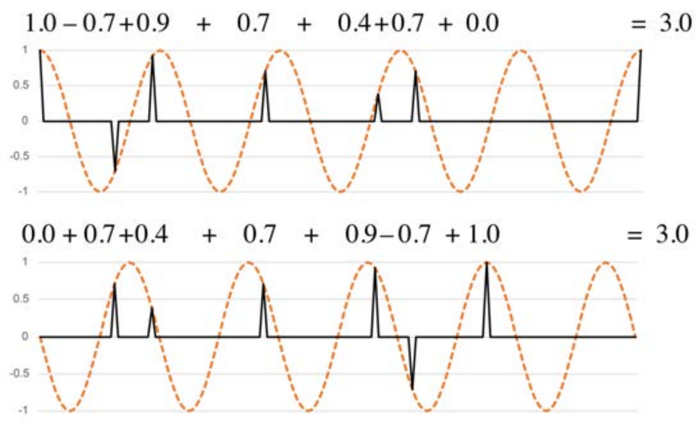


Sine and Cosine functions

Periodicities need not be integer multiples of the minimal duration.

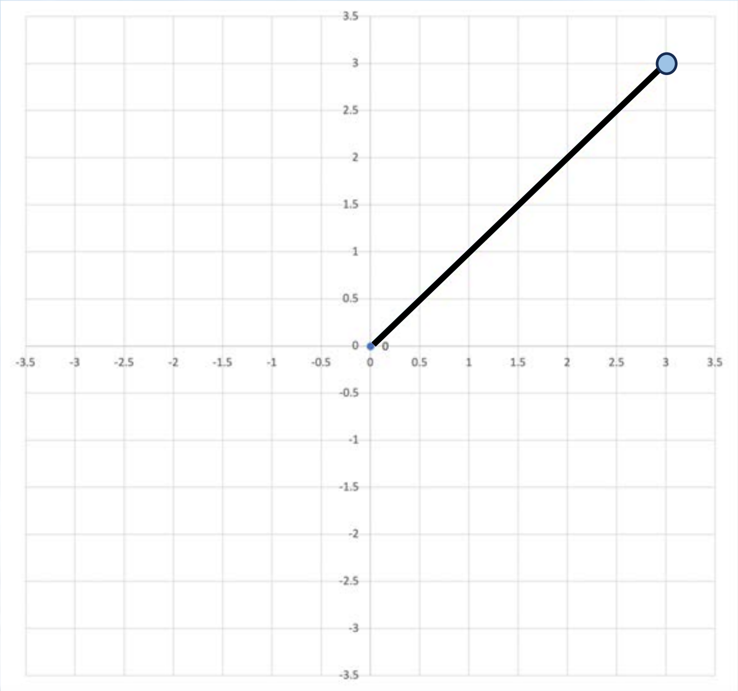
4/5♩ periodicity (cosine):

4/5♩ periodicity (–sine):



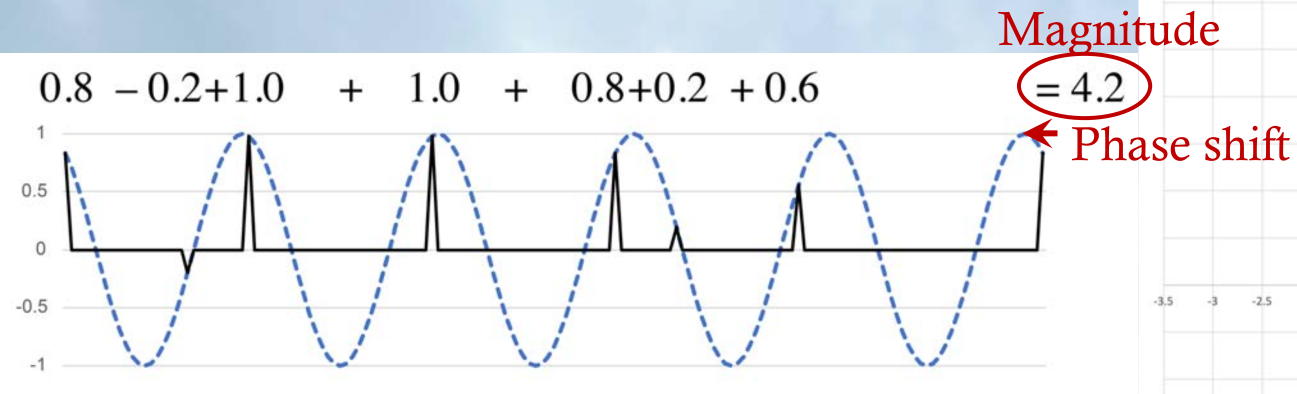
Frequency 5

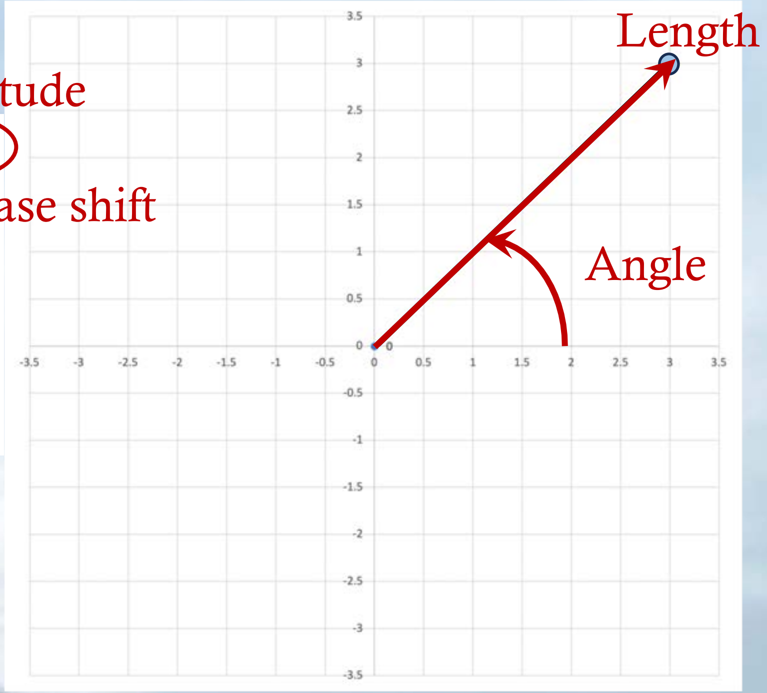
On xy plane:



Phase and magnitude

Angle in 2-d space corresponds to the **phase** of the best-matching wave.





Rhythmic spectrum

The rhythmic spectrum shows the **magnitudes** at all possible frequencies

Rhythmic spectrum for the clave rhythm:

♪. ♪. ♩ ♪ ♩

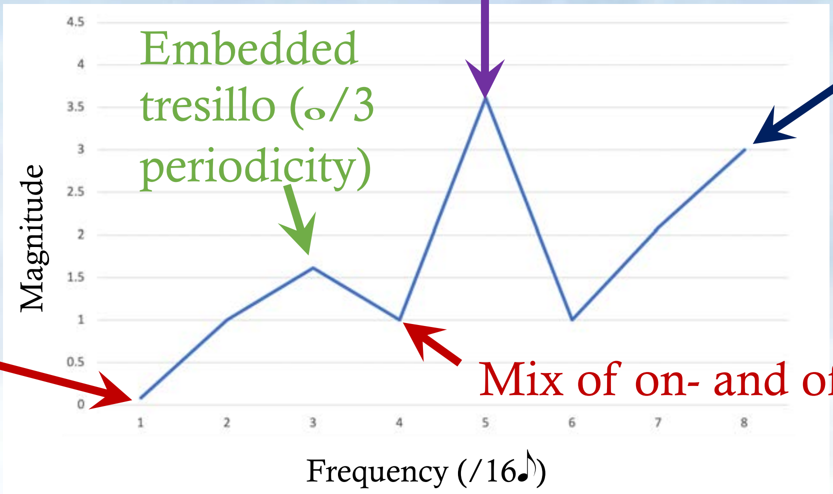
The strongest frequency (periodicity 𝅝/5) shows that clave is close to 5 equally spaced onsets

Embedded tresillo (𝅝/3 periodicity)

Mostly on-beat at ♪ level

Low 𝅝 periodicity: Relatively even distribution of onsets

Mix of on- and off-beat at ♩ level



N.B.: Periodicities are the reciprocals of frequencies

Flexibly Defined Tuning Systems

Chromaticity, Heptatonicity, Triadicity

Traditional Scale/Tuning Theory

Traditional tuning theories, despite distinctions (ET, meantone, JI, Pythagorean), all involve discrete mappings from note to pitch.

For example both Andreas Werckmeister and Harry Partch focus on

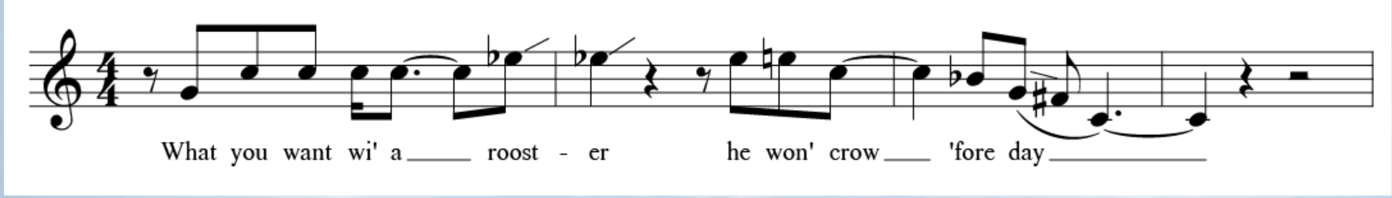
- Constructing relatively even, finite, fixed-pitch scales
- Tuning of keyed (fixed-pitch) instruments.

Deviation conceived as error.

Division of labor between tuning and music-making.

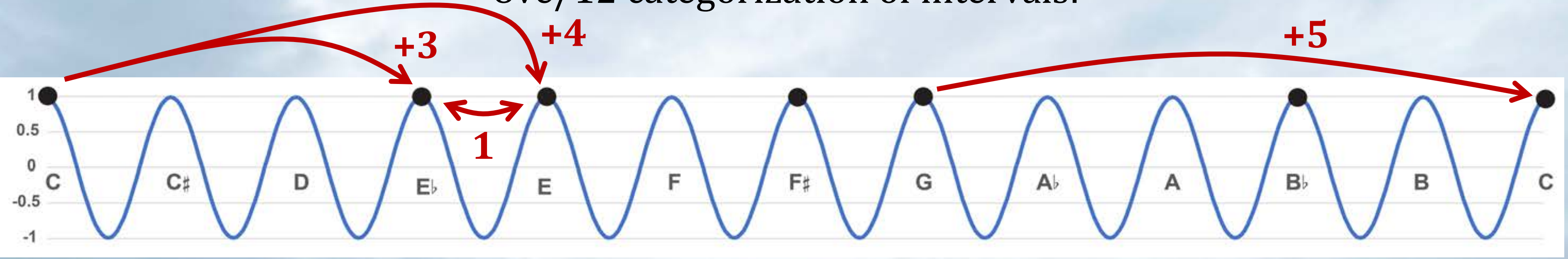
Flexibly Defined Interval Categories

An attempted transcription (after Titon) of Charlie Patton "Banty Rooster Blues"



+5 +3 −4 −2 −3 −7

8ve/12 categorization of intervals:



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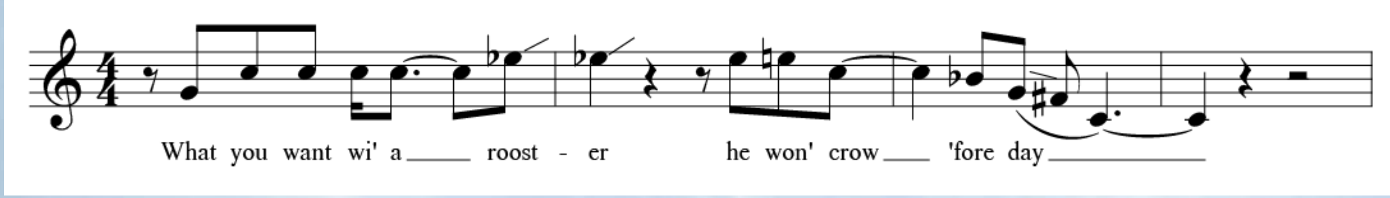
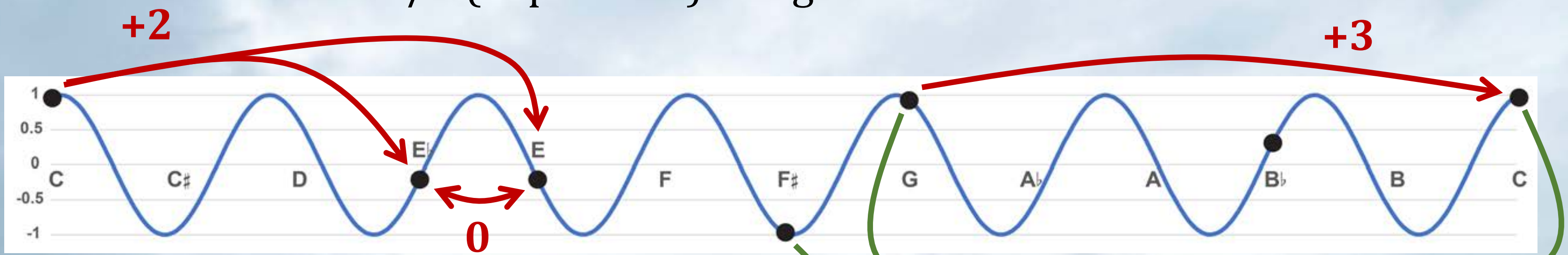


+3 +2 −2 −1 −2 −4

8ve/7 (heptatonic) categorization of intervals:



Low value =Weak, ambiguous position

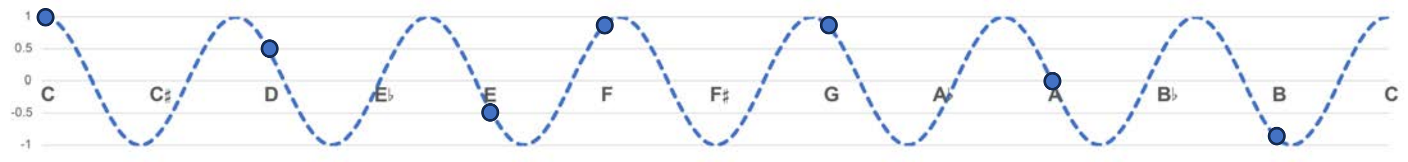
High value = Clear, central heptatonic position

Heptatonic coordinates

Heptatonic coordinates of a C major scale

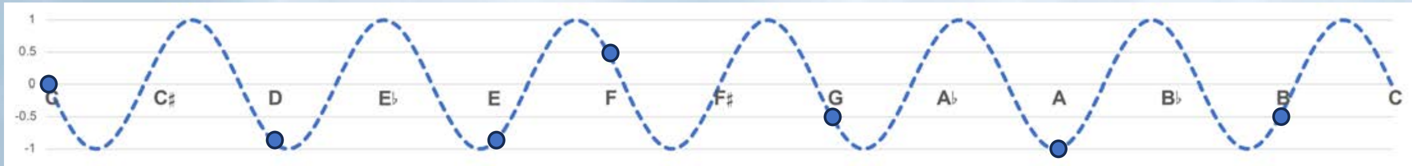
1.0 + 0.5 + −0.5 + 0.87 + 0.87 + 0 + −0.87 = 1.87

Cos



0 + −0.87 + −0.87 +0.5 + −0.5 + −1.0 + −0.5 = −3.23

Sin

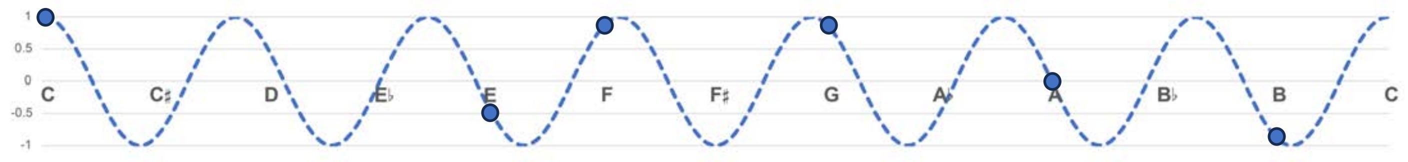


Heptatonic coordinates

Heptatonic coordinates of a C major triad

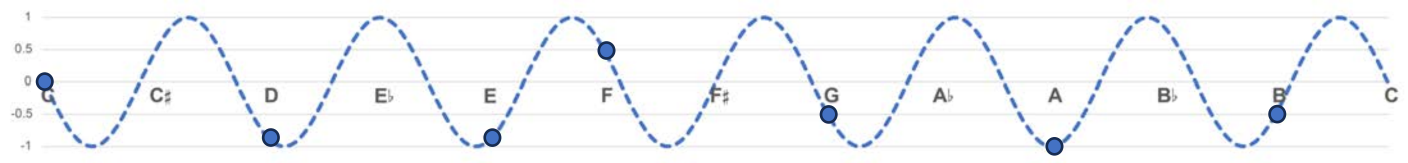
1.0 + –0.5 + 0.87 = 1.37

Cos



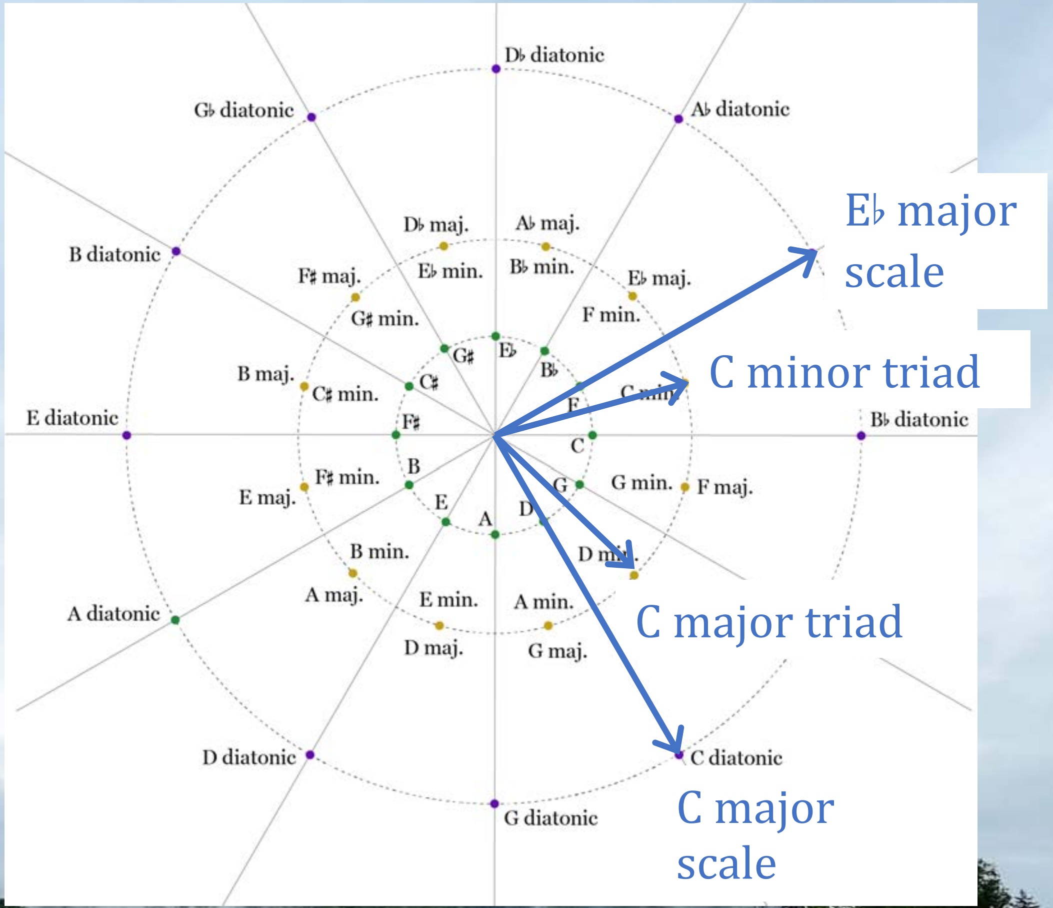
0 + –0.87 + –0.5 = –1.37

Sin

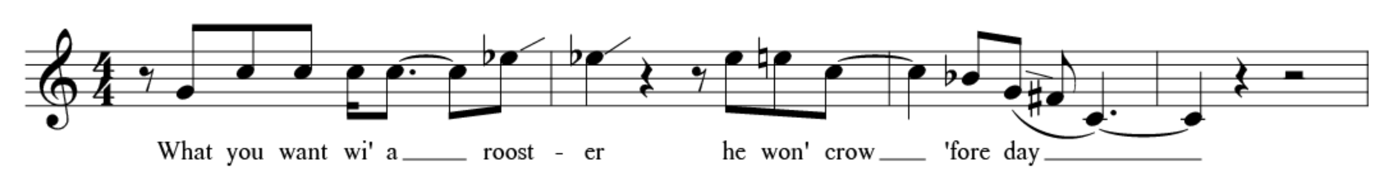


Heptatonic coordinates

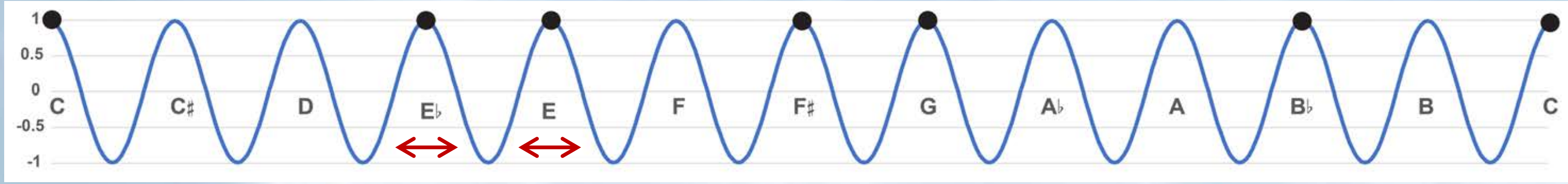
Sets are arranged in circle-of-fifths order in a heptatonic space



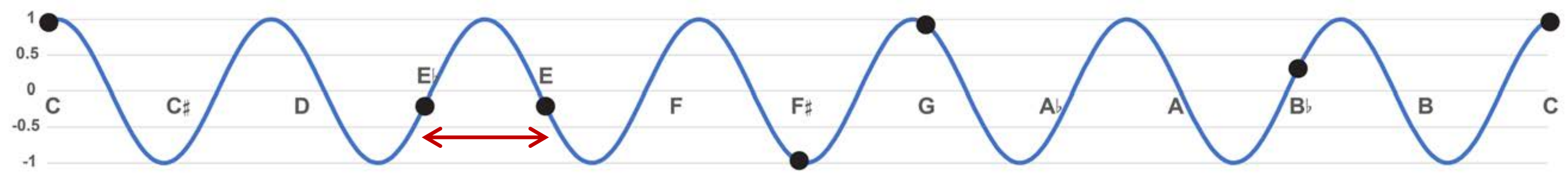
Flexibly Defined Interval Categories



Flexibility of intonation is inversely related to the number of interval categories.



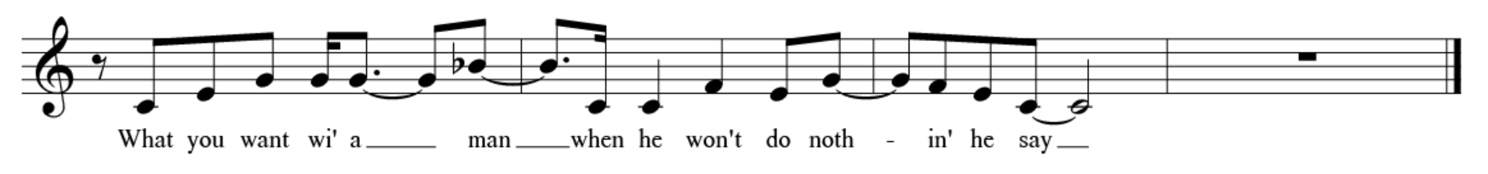
Chromatic categories restrict intonational flexibility



Heptatonic categories allow for greater flexibility

Flexibly Defined Interval Categories

B phrase of "Banty Rooster Blues"

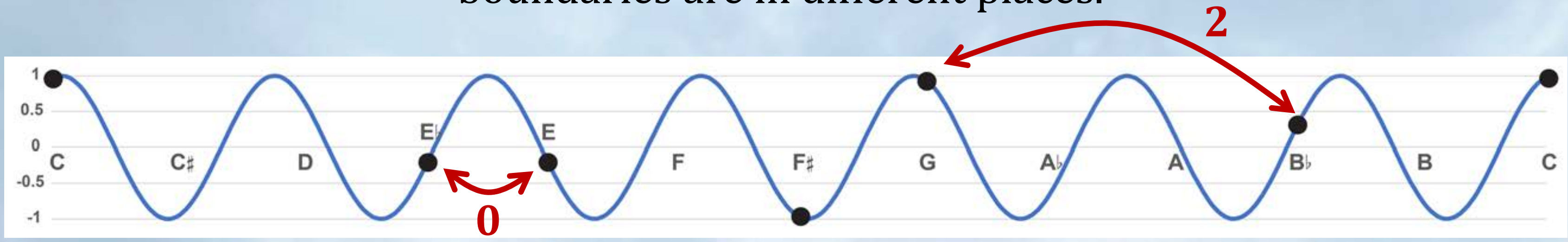


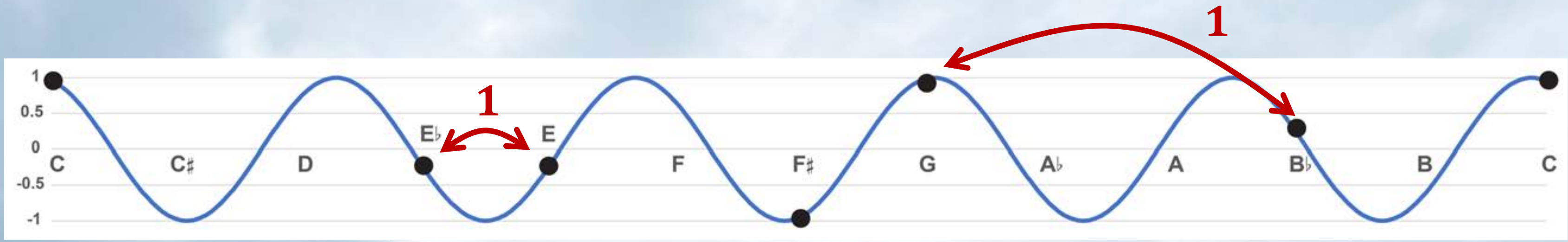
+1 +1 +1 **0** +1

8ve/3 (triadic) categorization groups multiple scale tones
→ flexibility allows for harmonic changes

Pentatonic vs. Heptatonic intervals

Pentatonic values are the same as heptatonic at 12t-ET locations, but category boundaries are in different places.



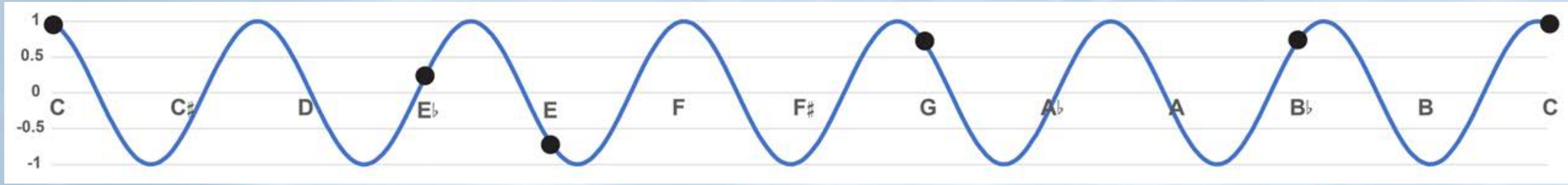


Distinguishing strength of pentatonicity vs. heptatonicity requires going off the 12-tET grid.

Fourier magnitudes

The sum of heptatonic (chromatic, triadic, etc.) values across pcs gives the **magnitude**, a measure of how well the categorization works for that set.

0.97 + 0.26 – 0.71 + 0.71 + 0.71 = 1.93



Spectra

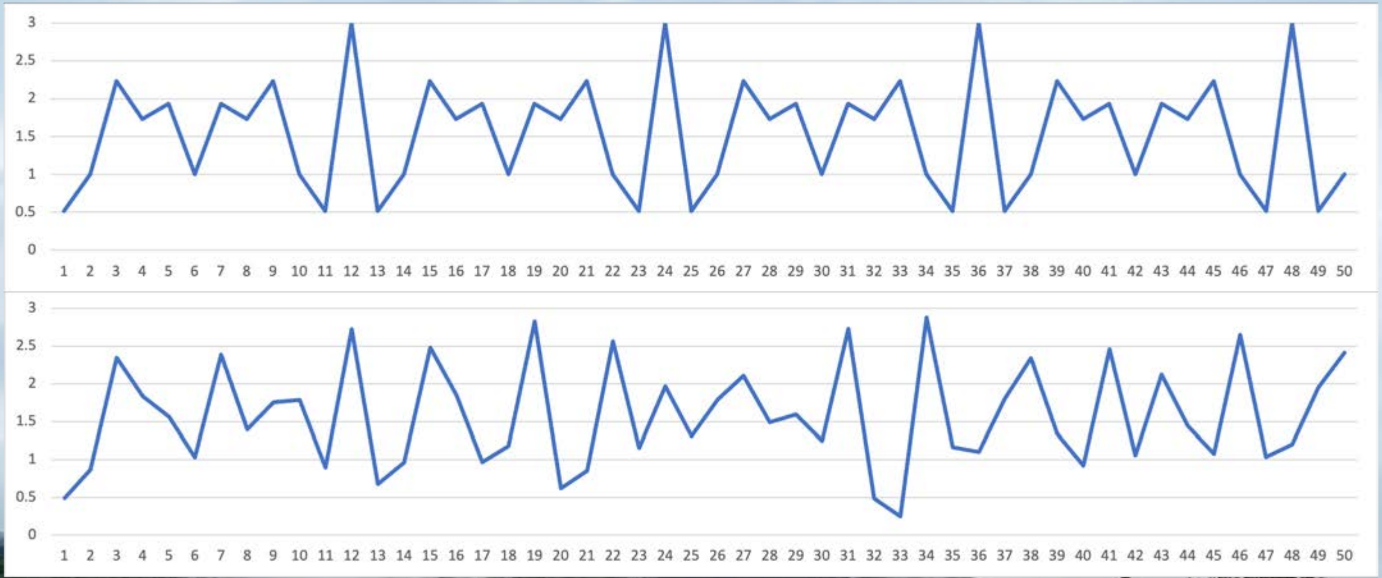
The ***spectrum*** of a pitch-class vector shows the magnitudes of all its Fourier coefficients (ignoring phases)

The spectrum is **invariant with respect to transposition and inversion** (i.e. it is a *set class* property)

Examples:

12tET major triad

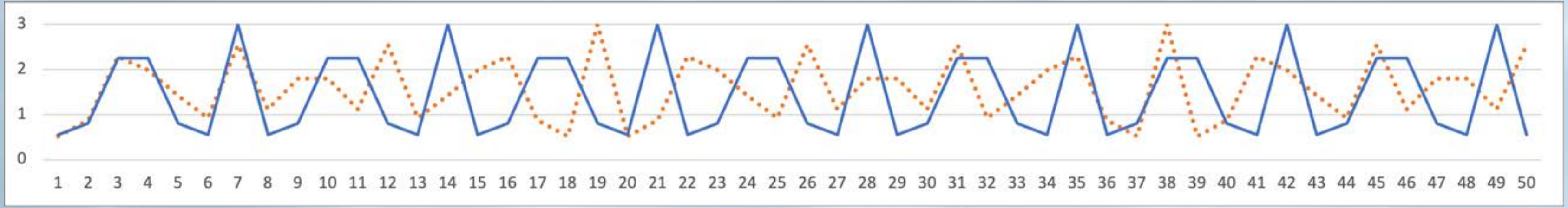
Just major triad



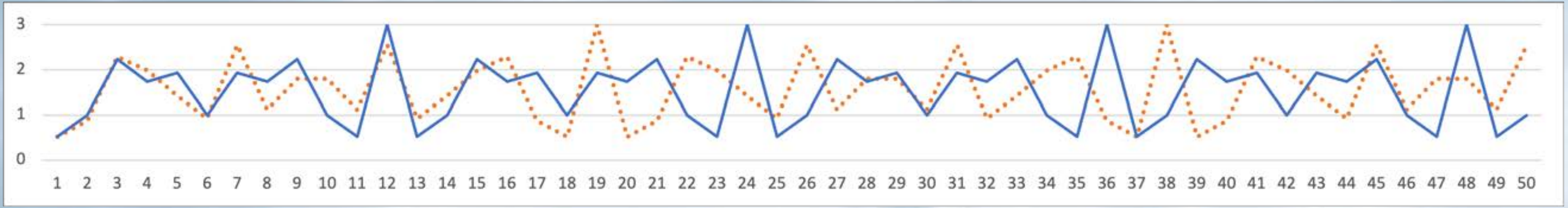
Spectra

Small tuning differences effect higher frequencies in the spectrum

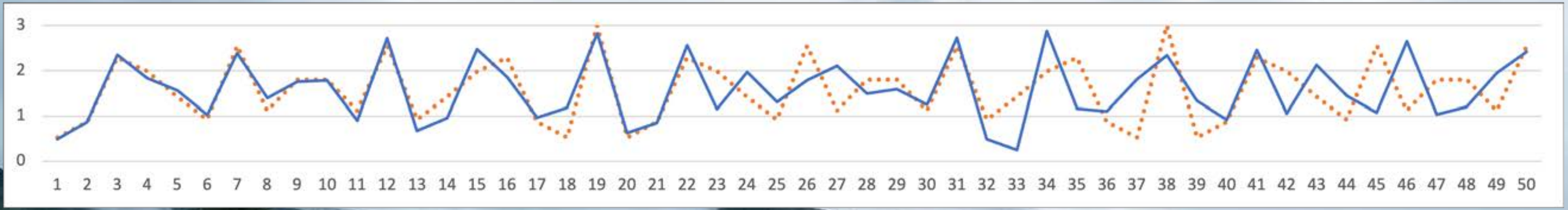
Examples: Just triad (dotted) compared to . . .



7tET triad

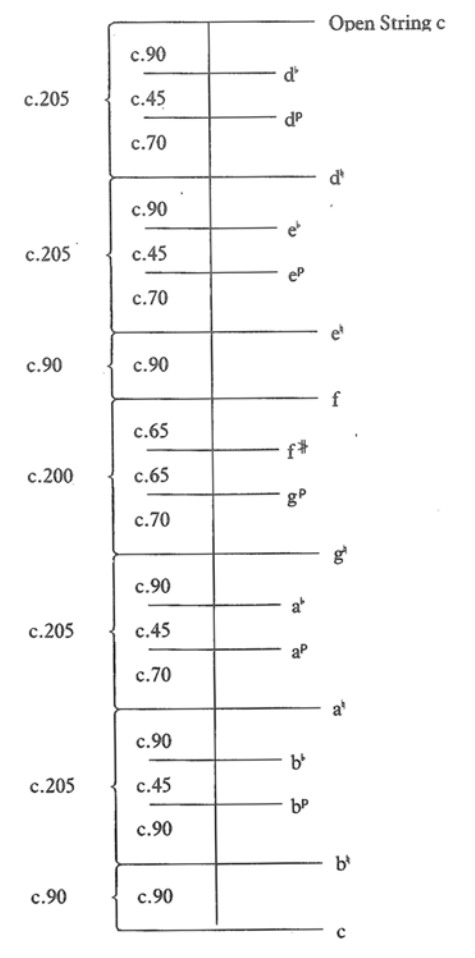


12tET triad



19tET triad

Persian Dastgah Tuning



Hormoz Farhat’s Tuning

—Loosely empirical (based partially on measurements but no data reported)

—Generated by two basic intervals:

- Perfect fifth (two Pythagorean scales of 11 and 6 notes each) and
- Neutral step, which Farhat estimates at 135¢ (Pythagorean second – koron = 205¢ – 70¢)
- (Large neutral step is semitone + koron, 90¢ + 70¢ = 160¢)

Some Scales and Tetrachords


Shur


Bayāt-e Tork


Segāh

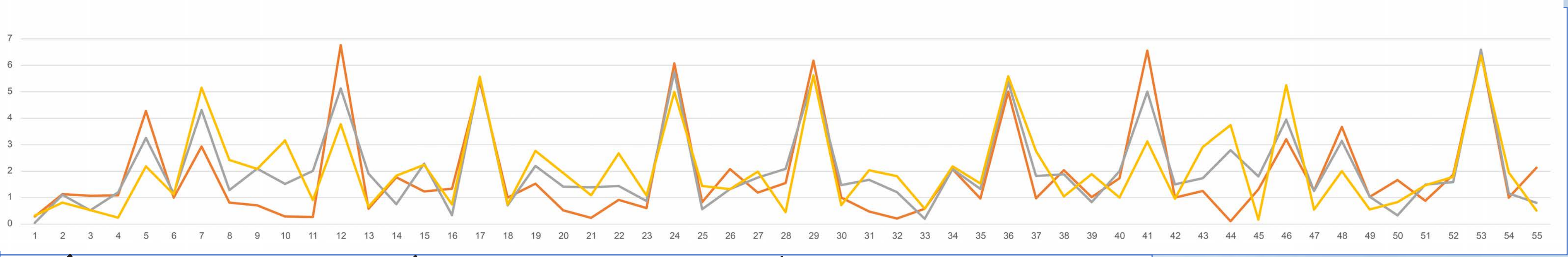

Mahur

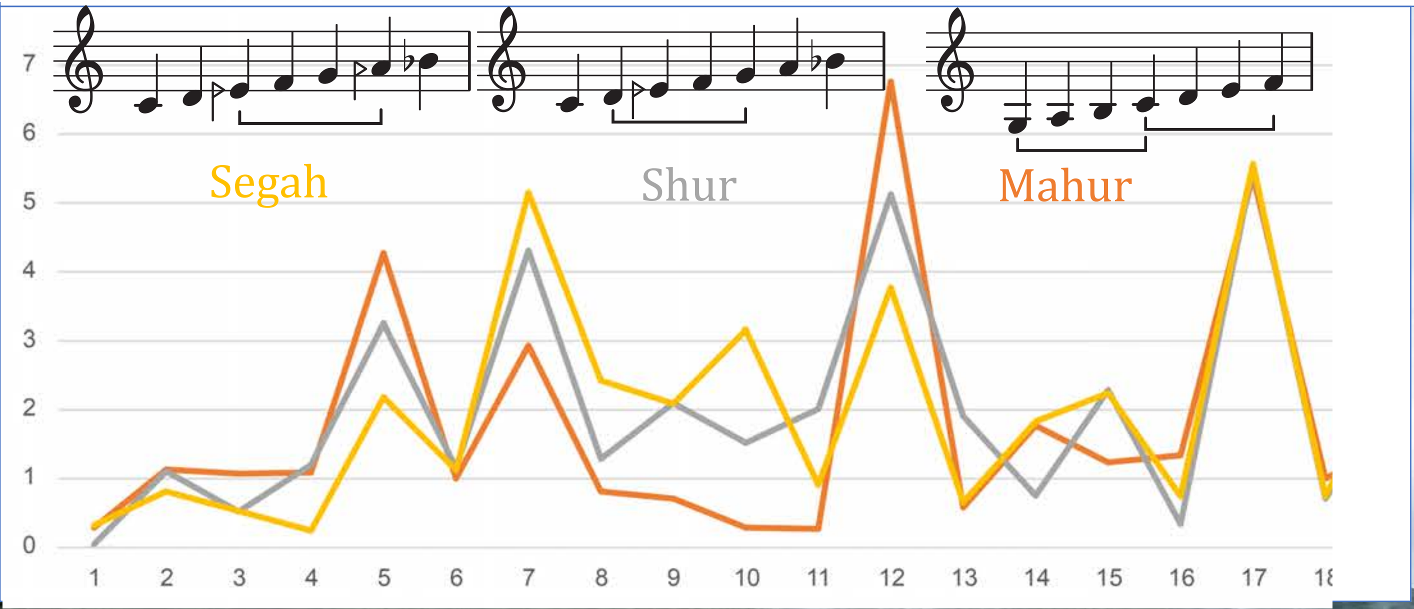

Chahārgāh


Homāyun


Bayāt-e Esfahān

Spectra for octave scales



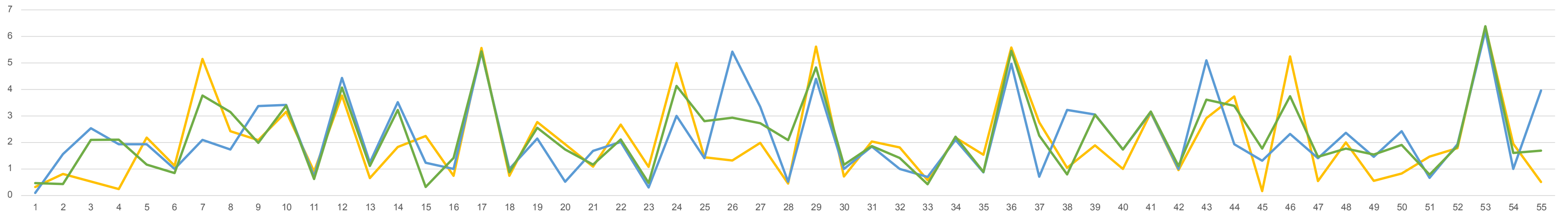


All scales peak at 17 and 24.

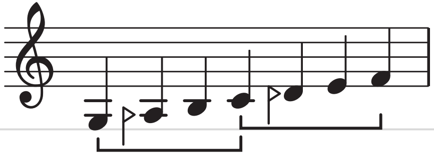
Mahur has highest peak at f_{12}.

Other scales are more even: f_7 higher than f_5.

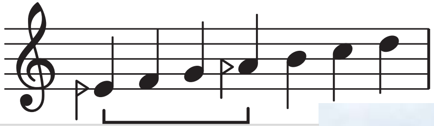
Spectra: Scales with plus-seconds



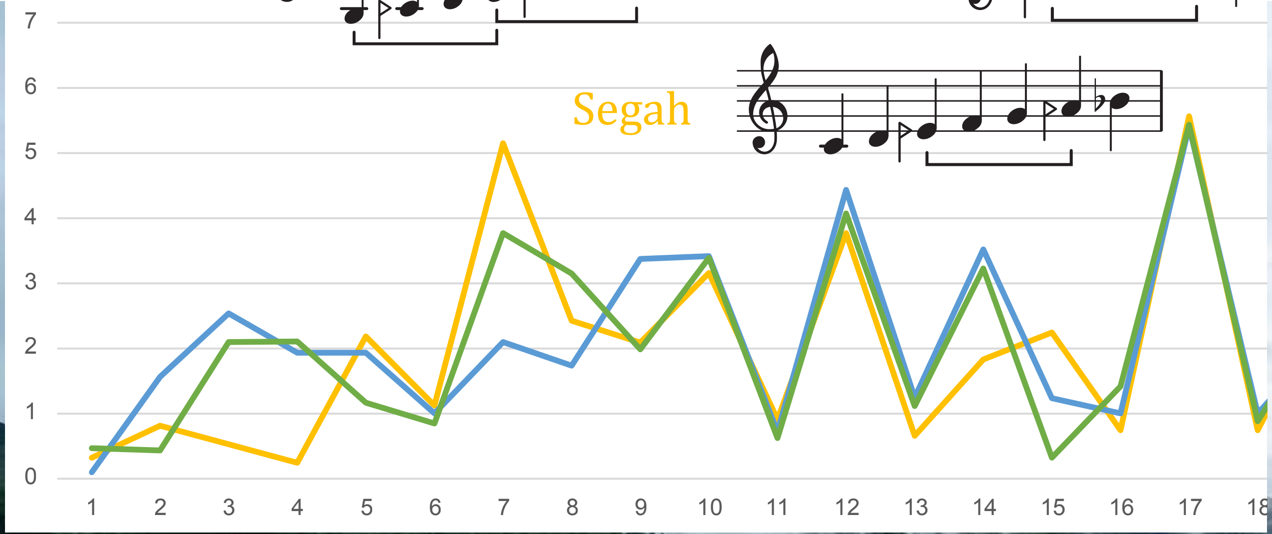
Chahargah



Homayun



Segah

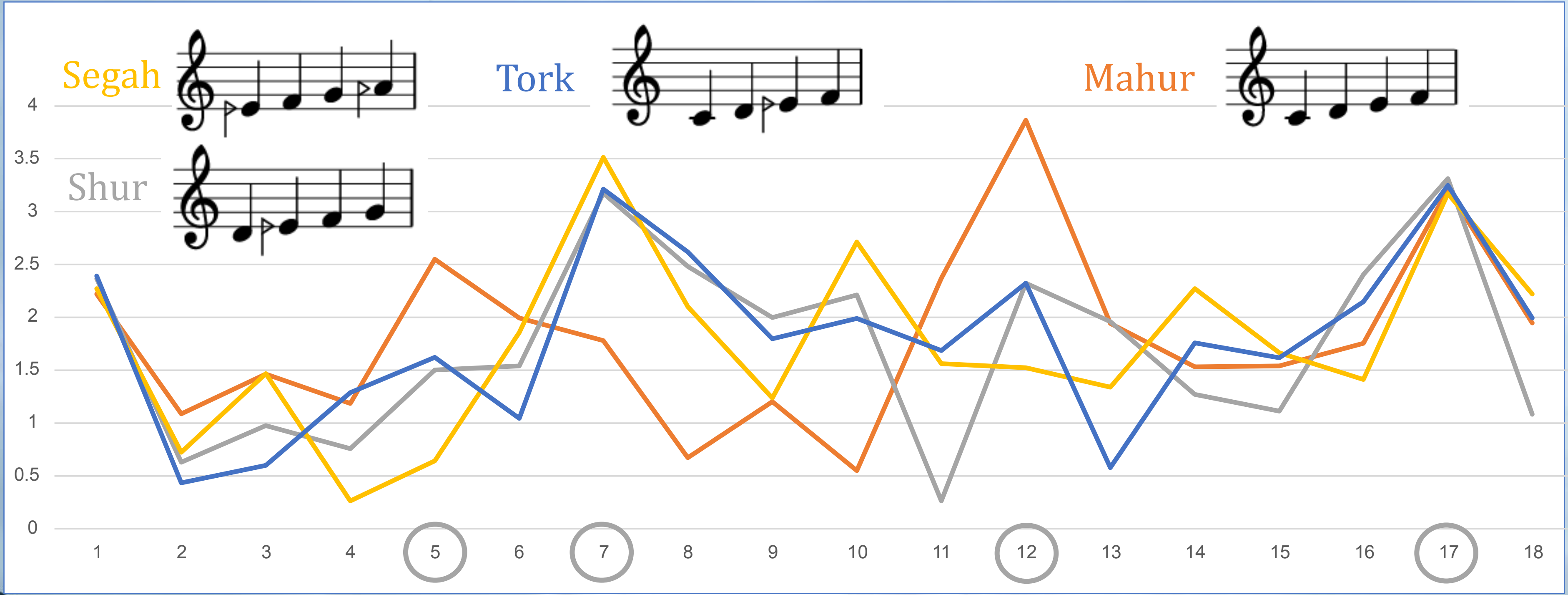


Chahargah and Homayun:

- Peak at 17 strong, not 24
- Less even (smaller $|f_7|$)
- Introduce f_3
- $|f_{10}|$ more prominent than $|f_7|$ (complements in 17)

Spectra for Tetrachords

Tetrachords show similar patterns for $|f_5|$, $|f_7|$, and $|f_{12}|$



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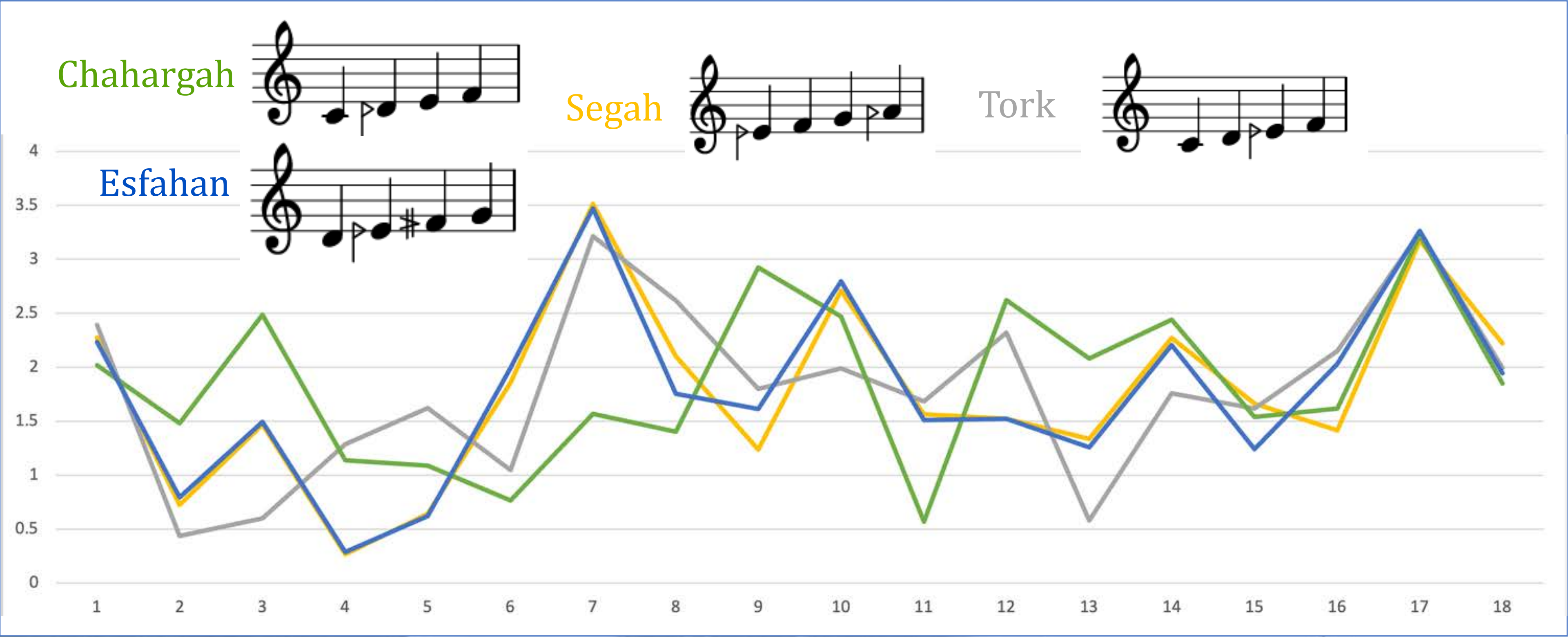
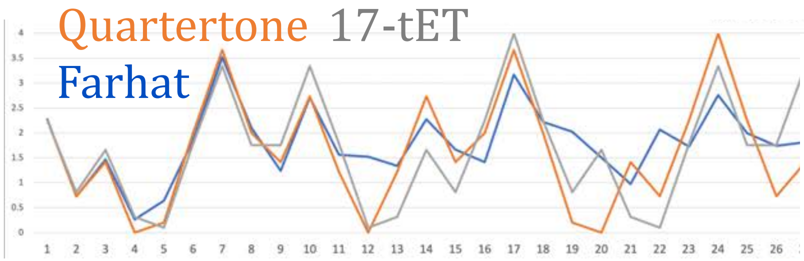
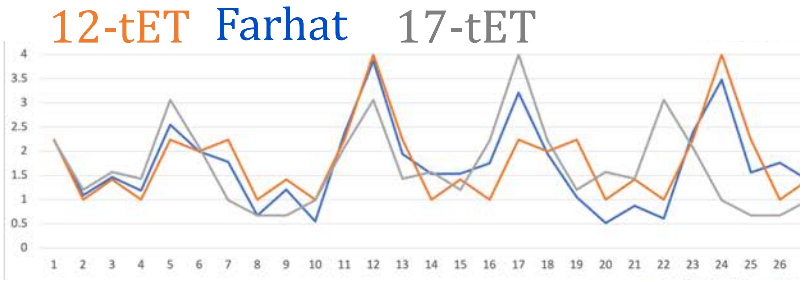


Comparison of tunings for tetrachords

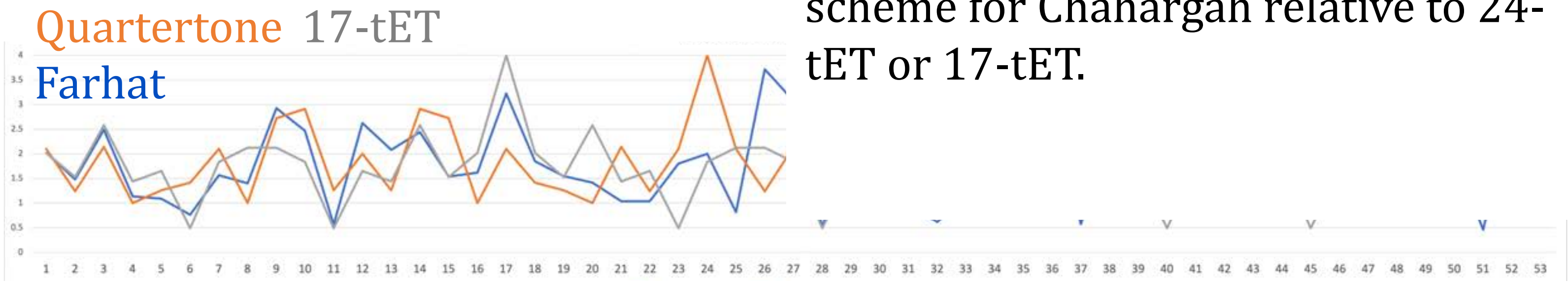
Segah
E𝄬 FGA𝄬



Mahur
CDEF



Chahargah
CD𝄬 EF



Tunings make few significant differences at lower coefficient numbers.

For Mahur, 17-tone tuning strongly favors $|f_5|$ over $|f_7|$. Farhat's tuning mediates 12-tET vs. 17-tET.

Farhat's tuning favors a 12-category scheme for Chahargah relative to 24-tET or 17-tET.

Balinese Pelog

Gamelan Kebyar Tunings: Toth data

Andrew Toth's Data

Toth measured 50 gamelans across all regions of Bali

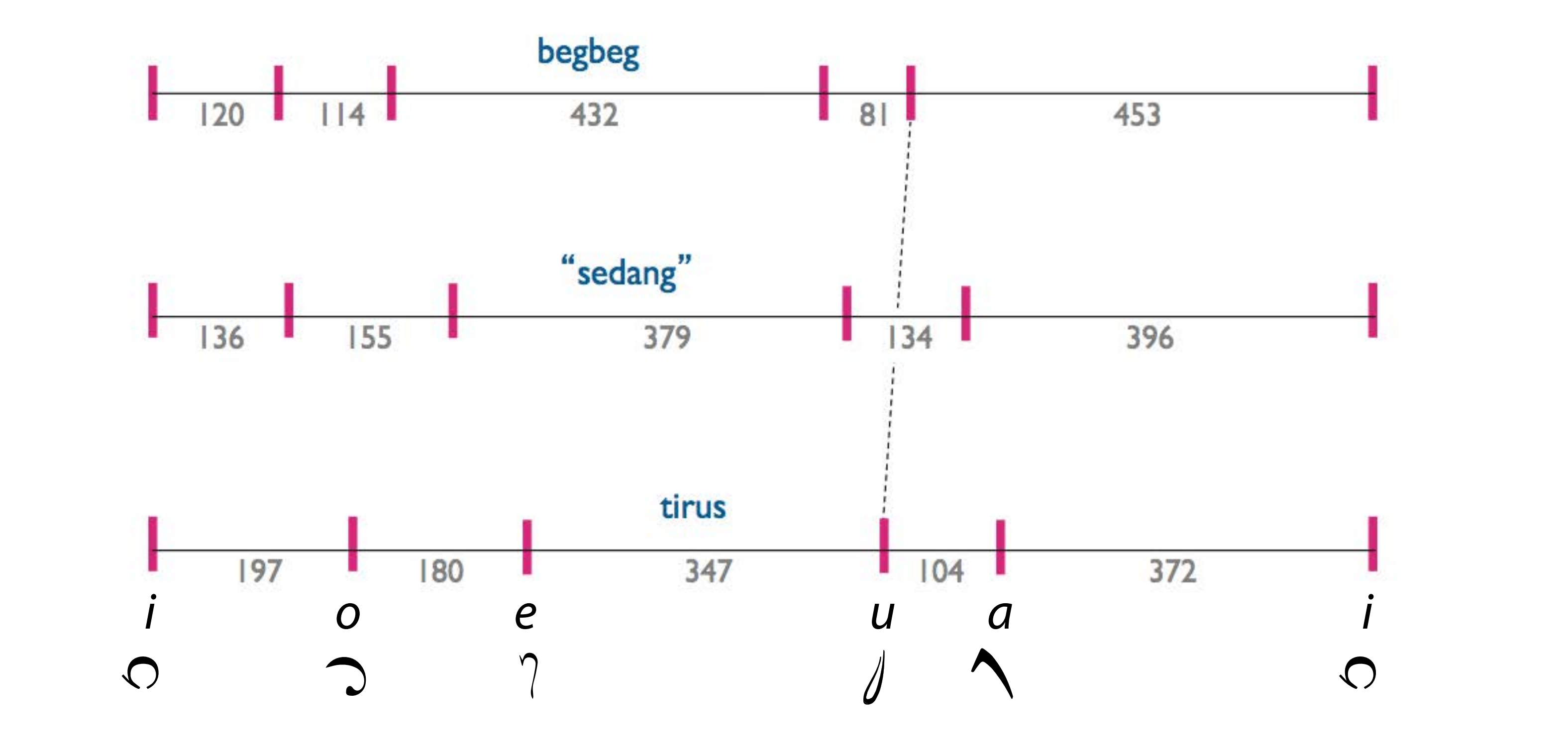
Thanks to Wayne Vitale and Bill Sethares for data. ("Balinese Gamelan Tuning: The Toth Archives" *Analytical Approaches to World Music*)

Processing:

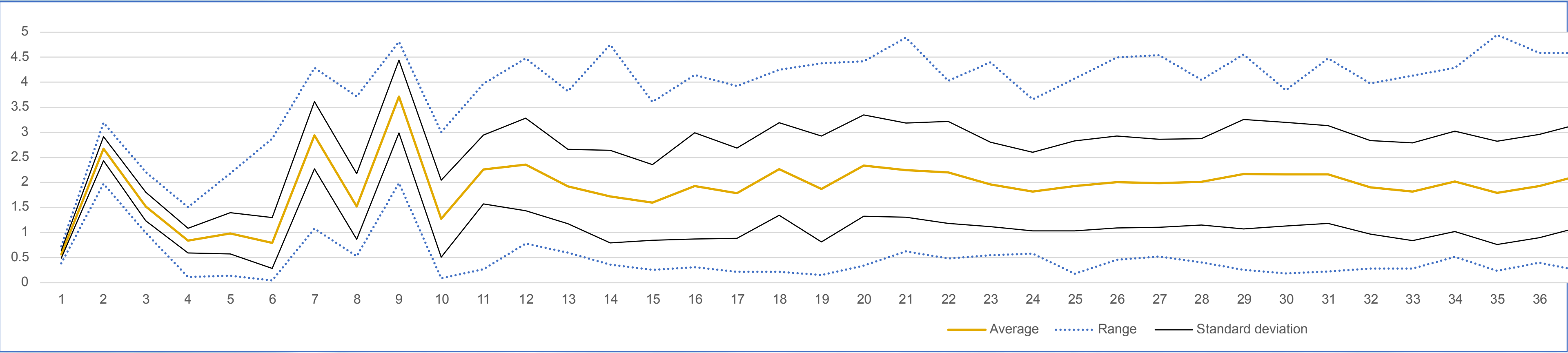
- Average across instruments.
- Average step sizes between second and third octave.
- Stretch/compress to a 1200¢ octave.

Models: Begbeg – Sedang – Tirus

Toth's idealized models of pelog tuning varieties (from testimony of a master tuner)



Pelog Spectra



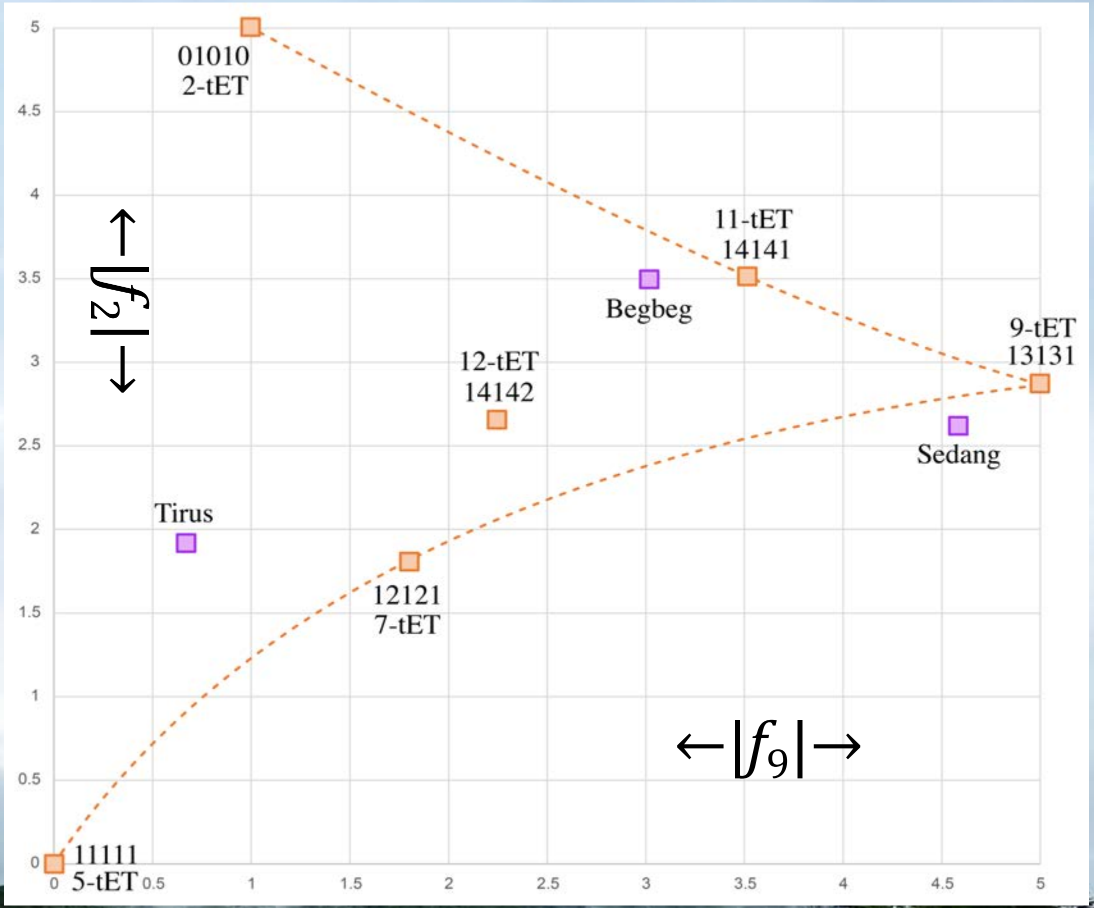
- Peaks at f_2, f_7, and f_9 and troughs in between are consistent.
- Above f_9, little discernable consistency.

Begbeg-Tirus in $|f_2|/|f_9|$-space

$|f_2|$ is a good model for Begbeg-Tirus axis, but the "Sedang" tuning also differs in $|f_9|$.

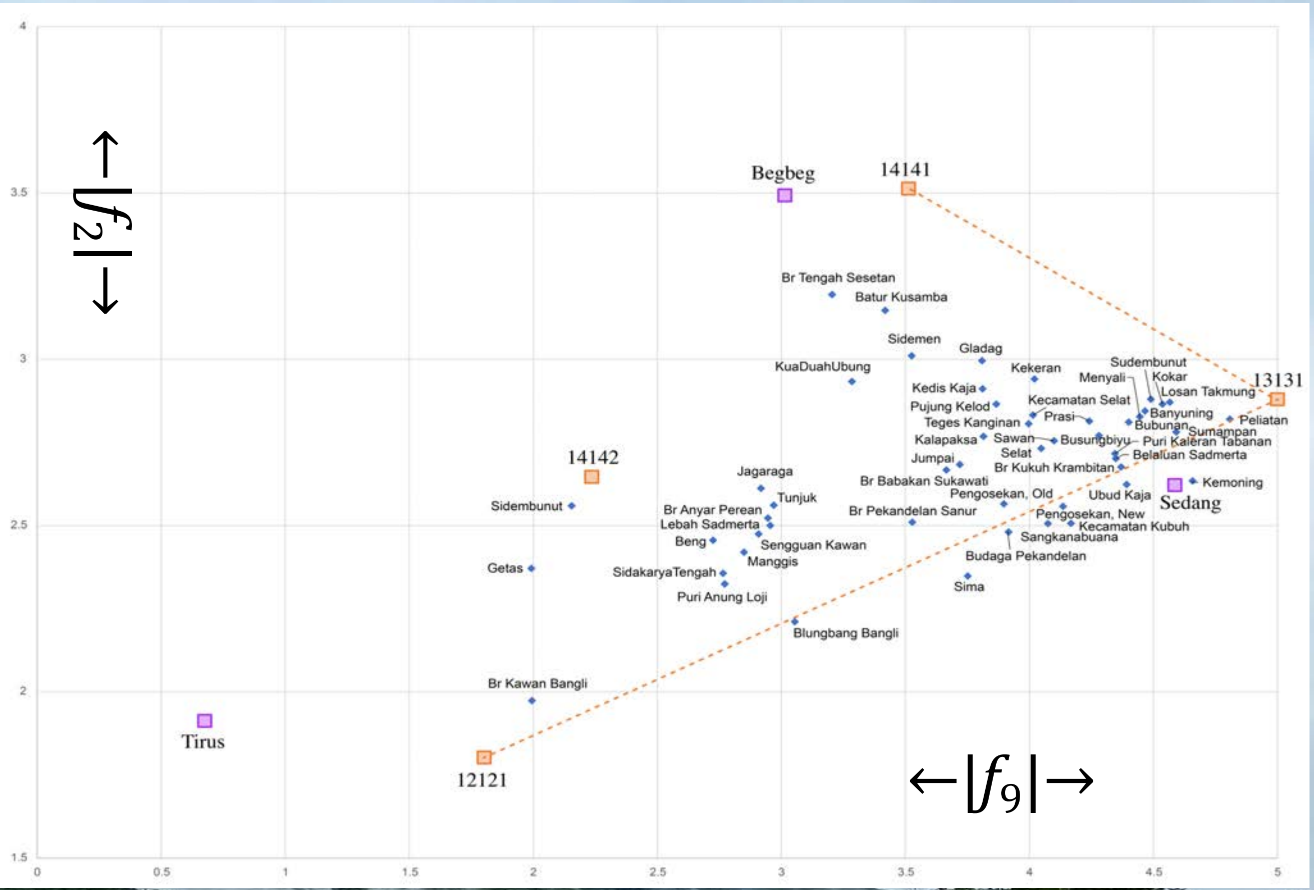
Dashed line shows gradual change in large vs. small step size assuming uniformity.

Sedang emphasizes similarity to 9-tET, others de-emphasize it.



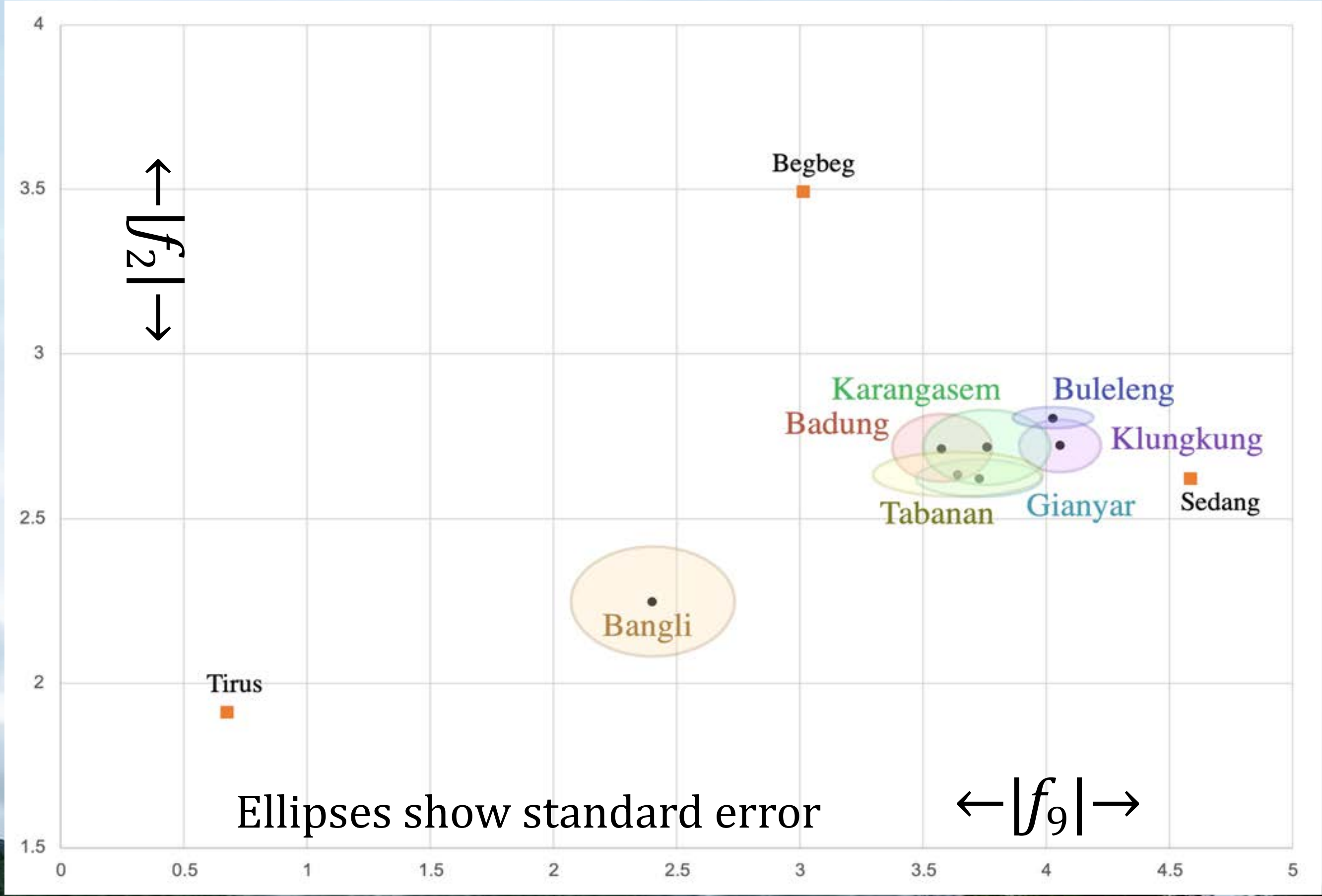
Measured tunings in $|f_2|/|f_9|$-space

Most tunings are close to Sedang. Begbeg and Tirus are outside the range of observed tunings.



Geographic regions in $|f_2|/|f_9|$-space

Only Bangli region (central highlands) is reliably distinct, with all of the most Tirus tunings.



Rhythmic Maximal Evenness

Maximally even vs. Isochronous

Traditional metrical theory only recognizes isochrony, not approximate evenness

4-in-8
Maximally even and isochronous

2-in-8
Maximally even and isochronous

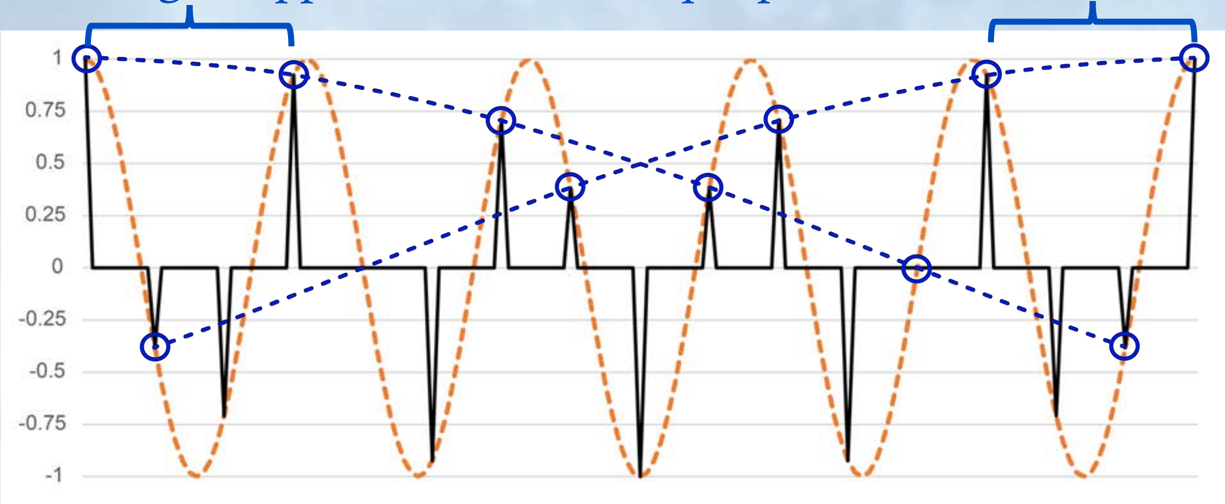
3-in-8 (*Tresillo*)
Maximally even, *not* isochronous

Discretizing a periodic function

What happens when we sample a sine function along a discrete grid with a different period?

3♪ = closest ♪-grid approximation to freq.-5 peak

Intervals are ordered by multiples of 3♪



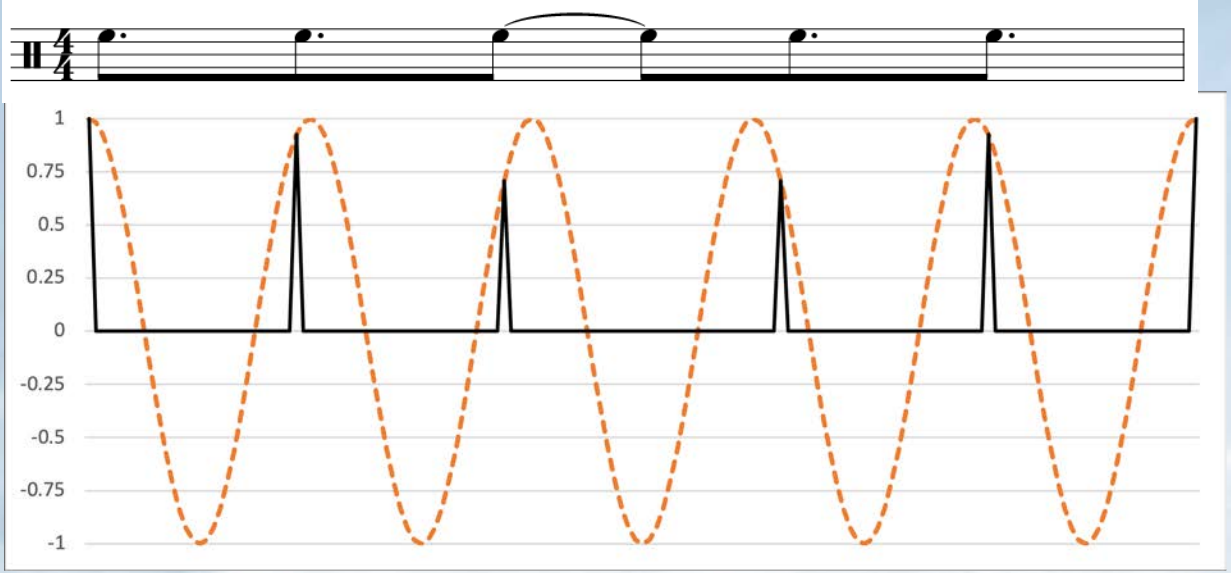
Ascending or descending

Freq.-5 periodic function sampled on 16^{th}-note grid

Generated and maximally even rhythms

Generated rhythms maximize the corresponding frequency.

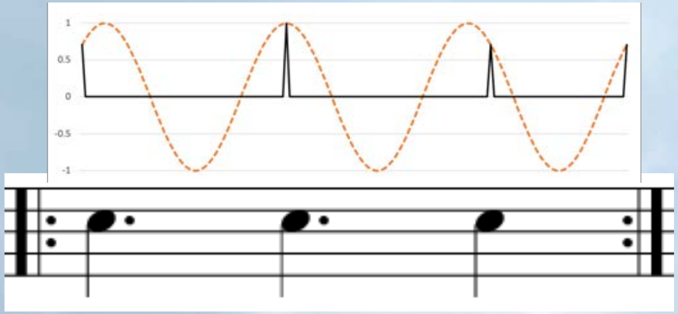
They are ***prototypes*** of the corresponding ***rhythmic quality*****.**



Maximally even rhythms are a special case of generated rhythms with exactly one onset for each peak of the periodic function.

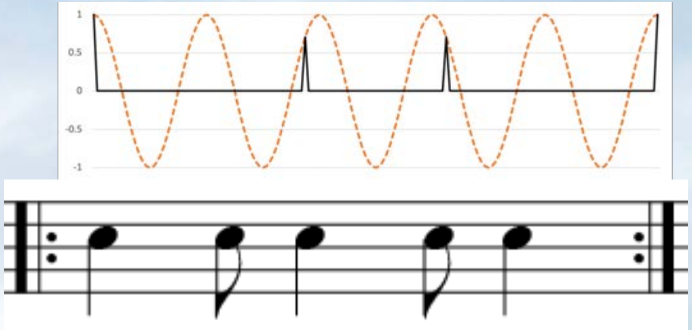
Generated and maximally even rhythms

Example: ***Tresillo* (3-in-8)** and ***Cinquillo* (5-in-8)**



↓ Complement

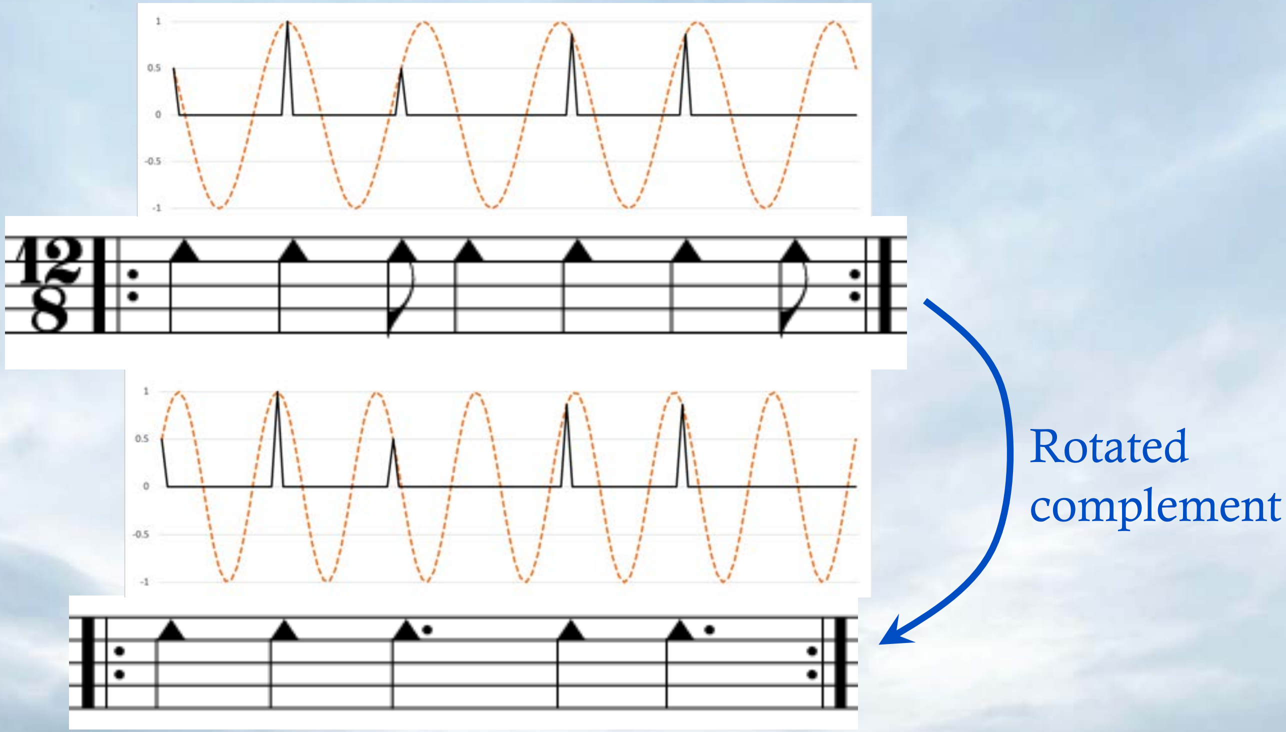
Rotate →



Complementation and rotation affect phases only

Generated and maximally even rhythms

Example: ***Standard Pattern*** **(7-in-12** and **5-in-12)**



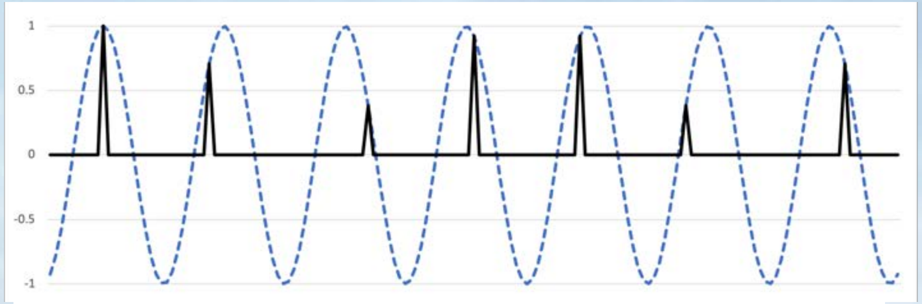
Generated and maximally even rhythms

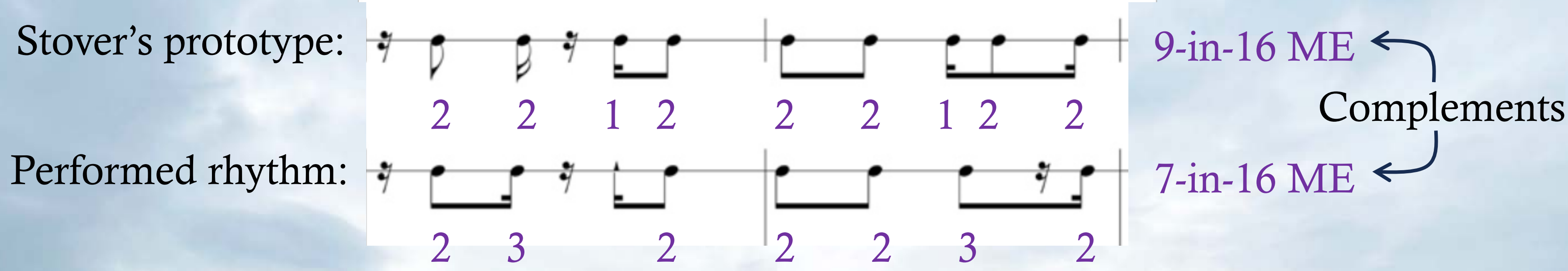
Example: ***Samba Timeline*** **(9-in-16)** (from Stover forthcoming)

"Alvorada" by Cartola

Generated and maximally even rhythms

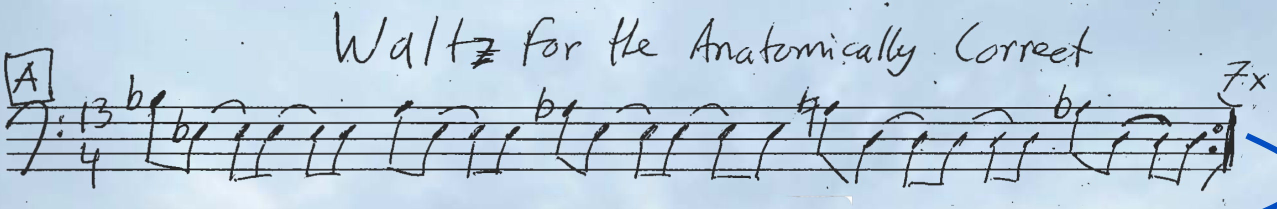
Example: ***Samba Timeline*** **(9-in-16)** (from Stover forthcoming)





Generated and maximally even rhythms

Example: Rudresh Mahanthappa, ***Waltz for the Anatomically Correct*** **(5-in-13)**

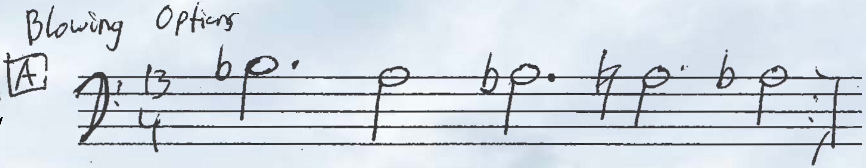


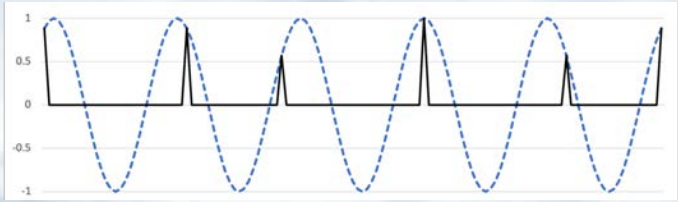
Mod 26 complement

8-in-13 ME

Mod 13 complement

5-in-13 ME





Spectrum of a maximally even rhythm

Maximally even rhythms emphasize a single frequency

Rhythmic spectrum for the standard pattern:

♩ ♩ ♪♩ ♩ ♩ ♪

Or its complement:

♩ ♩ ♩. ♩ ♩.

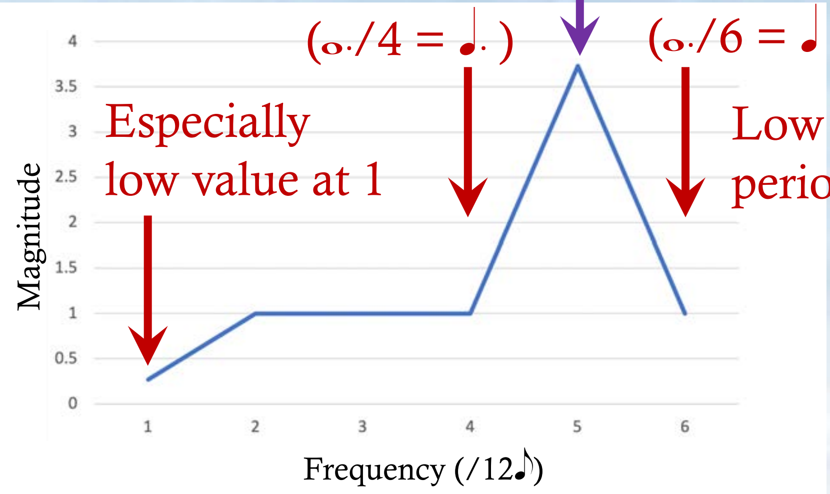
High value at principal periodicity (𝅝./5)

(𝅝./4 = ♩.)

(𝅝./6 = ♩)

Especially low value at 1

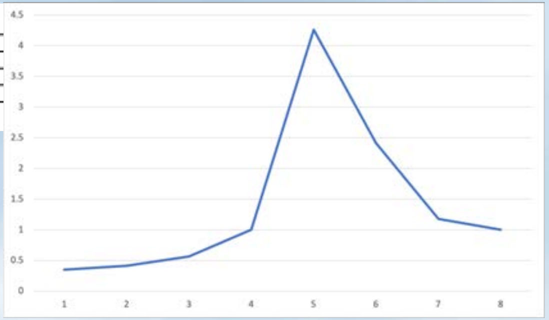
Low values at nearby periodicities



N.B.: Periodicities are the reciprocals of frequencies

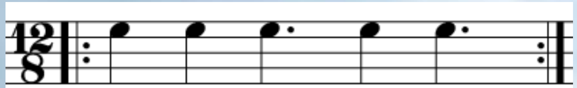
Near-ME rhythms

Rhythms close to ME also have large values at that frequency



ME 5-in-16
(Bossa Nova)

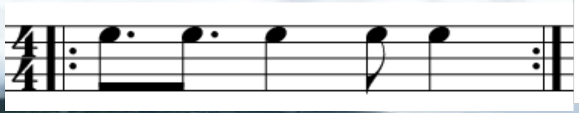
12-cycle Son clave:

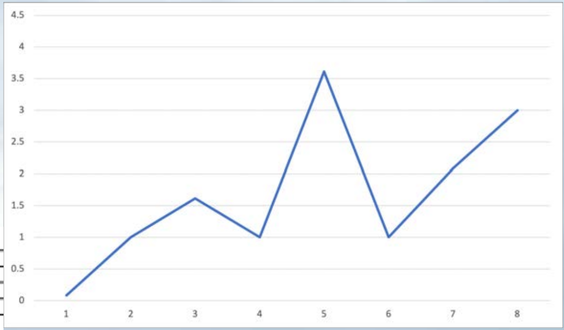


Full (2-sided)
spectrum

(half spectra)

Son Clave,
near-ME

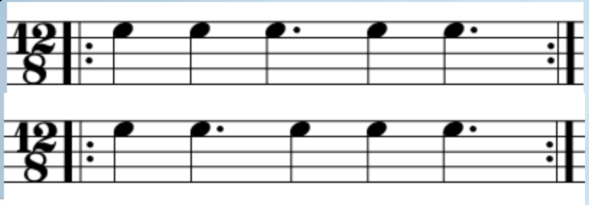




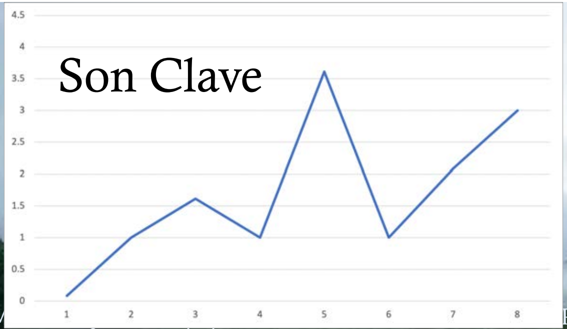
Near-ME rhythms

Subsets of ME rhythms also have large values at that frequency

12-cycle Son/ Rumba clave:

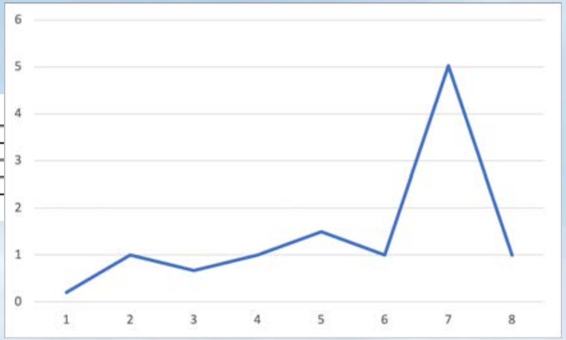


Full (2-sided) spectrum



Son Clave

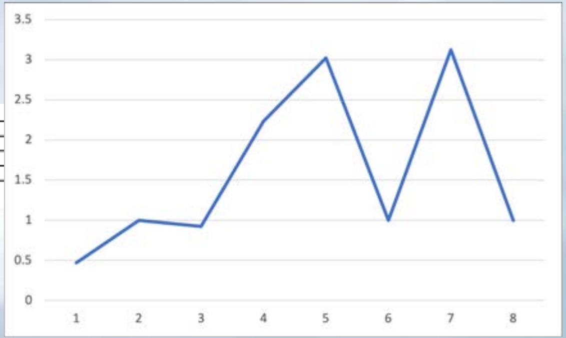
ME 7-in-16



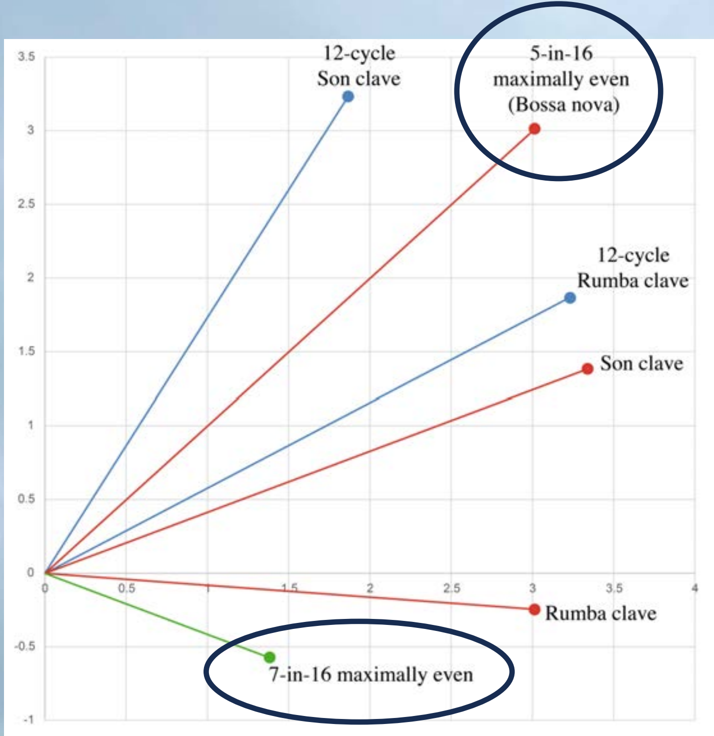
Subset

(half spectra)

Rumba clave

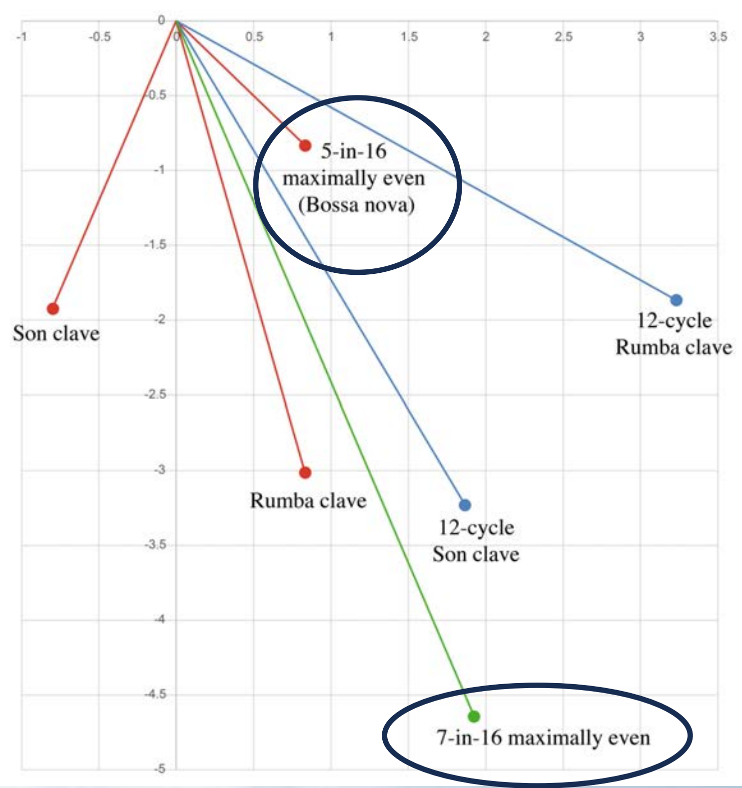


ME and near-ME rhythms on 2-d. planes



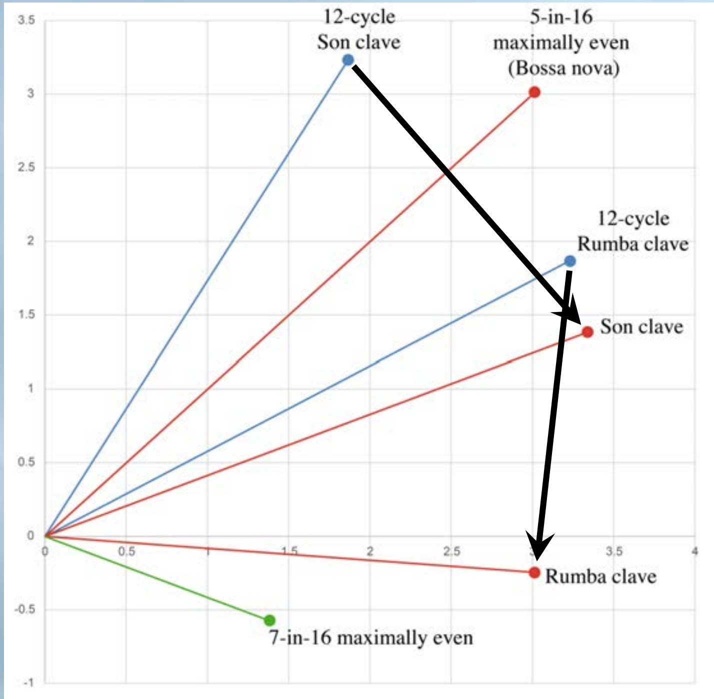
Freq.-5 space

The maximally even rhythms strongly favor one division or the other.



Freq.-7 space

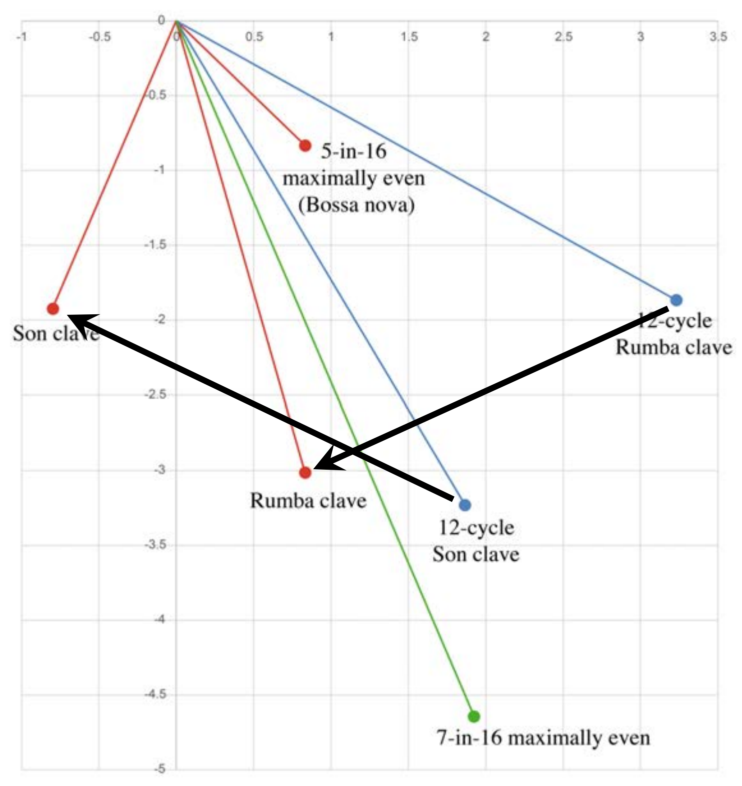
ME and near-ME rhythms on 2-d. planes



Freq.-5 space

The shift from 12-cycle to 16-cycle moves onsets forward.

Clave rhythms that move between duple and triple feel occupy these intermediate spaces.



Freq.-7 space

Interaction of Frequencies

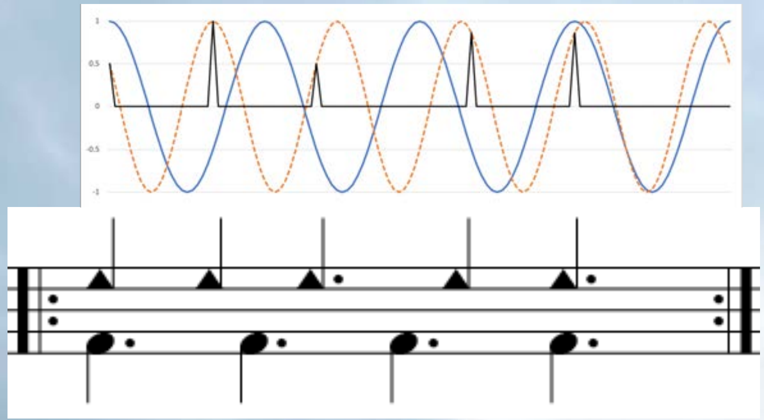
Hidden polyrhythm in timeline music, Ligeti, Dave King, Miles Okazaki

Interaction of frequencies

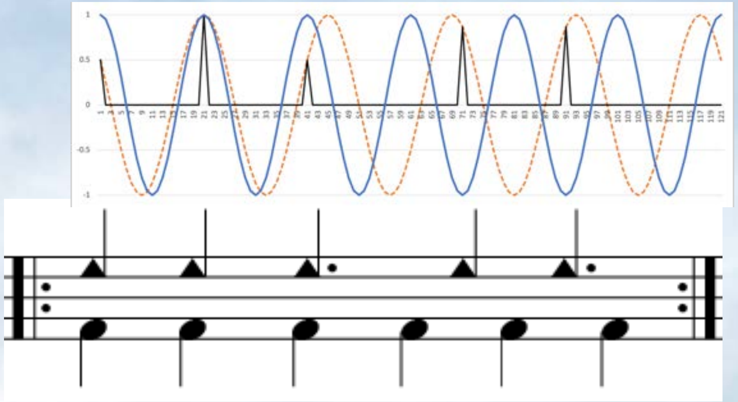
When two frequencies are close together, we get a **slow phase shift.**

Example: Standard pattern (5) against main beat (4), secondary beats (6)

→ Out of phase → In phase →



→ In phase → Out of phase →



See Ladzekpo 1995, Peñalosa 2009, Stover Forthcoming

Interaction of frequencies

C.K. Ladzekpo (1995) on cross-rhythm in Anlo-Ewe thought:

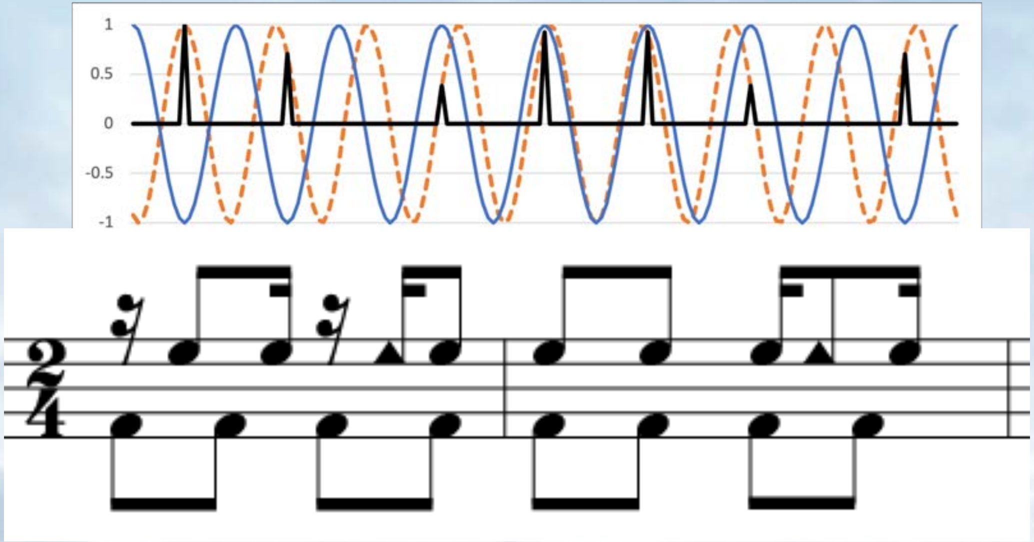
"In aesthetic expression, **a moment of resolution or peace occurs when the beat schemes coincide and a moment of conflict occurs when the beat schemes are in alternate motion**. These moments are customarily conceived and expressed as physical phenomena familiar to a human being. A moment of resolution is expressed as a human being standing firm or exerting force by reason of weight alone without motion while moment of conflict is expressed as a human being travelling forward alternating the legs.

"In the cultural understanding, the technique of composite rhythm embodies the lessons of establishing contact between two dissimilar states of being, or in particular, the right way to look at despair. . . . Those in despair recognize the facts of their existence, rather like a drowning swimmer admitting the water is there. If you block off the despair, you block off the joy. More simply, an avoidance of contrasting obstacles is an avoidance of the real challenges of life. It will only stifle progress."

Interaction of frequencies

Example: **Samba Timeline (9-in-16)** (from Stover forthcoming)

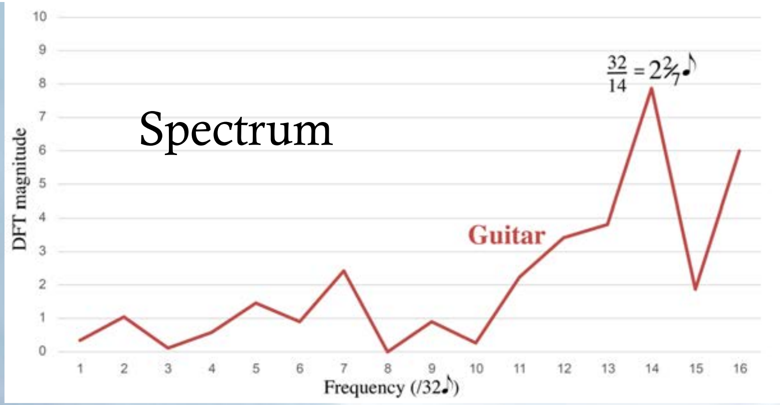
Out of phase → In phase →



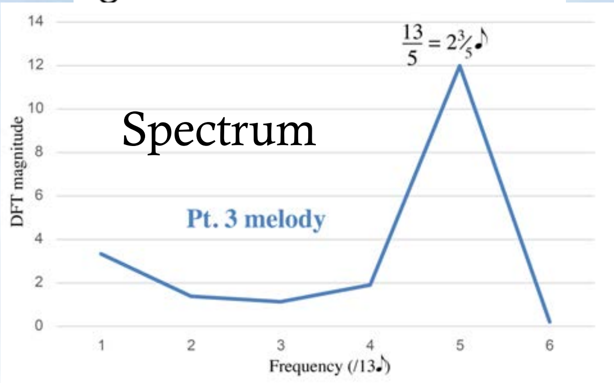
Interaction of frequencies

Ex.: "You Can't Say Poem in Concrete" by Dave King Trucking Company

Pt. 2 guitar ostinato



Pt. 3 melody



Approximates 14-in-32 maximally even rhythm:

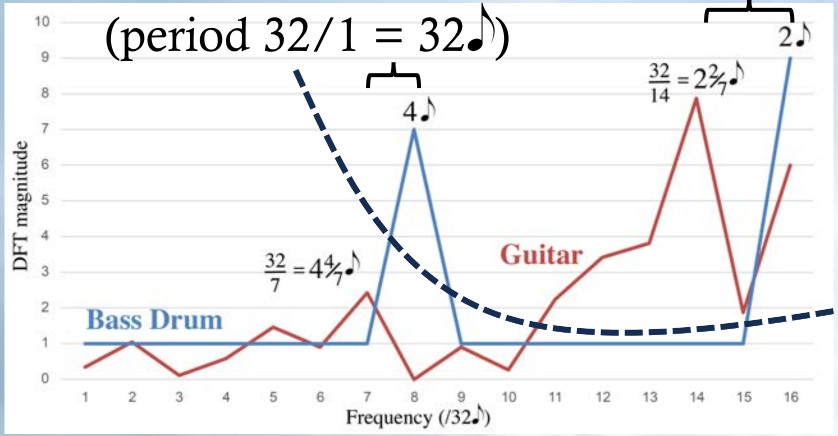
Approximates 5♪-generated rhythm:

Interaction of frequencies

Ex.: “You Can’t Say Poem in Concrete” by Dave King Trucking Company

Frequency difference of 1 (period 32/1 = 32♪)

Frequency difference of 2 (period 32/2 = 16♪)



Spectrum

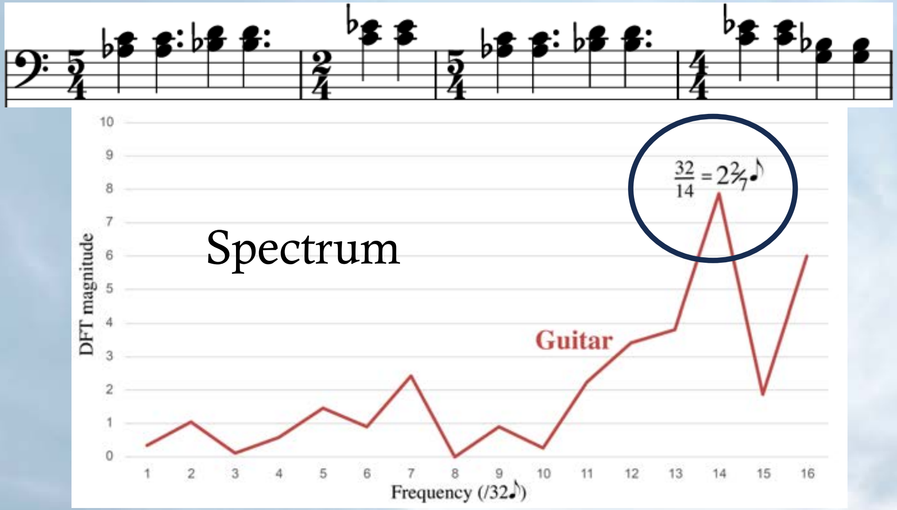
In phase → Out of phase → In phase → Out of phase → In phase

In phase → Out of phase → In phase

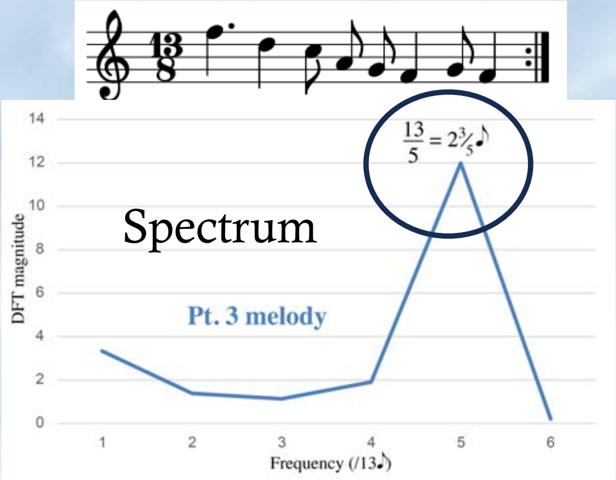
Interaction of frequencies

Ex.: “You Can’t Say Poem in Concrete” by Dave King Trucking Company

Pt. 2 guitar ostinato



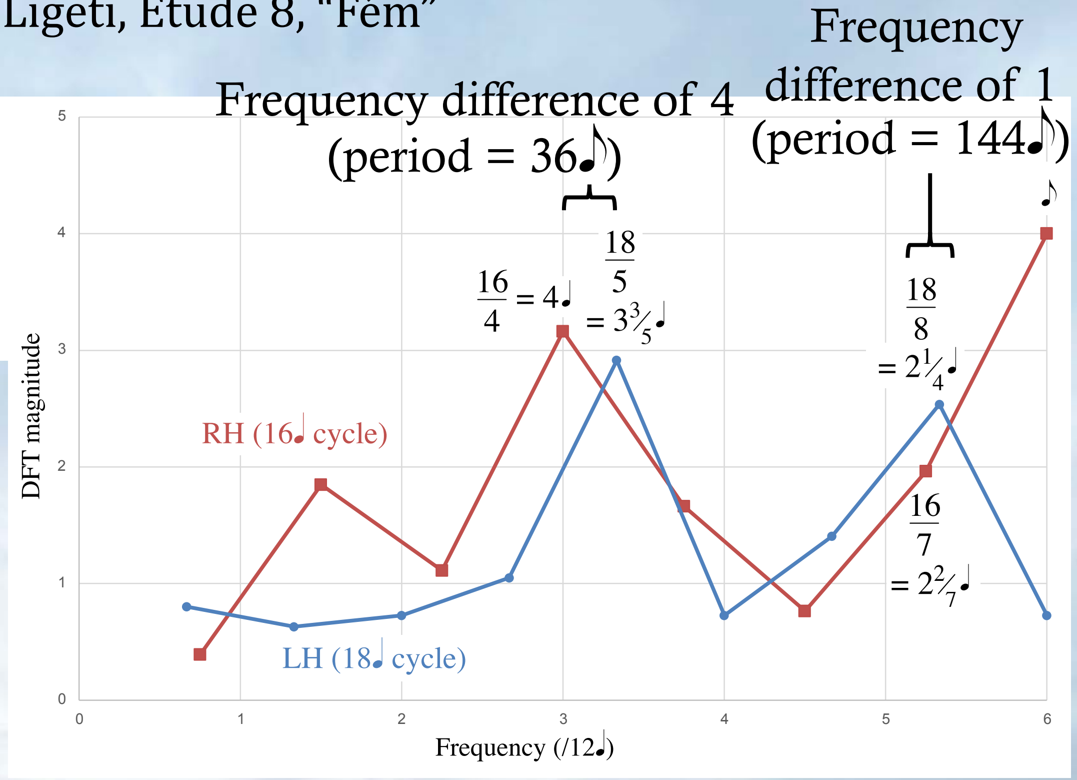
Pt. 3 melody



Despite having very different cycles (32♪ vs. 13♪), the principal frequency is very close.
The band also speeds up slightly from ♪ = 230 to ♪ = 236, making
$2\,{}^{2}/_{7}$ ♪ ≅ MM101 and $2\,{}^{3}/_{5}$ ♪ ≅ MM91

Interaction of frequencies

Ex.: Ligeti, Etude 8, “Fém”



Spectra

Interaction of frequencies

Ex.: Ligeti, Etude 8, “Fém”

36♪ wave: Interlocking → Together → Interlocking →

144♪ wave: Mostly interlocking - - - - →

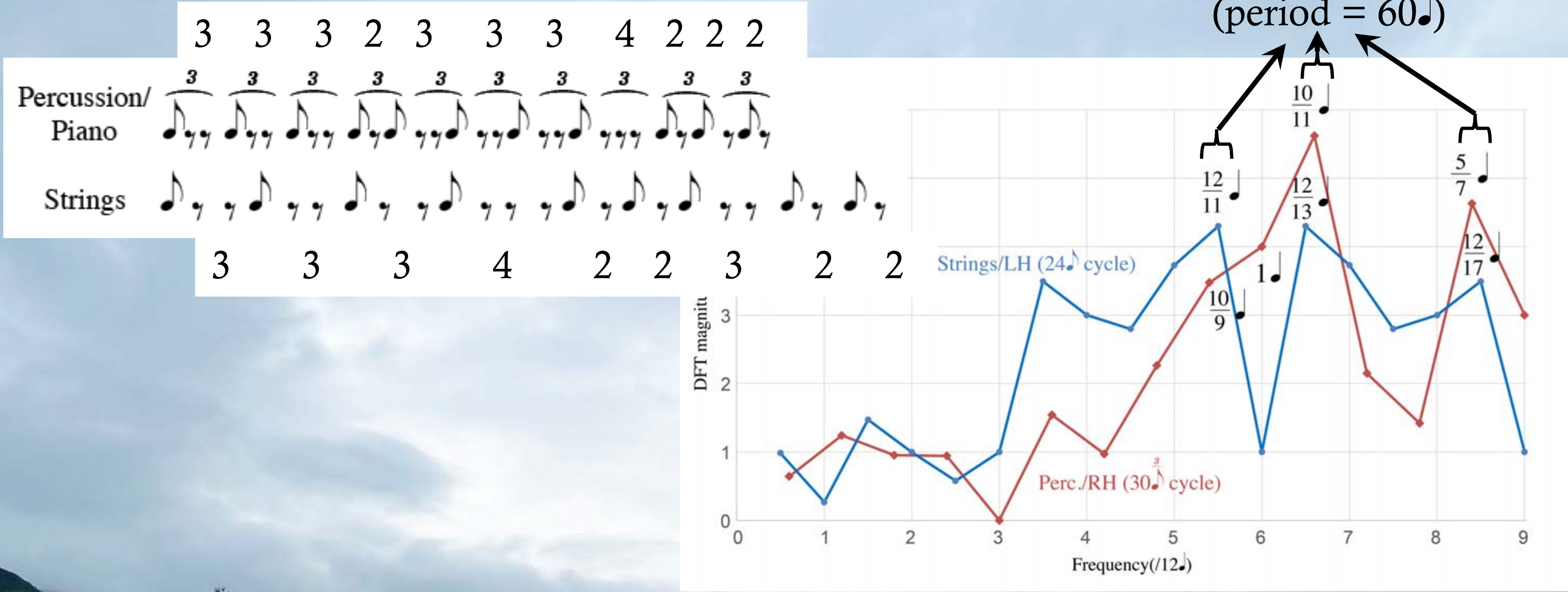
→ Together → Interlocking

- - → More together - - - →

Interaction of frequencies

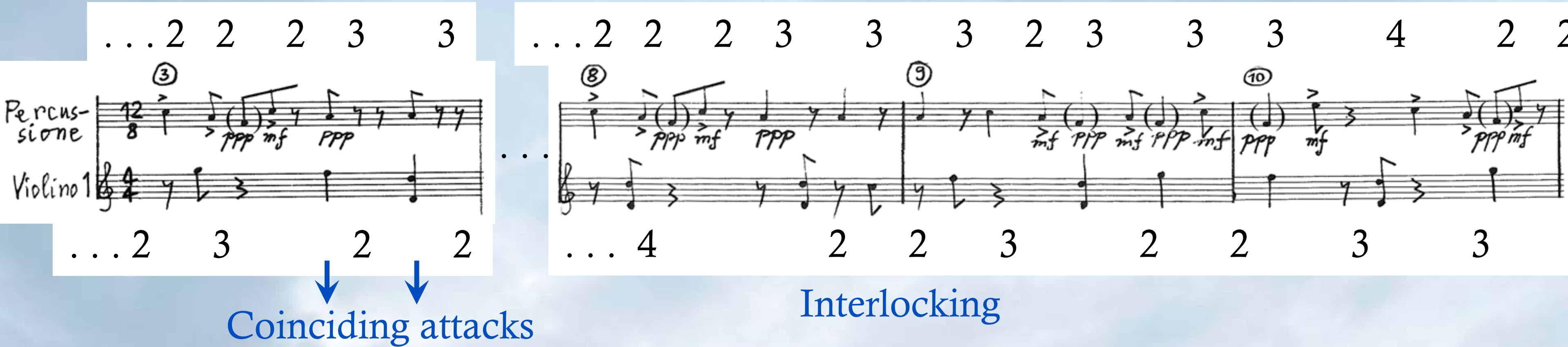
Ex.: Ligeti, *Piano Concerto* Mvt. 1

Frequency differences of $^1/_{60}$ (period = 60♩)



Interaction of frequencies

Ex.: Ligeti, *Piano Concerto* Mvt. 1



Interaction of frequencies

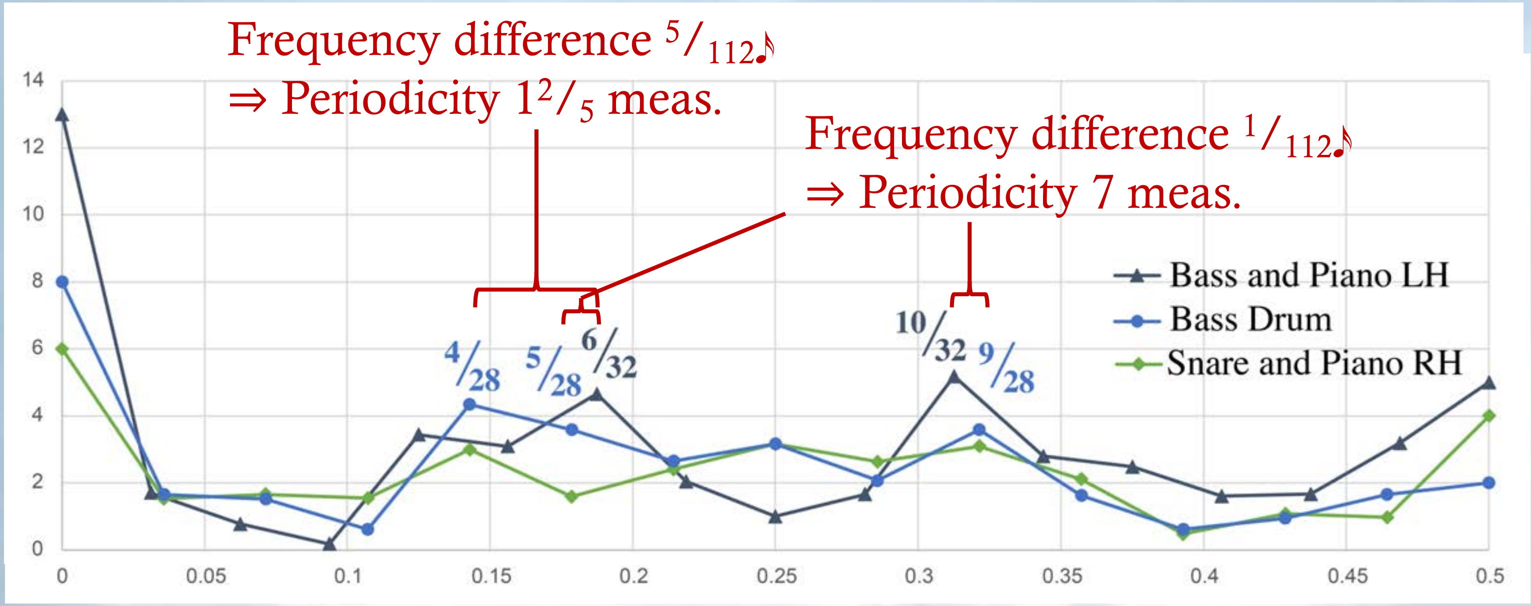
Ex.: Okazaki, “Box in a Box” (2017)

Bass and Piano LH: 8♩ ostinato

Drums and Piano RH: 7♩ ostinato

Interaction of frequencies

Ex.: Okazaki, "Box in a Box" (2017)



Rhythmic spectra

Interaction of frequencies: "Box in a Box"

Bass/
Piano LH
Bass Drum

$1^2/_5$ meas. periodicity

7 meas. periodicity

C I (C) I C I

More interlocking

More coincidin

C I (C) I C I C

More interlocking

I C (I) C I (C) I

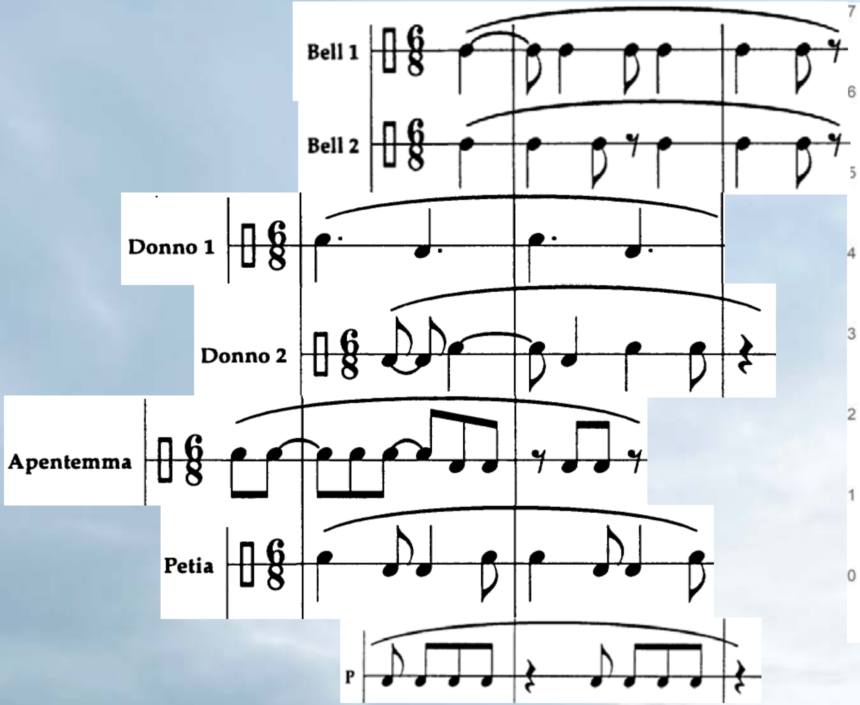
More coinciding

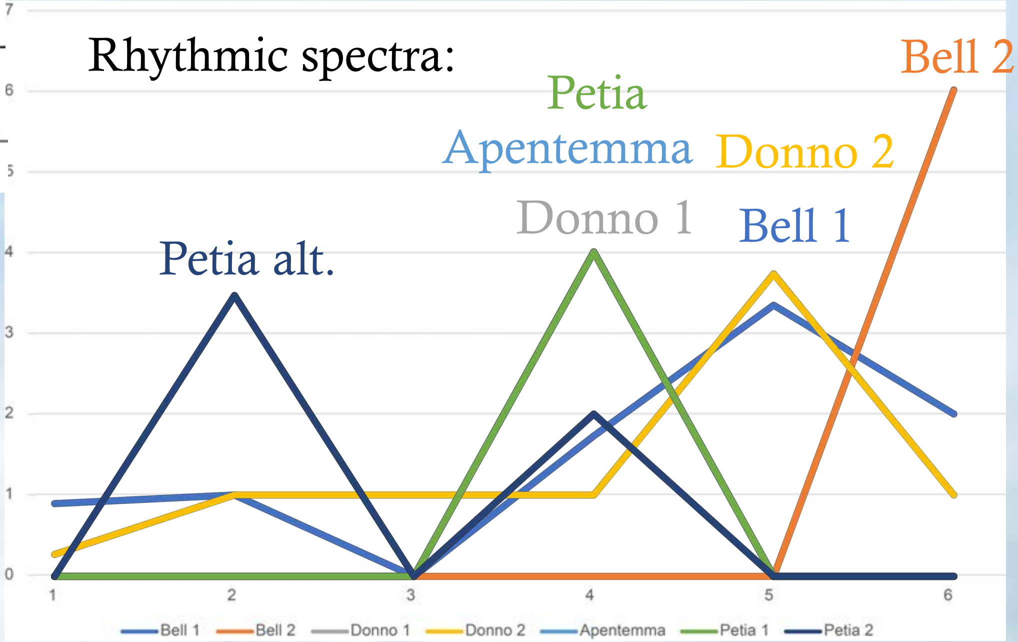
Composite Rhythm in Adowa

Analysis of a transcription by Willi Anku

Adowa

The Adowa ensemble (in Anku's transcription)

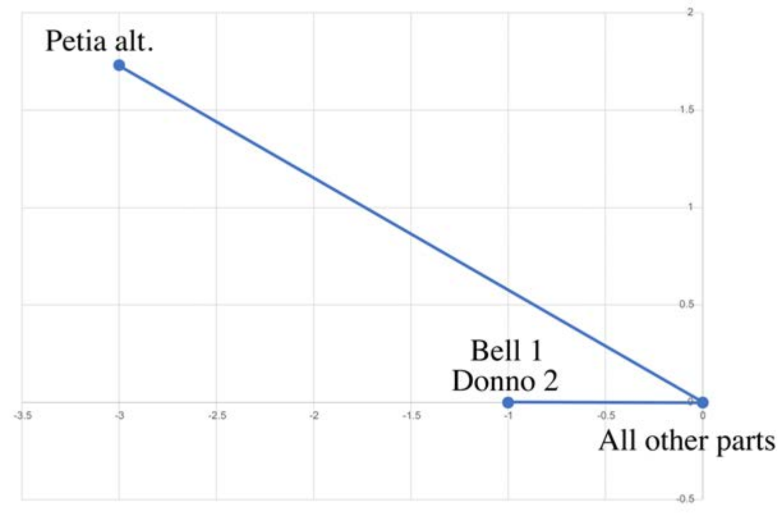




Frequencies 4 and 5 are prominent and represented by multiple parts

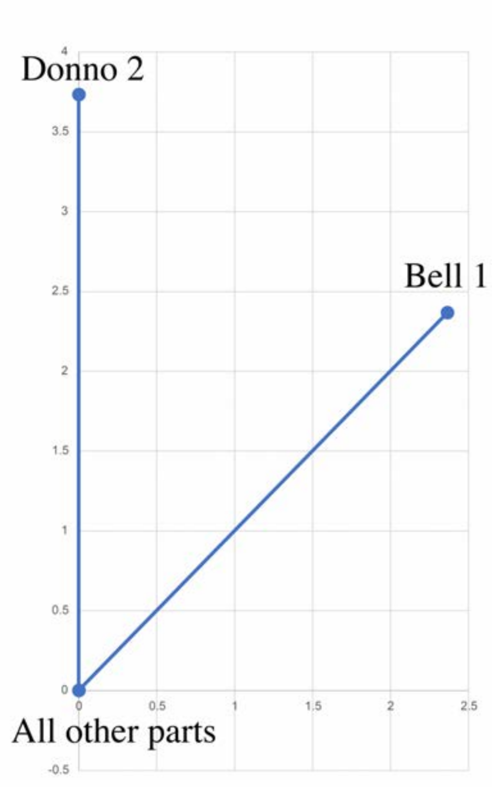
Adowa

The Adowa ensemble on 2-d. planes



Frequency-2 space

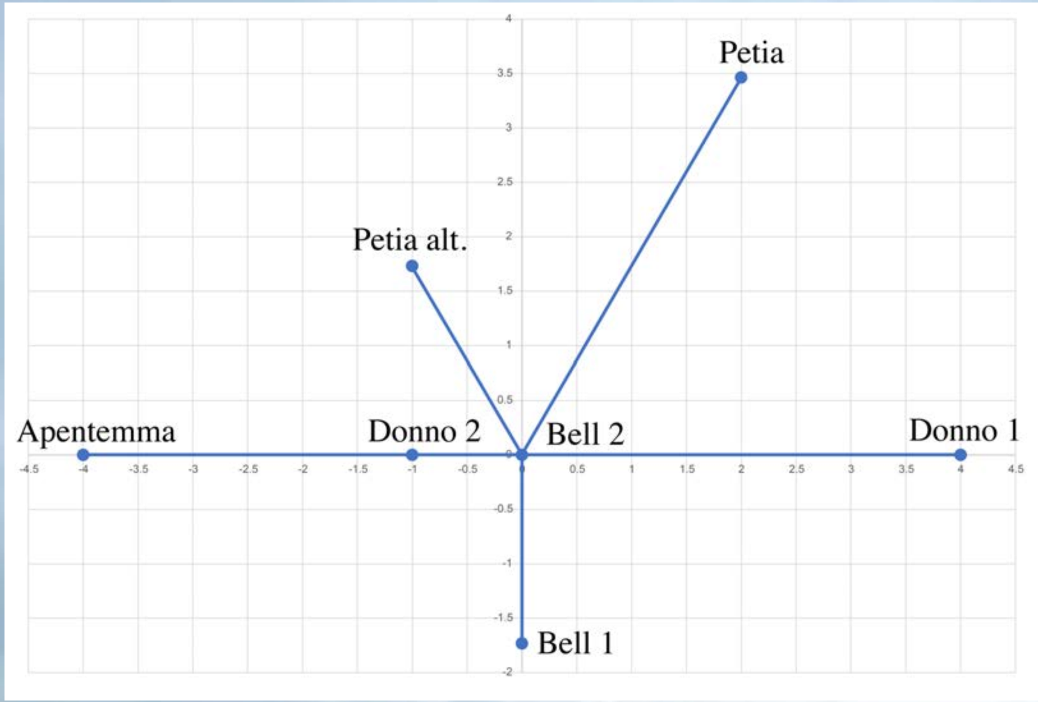
Frequencies 2 and 5 (periodicities 𝅗𝅥. and ⅘♩.) are both represented by just 2–3 parts, similar in phase.



Frequency-5 space

Adowa

The adowa ensemble on 2-d. planes



Frequency-4 space

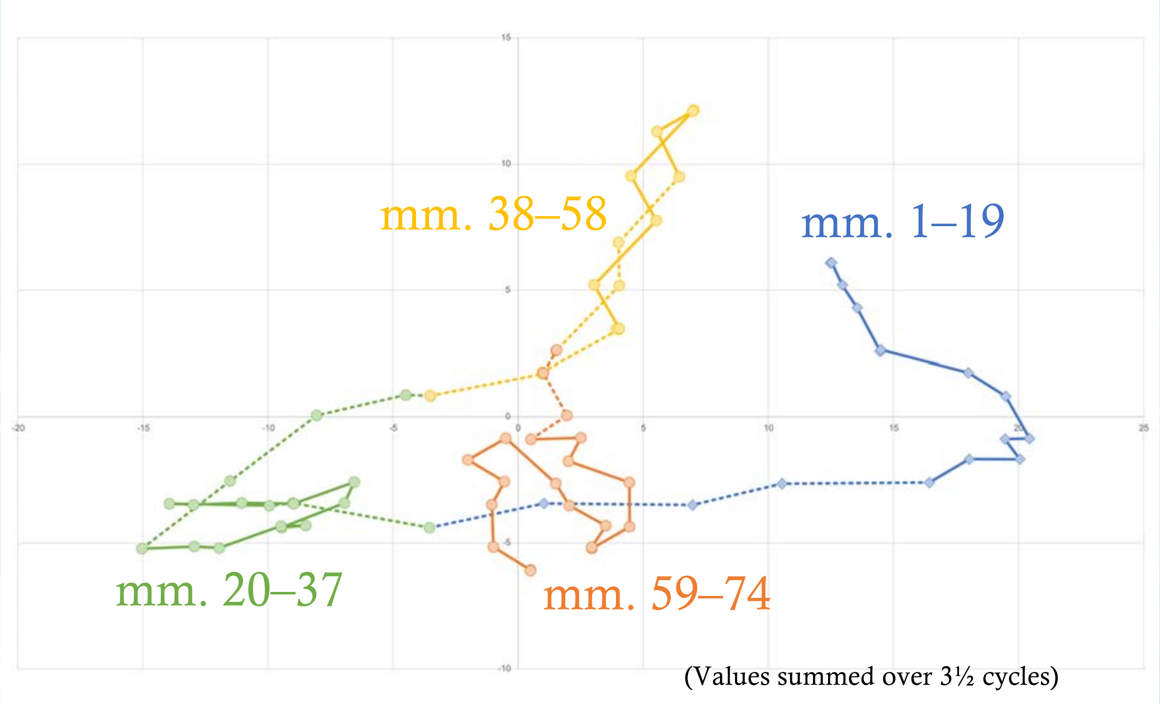
Frequency 4 represents the periodicity of the beat (♩.) and here multiple parts cover different regions of the space (on-beat, off-beat, ahead of beat, behind beat).

Adowa: Atumpan (lead drum)

Anku's transcription of a performance by Solomon Amonquandoh divided into 4 sections

Amonquandoh begins centered on the main two beats.

Then he explores each region of the space in turn: off-beats, ahead of the beat, and behind the beat.



Frequency-2 space

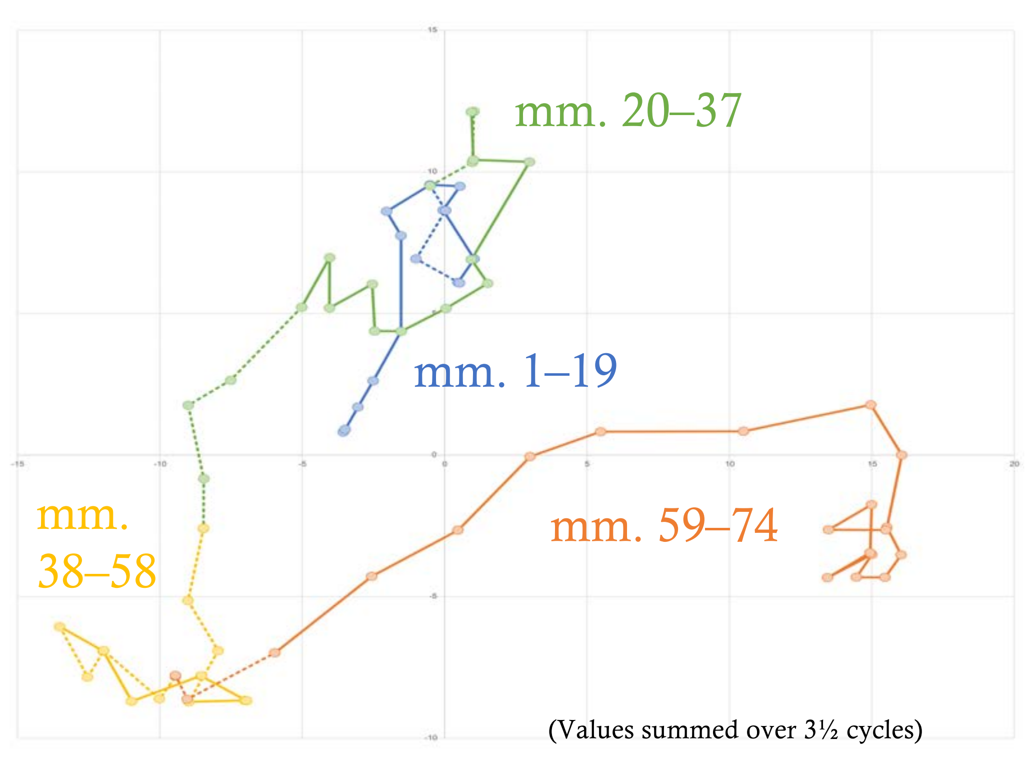
Adowa: Atumpan (lead drum)

Anku's transcription of a performance by Solomon Amonquandoh divided into 4 sections

Frequency 4 measures orientation with respect to the main 4 ♩. beats.

The performance also explores all the regions of this space in sequence.

The first two sections are consistently ahead of the beat, the third section behind, and the last section on the beat.

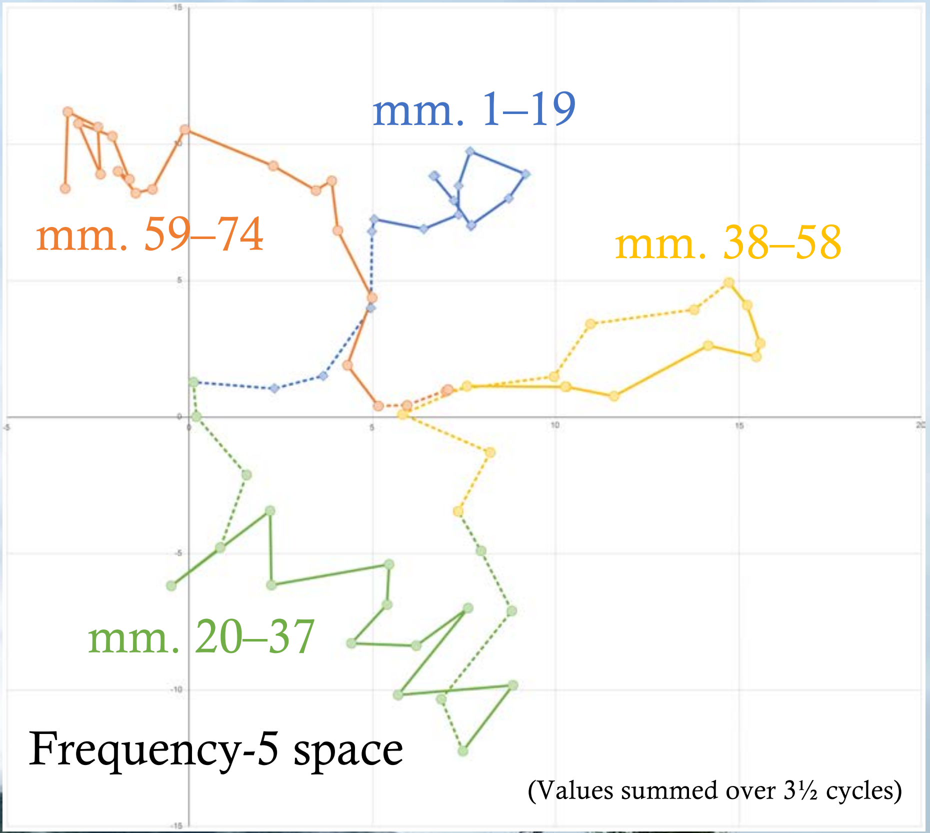


Frequency-4 space

Adowa: Atumpan (lead drum)

Anku's transcription of a performance by Solomon Amonquandoh divided into 4 sections

This is frequency articulated by the timeline rhythm of the bell, which is in the upper right quadrant of the space. Amonquandoh starts in the vicinity of the bell and explores all the adjacent regions, avoiding the half of the space across from the bell.



Iqa’at

Comparing with different cycle lengths

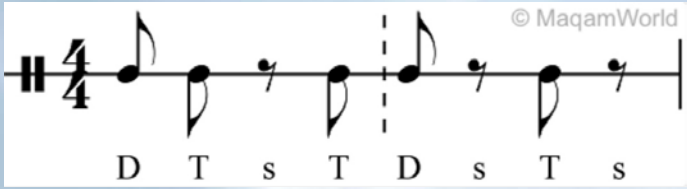
Arabic Iqa’at

Examples are all taken from Farraj and Shumays, Inside Arabic Music, and maqamworld.com (excellent resources!)

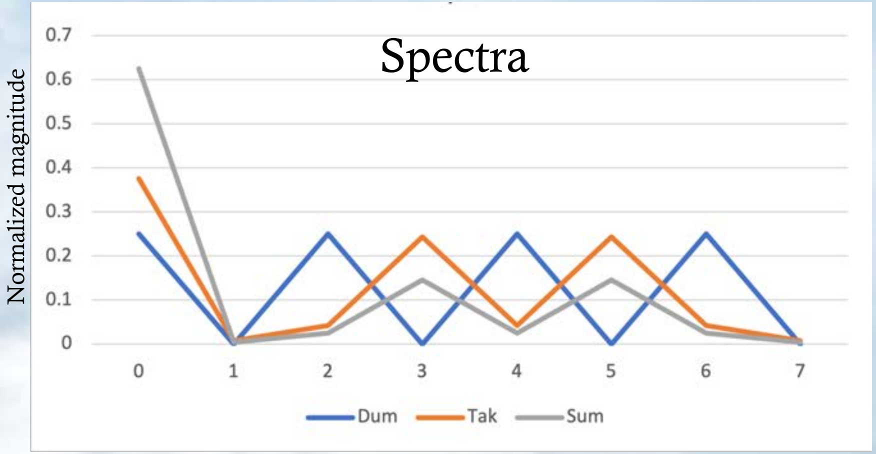
Musicians describe rhythmic types as a pattern of “Dums” (low resonant strokes), “Taks” (high-energy strikes) and rests.

Um Kulthum, Darit el-Ayyam:

Example: Maqsum



The Dum rhythm has only even frequencies. The Tak rhythm emphasizes the odd frequencies and this is preserved in the sum

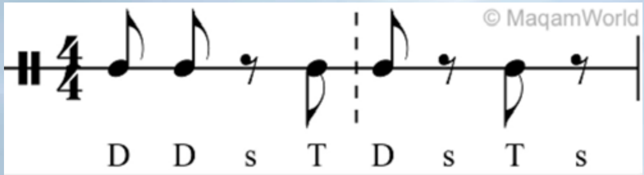


Arabic Iqa'at

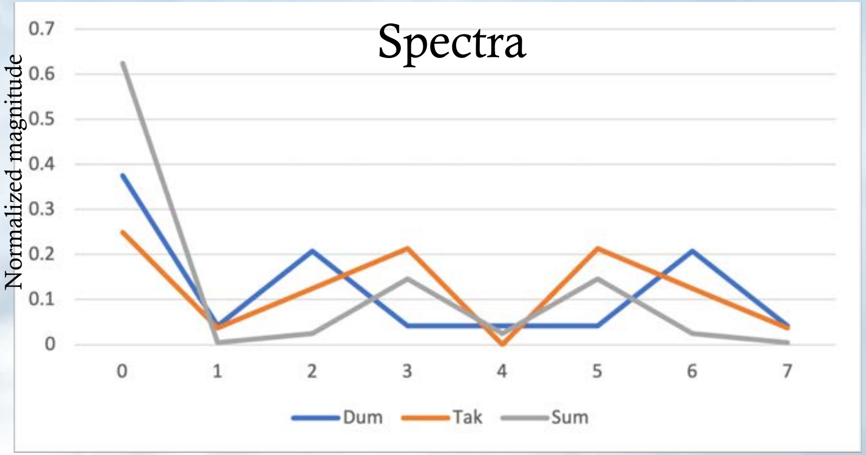
Examples are all taken from Farraj and Shumays, Inside Arabic Music, and maqamworld.com (excellent resources!)

Hassan al-Hafar,
Talumuni Wa Lam Tarthu Li Hali

Example: Baladi



The sum is a cinquillo rhythm

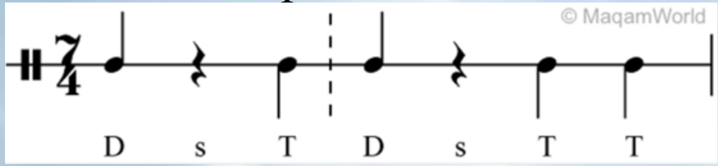


Arabic Iqa'at

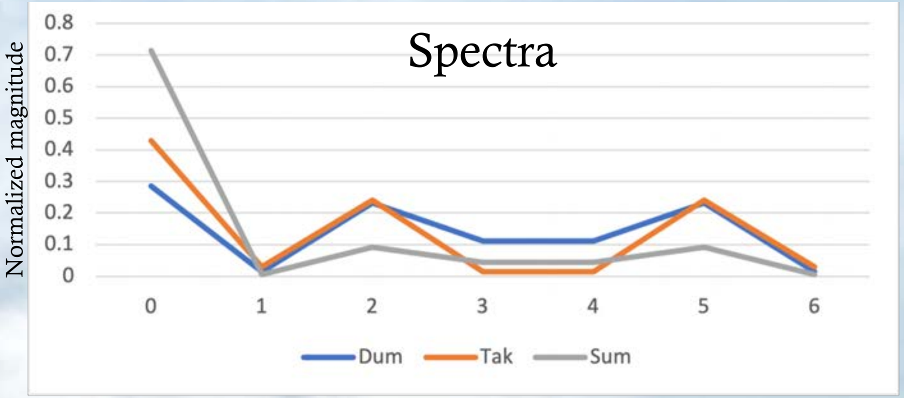
Examples are all taken from Farraj and Shumays, Inside Arabic Music, and maqamworld.com (excellent resources!)

Ensemble Markos
Muwashah Jalla Man Qad Sagha Badran

Example: Nahwakht



Frequency 2 is prominent in all components of the rhythm.



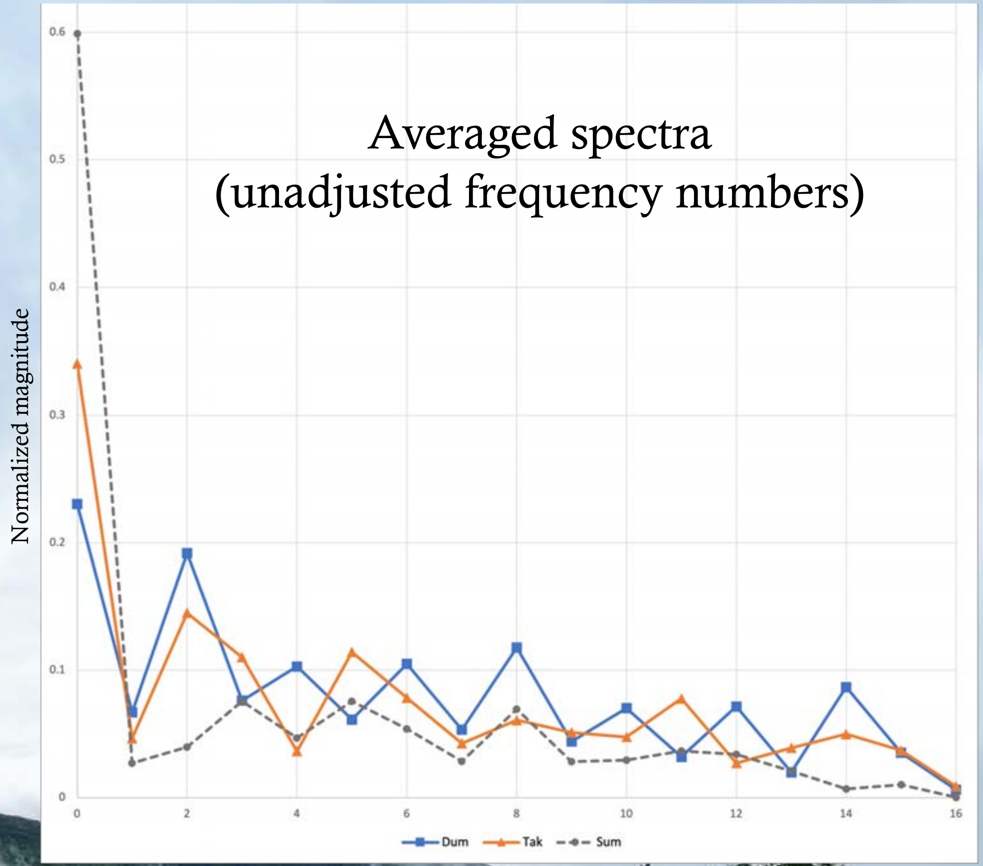
Arabic Iqa'at

Descriptive analysis of 37 iqa'at included in Farraj and Shumays Inside Arabic Music.

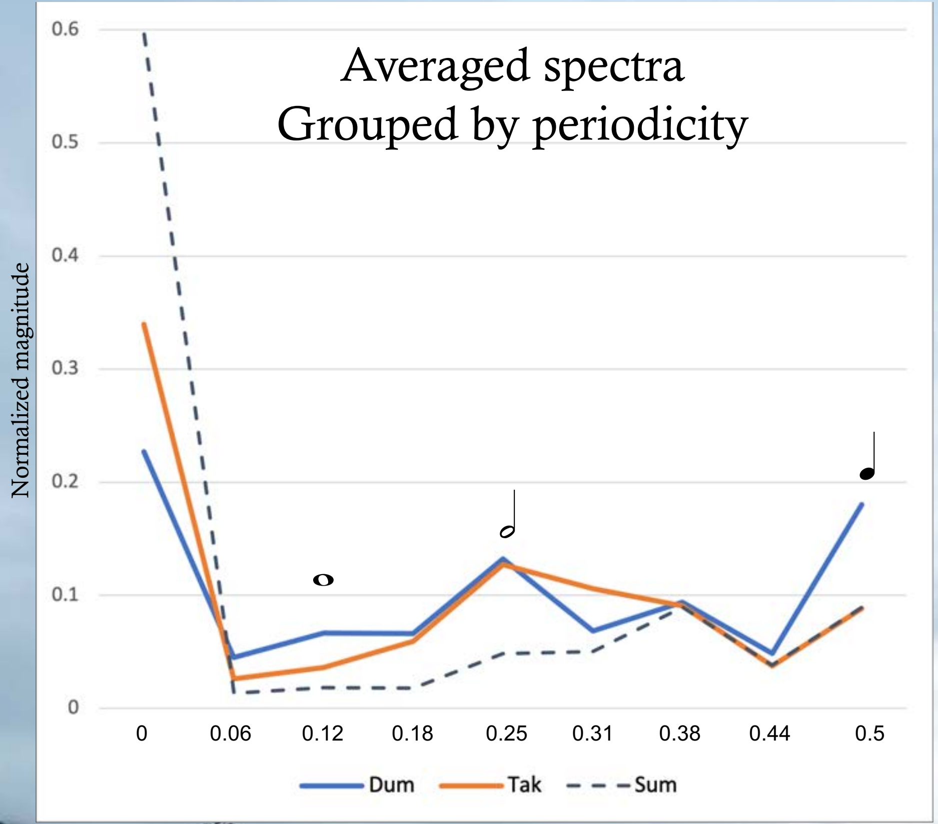
Here I average frequencies as divisions of the cycle.

The even-numbered frequencies clearly favor Dum while 3 and 5 favor Tak.

We see destructive interference at 2: Dum and Tak tend to be large but opposed in phase so they sum to a small value.



Arabic Iqa’at



Here I align spectra based on periodicity (multiples of ♪) rather than frequency number.

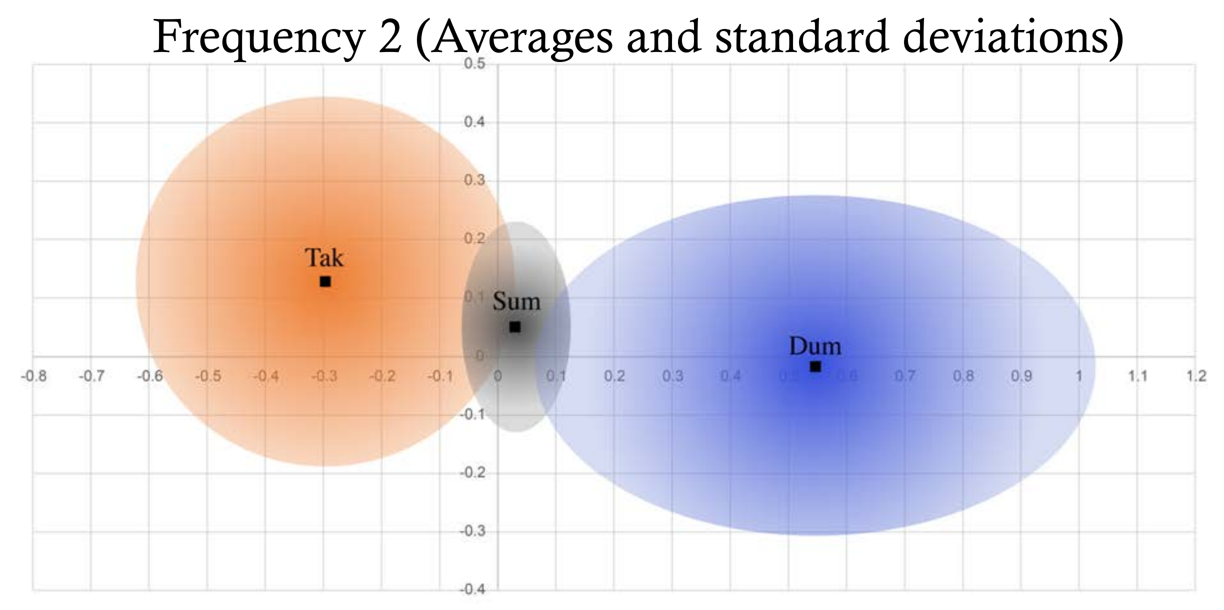
This requires grouping nearby periodicities into 8 bins, so periodicities are approximate.

The lower frequencies tend to have destructive interference.

Both individual parts peak at 𝅗𝅥 and Dum peaks at ♩

Arabic Iqa'at

Averaging values in 2-d. space shows phase values.

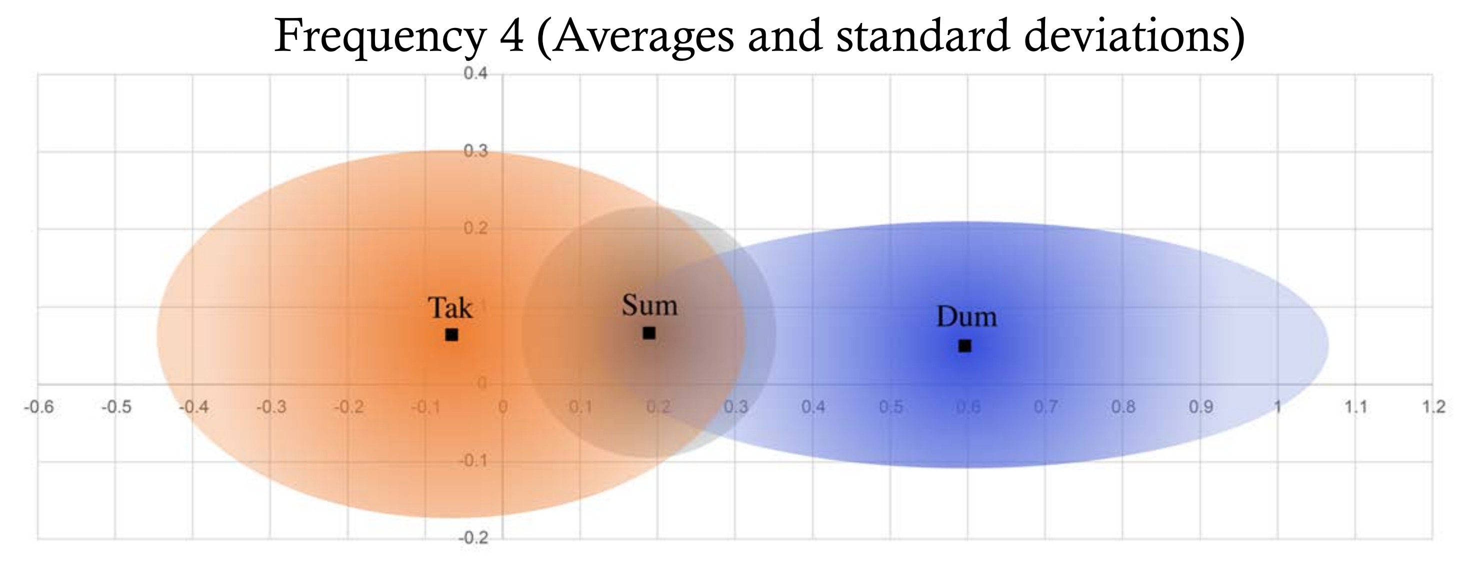


–A clear on-beat/off-beat division between Dum and Tak.

–The resulting sums are weakly on-beat.

Arabic Iqa'at

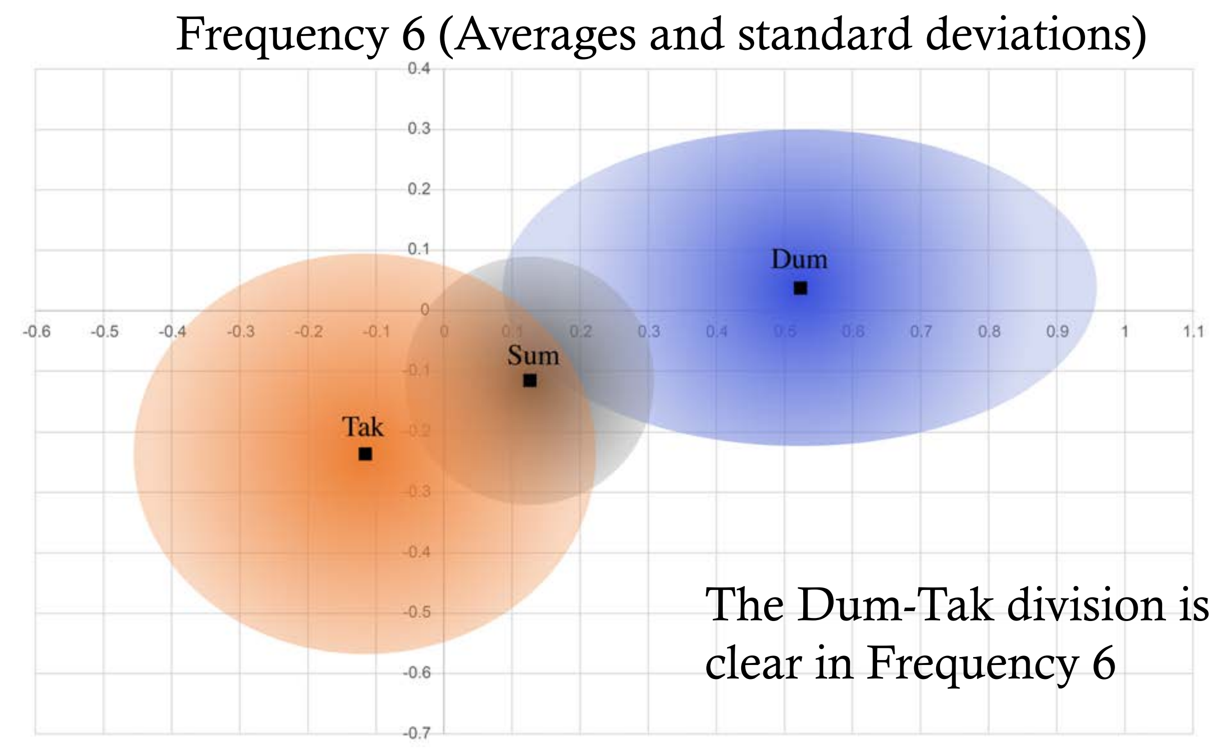
Averaging values in 2-d. space shows phase values.



–Frequency 4 has a similar division between Dum and Tak, although Tak is not exclusively off-beat.

Arabic Iqa'at

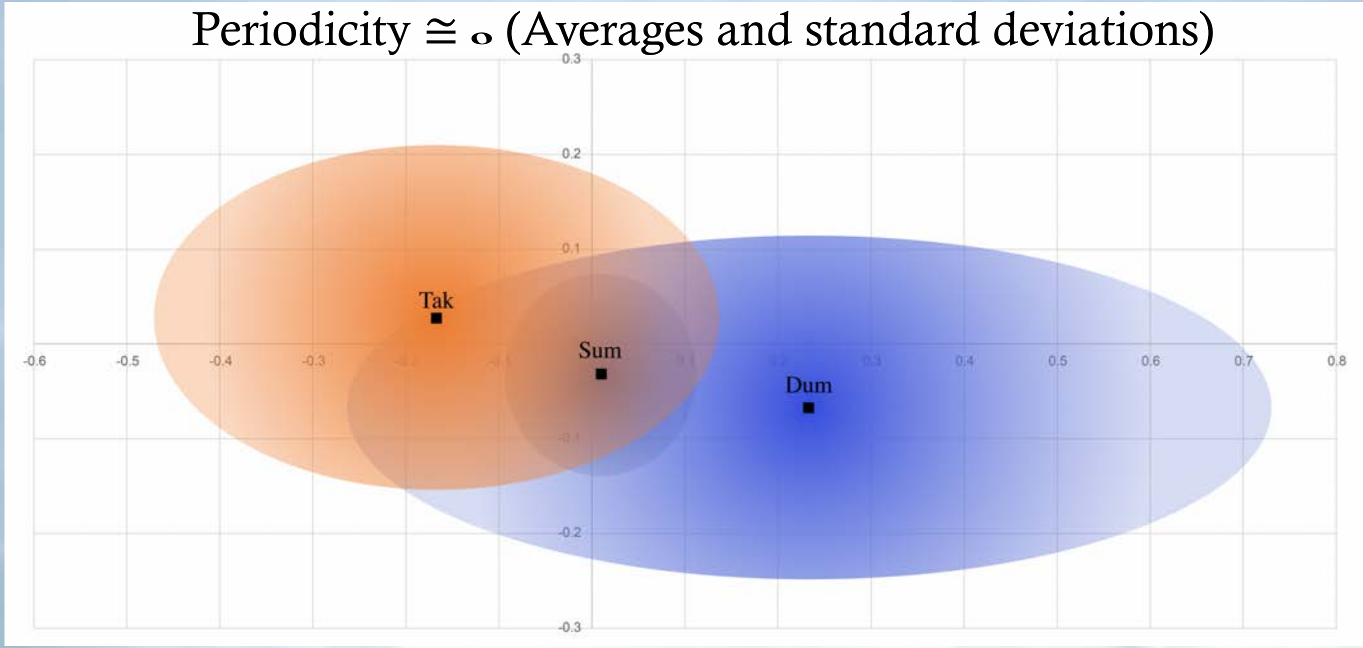
Averaging values in 2-d. space shows phase values.



The Dum-Tak division is also very clear in Frequency 6

Arabic Iqa'at

Averaging values in 2-d. space shows phase values.

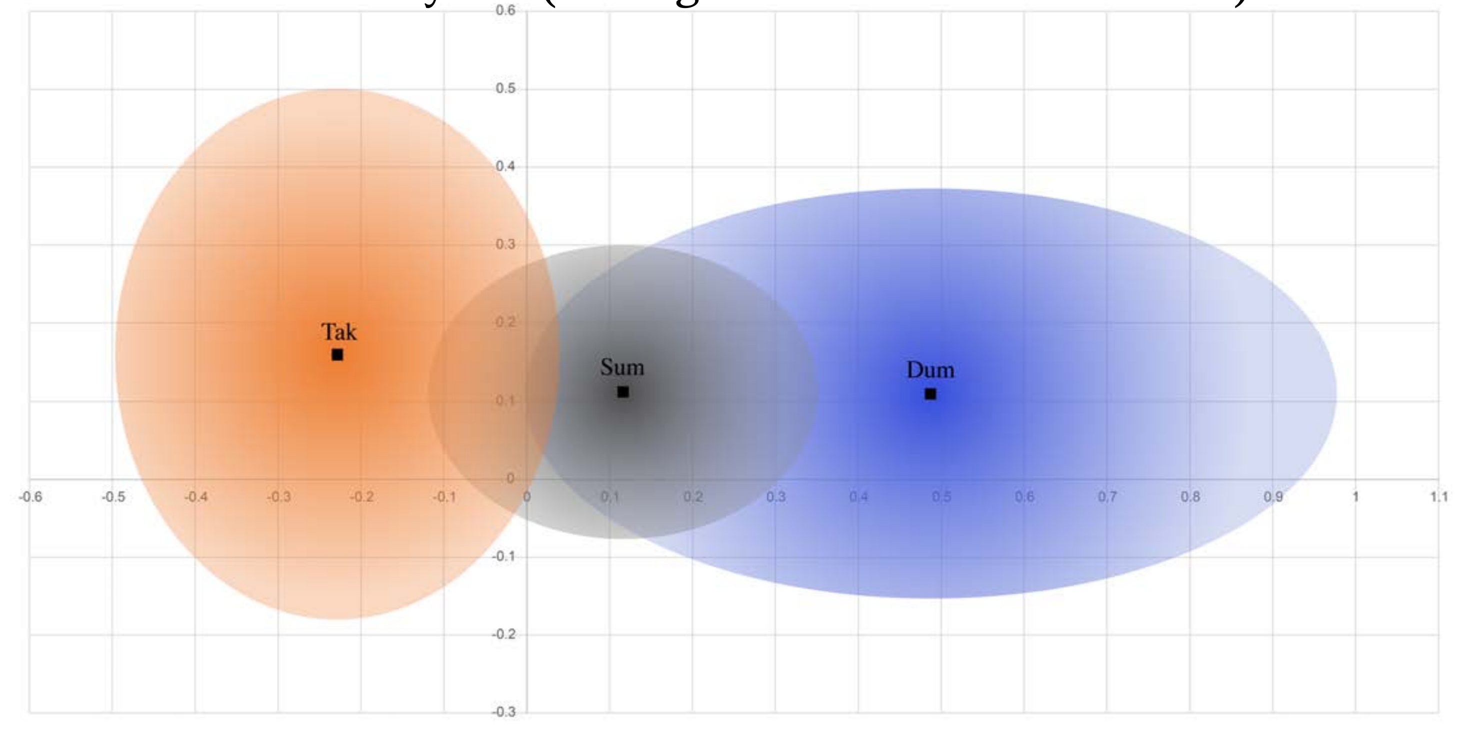


We get similar Dum-Tak divisions grouping by approximate periodicity.

Arabic Iqa’at

Averaging values in 2-d. space shows phase values.

Periodicity ≅ 𝅗𝅥 (Averages and standard deviations)



Of the periodicity-grouped data, the 𝅗𝅥 periodicity has the clearest Dum-Tak division.

Flow in Jazz, Old and New:

Donald Byrd and Marquis Hill, “Fly Little Bird Fly”

Flow in jazz: Byrd/Hill “Fly Little Bird Fly”

Donald Byrd’s “Fly Little Bird Fly” (1967) has a distinctive melodic rhythm in the head.

Conventional notation:

With triplet swung eighths:

Alternate triplet rhythm:

Approximately as measured from the studio recording:

Flow in jazz: Byrd/Hill “Fly Little Bird Fly”

Marquis Hill’s version (2016) puts the whole tune in 7/4.

Byrd:

or

Hill:

Marquis Hill on Donald Byrd:

“Just talking about the similarities in the music, definitely the groove aspect. Even his bebop, straight-ahead stuff of that era still had that aspect of groove. That essence was from where this music comes. And I try to capture that in my music—even my more hip-hop or funky stuff to my more swinging jazz stuff. It’s all about capturing that feeling and being able to transfer it to people.

Jazz Times Oct. 24, 2017

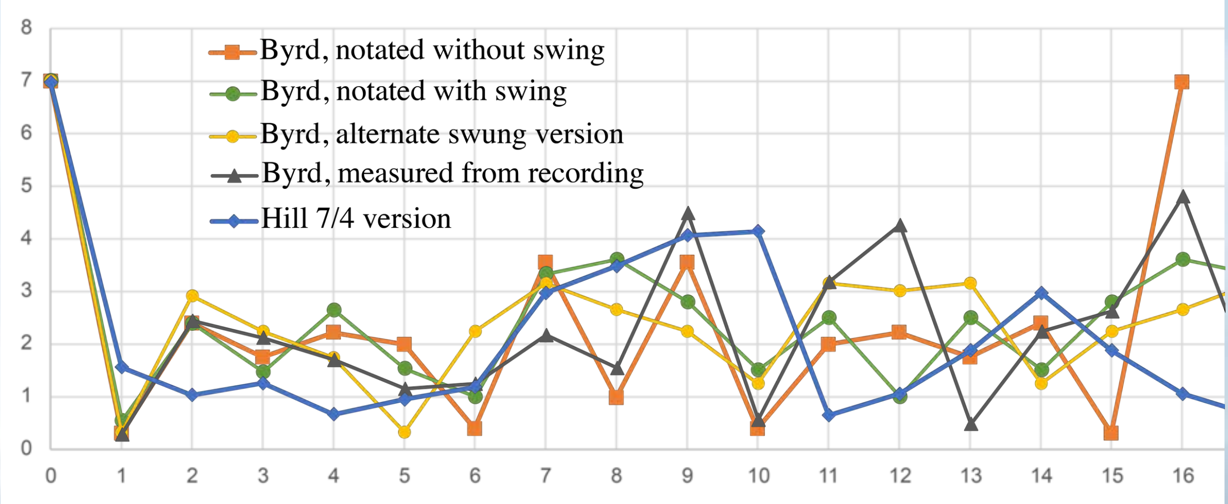
Flow in jazz: Byrd/Hill “Fly Little Bird Fly”

Frequencies 7 and 9 are prominent in all spectra

The version with standard swing is similar, except with a single broad peak across 7–8–9

The alternate swung version weakens frequency 9, favoring 7

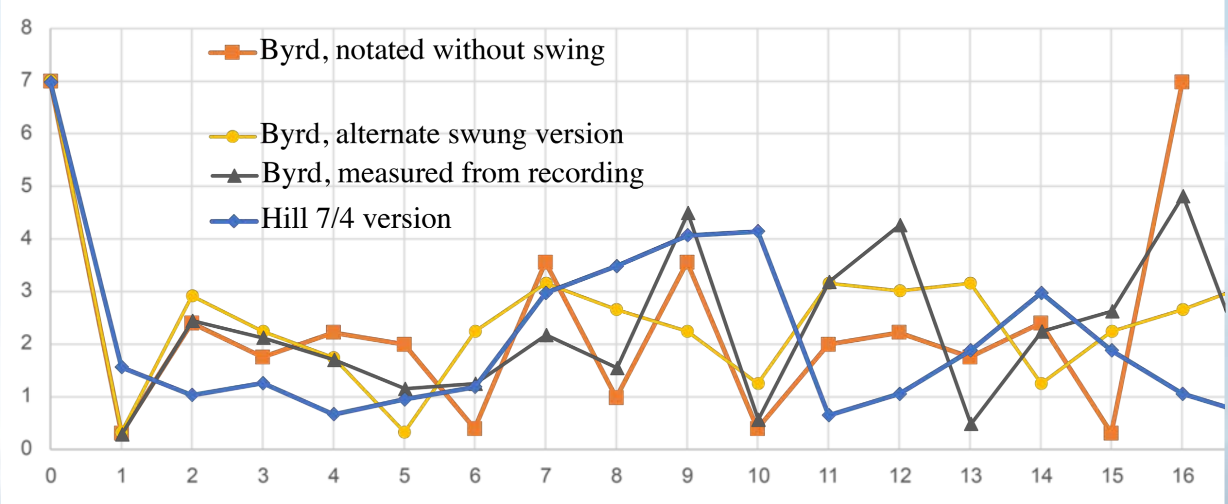
The onsets as measured from the recording favor frequency 9



Flow in jazz: Byrd/Hill “Fly Little Bird Fly”

Frequencies 7 and 9 are prominent in all spectra

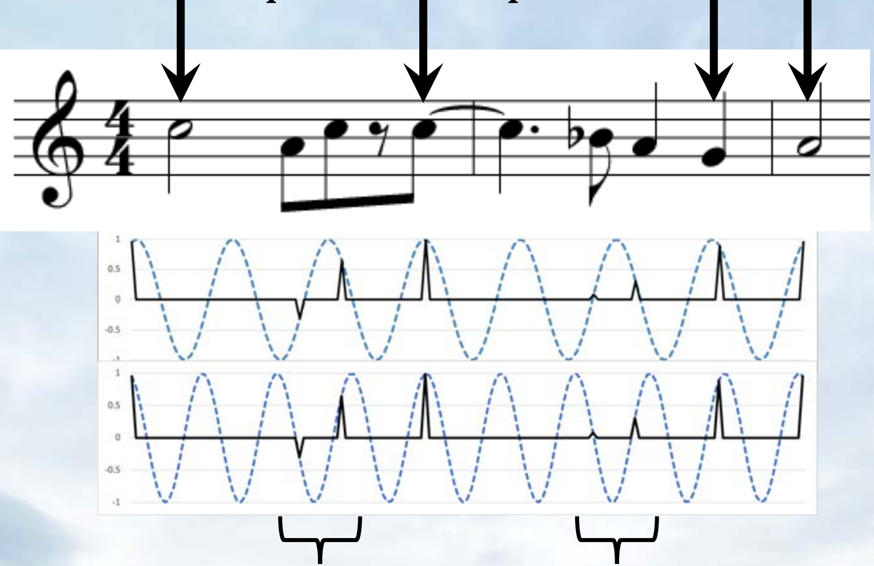
Hill’s recomposed rhythm favors frequency 9 like the Byrd’s recorded rhythm, but also includes frequency 7 as the underlying beat



Flow in jazz: Byrd/Hill “Fly Little Bird Fly”

Frequencies 7 and 9 as interpretations of the rhythm

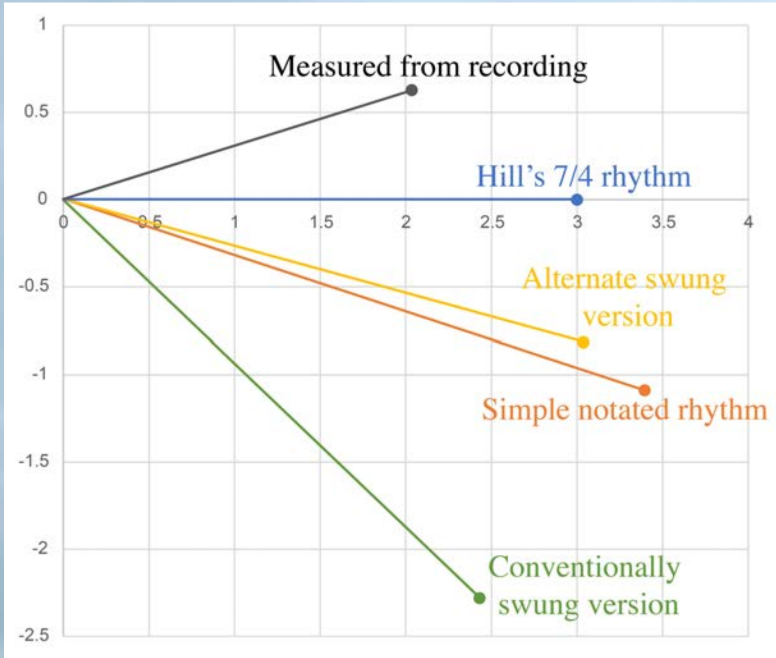
Both frequencies emphasize these notes.



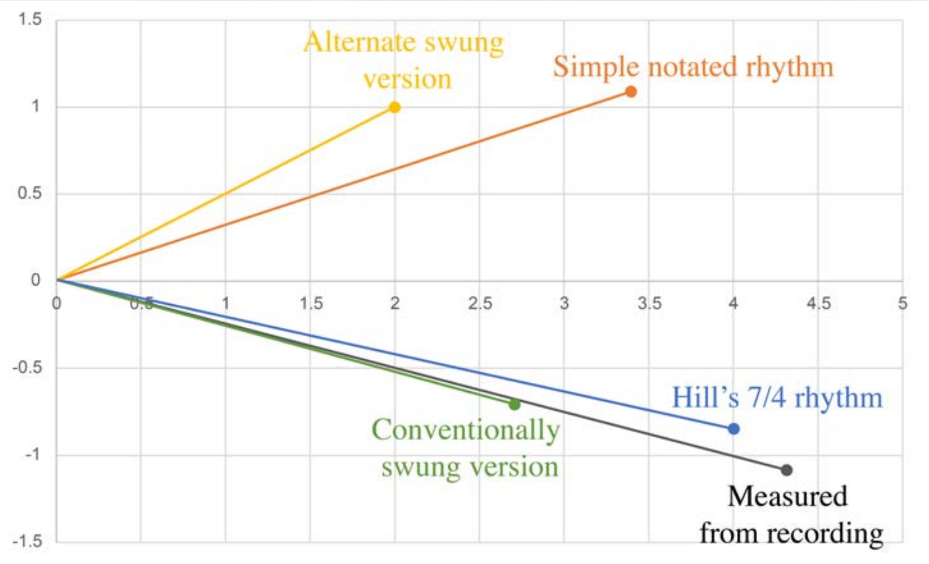
Frequency 7 groups the other two pairs of onsets.
Frequency 9 splits them up.

Flow in jazz: Byrd/Hill "Fly Little Bird Fly"

Frequency-7 space



Frequency-9 space



In both spaces, Hill's rhythm is closer to the measured one than other notatable versions.

Thanks!

Powerpoint and more here:

sites.bu.edu/jyust