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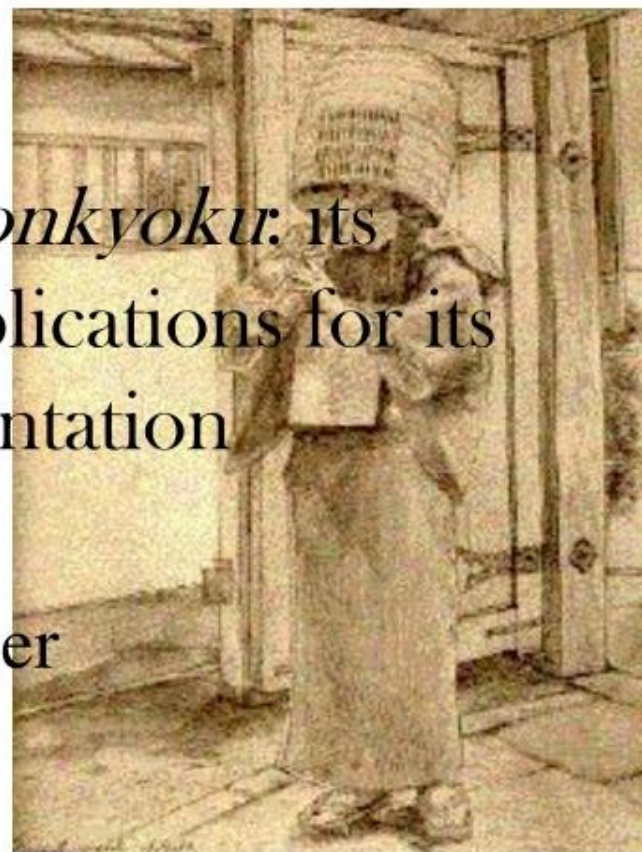
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Japanese shakuhachi *Honkyoku*: its characteristics and their implications for its analysis and representation

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## Shakuhachi Honkyoku: A little history

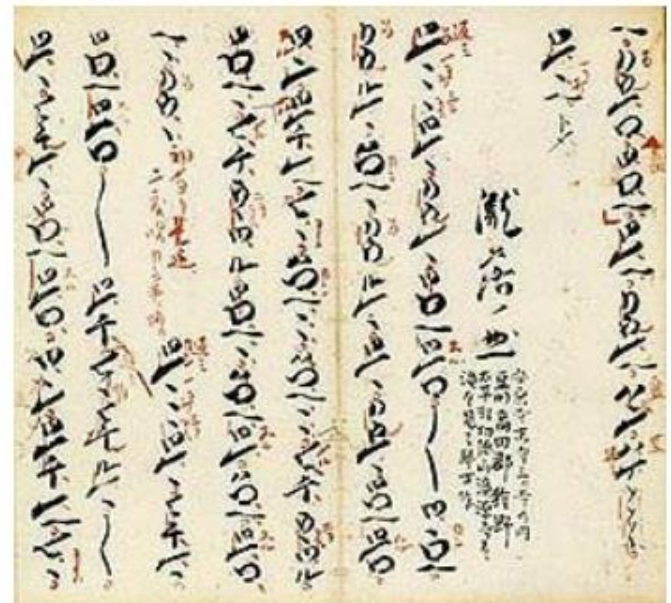
- Honkyoku or “Zen Music”: a tradition of wandering monks called *Komusō* since Muromachi period (1338-1573AD).
- Honkyoku is the religious tradition of shakuhachi music
- Komusō used shakuhachi as religious tool (*shugyo*).
- During the 18<sup>th</sup> century a *komusō* called Kinko Kurosawa was commissioned to collect *Honkyoku* pieces. He spent 3 years collecting and revising 36 honkyoku pieces which still exist today.





# Shakuhachi Honkyoku: general features

- Shakuhachi used as a meditative tool, thus physical act of playing is most significant.
- Solo, personal performance, originally not intended for public performance.
- Monophonic.
- Breathing patterns of player are a very important structural force.
- Arrhythmic, giving a sense of timelessness.
- Uses a tablature notation.
- Originated from an oral tradition.



Honkyoku Score of Araki Chikuo

# Shakuhachi: Physical Characteristics

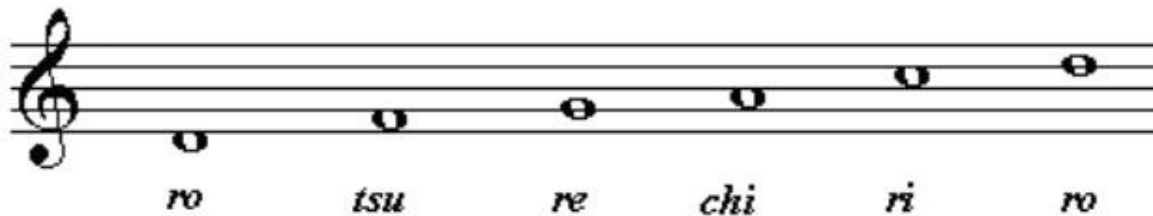
- Term *shakuhachi* specifies the length of the standard instrument → *shaku* (1 foot) and *hachi* (18 Japanese inches)
- Vertical, end-blown, bamboo flute with 5 finger holes: 4 front and 1 back.
- Has a notched embouchure.
- Rugged exterior is representative of Japanese aesthetic of *sabi*, something old, faded and endowed with natural ruggedness.





# Shakuhachi: Sound Characteristics

- Range of 2 octaves and 4<sup>th</sup> (standard).
- Tuned to pentatonic scale, no half steps.
- A fairly narrow dynamic range.
- Characteristically breathy sound.
- Wide tone-quality range: very mellow to nasal.



Basic pentatonic scale of standard shakuhachi in *katakana* names.



# Shakuhachi: timbre characteristics

- Tone-colour or *ne-iro*: traditionally considered a most important quality of shakuhachi.
- The shakuhachi is capable of producing a wide range of timbres.
- Characteristic breathy sound; use of *soto-buki* blowing style.
- Two main sounds produced in *honkyoku* performance:
  - *Kari*: big or main sound.
  - *Meri*: less stable, subordinate sound.

Japanese	English
<i>akarusa</i>	brightness
<i>kurasa</i>	darkness
<i>fukami</i>	depth
<i>marumi</i>	roundness
<i>asasa</i>	shallowness
<i>amasa</i>	sweetness
<i>sunda-neiro</i>	clarity
<i>ochitsuita</i>	stable
<i>wabi/sabi</i>	Loneliness of sound
<i>shibumi</i>	subdued



## Shakuhachi Honkyoku: structural features

- **Principles of performance:**

*“Maximum effect from the minimum of sound materials.”*

*“...to become Buddha in a single tone...”*

*“...there is a deep-seated attitude towards realization of a self-sufficient musical world within the scope of a single sound.”*

(Tsuge, 1981: p110)

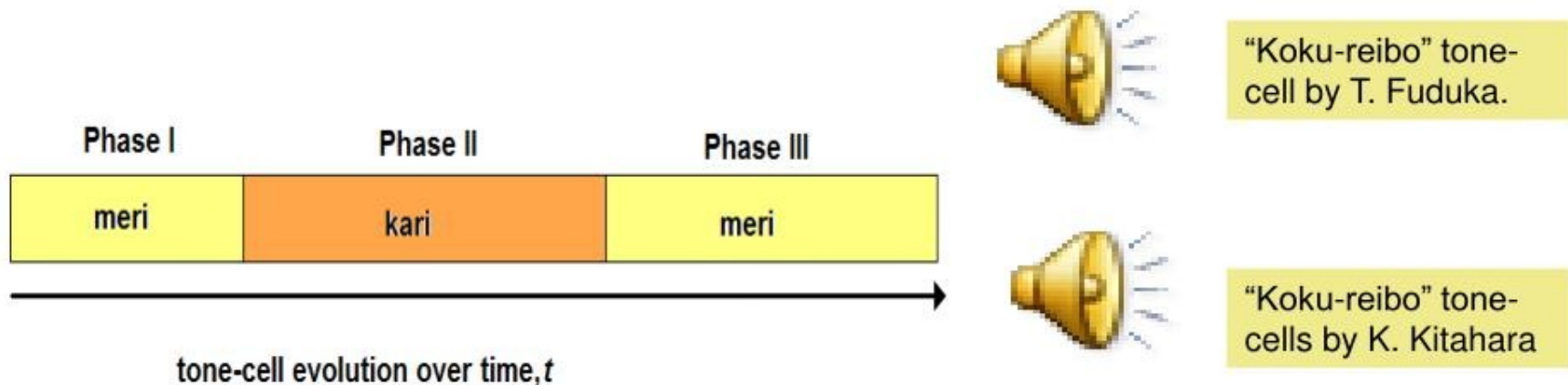
- *Tone-cells* lasting the length of one breath → also called *issokuon* or “one breath tones”.
- Tone-cells separated by distinct pauses for breath.
- Length of pauses varies according to discretion of the musician.
- Rhythmically very free.
- Constant state of change in both pitch and tone-quality.





# Shakuhachi Honkyoku: tone-cell features

- Vary in duration.
- Can last up to 10 seconds,
- Length depends on the breathing ability of the musician.
- Composed of one sustained tone or several tones.
- Tri-partite structure (Gutzwiller and Bennett, 1991):
  - changes in pitch, dynamics and tone-quality produced through use of **meri** and **kari** sounds.
- **Meri**: lowering of pitch, softer sound and less stable pitch, duller tone-quality
- **Kari**: strong stable pitch and brighter, clearer tone-quality.





# Shakuhachi Honkyoku tone-cells: “Kokû-reibo”

- Kokû: vacuity, *sunyata*.
- One of the “*San Kyorei*”: 3 most venerated honkyoku melodies
- Dates back to 16<sup>th</sup> century
- Sustained notes → sense of timelessness.
- Recurrent ascending motif.



Section from “Kokû”  
by Kozan Kitahara.



Section from “Kokû” by  
Tadjima Tadashi.



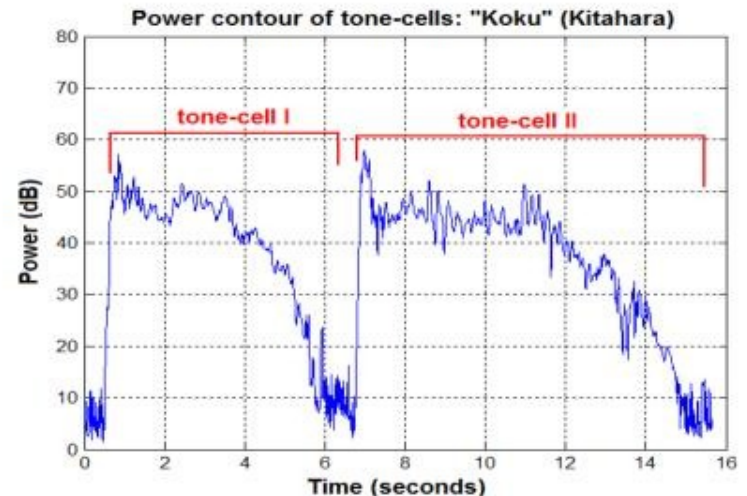
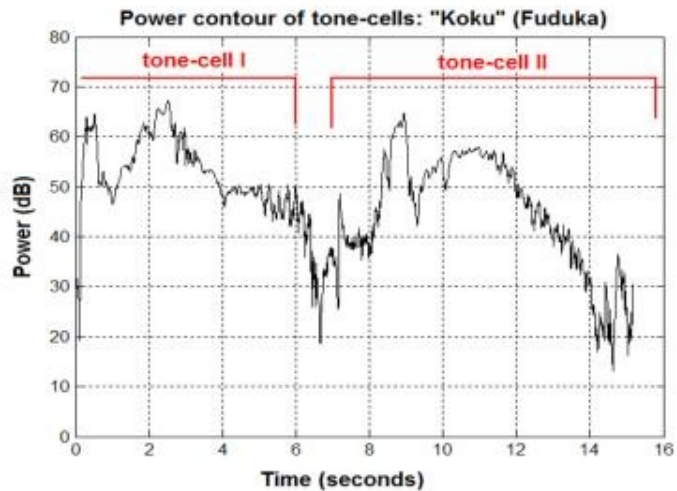
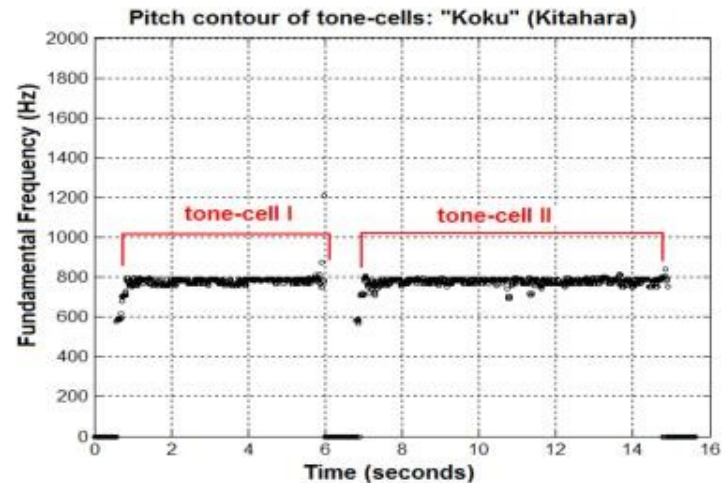
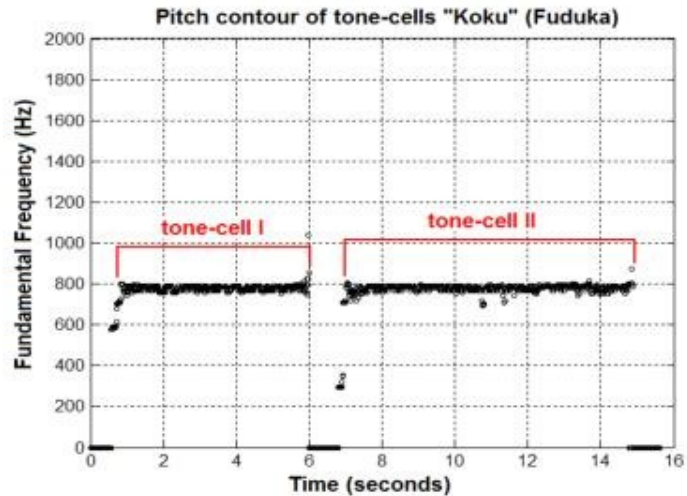
Section from “Kokû”  
by Teruhisa Fukuda



ro tsu re



# Tone-cell structure: pitch and dynamics





## Tone-cell structure: timbre

- Many possible tone-quality, *ne-iro* or **timbre** descriptions → its important in shakuhachi music
- Shakuhachi can produce many different qualities of tone → the possible use of timbre to structure the melody.
- The *meri* and *kari* tones → changes in timbre due to simultaneous changes in pitch and dynamics



- **Timbre as a contributor to the melodic structure.**



## Timbre is...

- “...the quality of sound that is not loudness and pitch.”  
(American Standards Association)
- Enables one to distinguish different musical instruments playing the same note.
- A sound phenomenon separate from frequency, amplitude and duration but existing due their interaction.
- The distinctive quality that differentiates one complex sound from another of identical pitch and loudness.



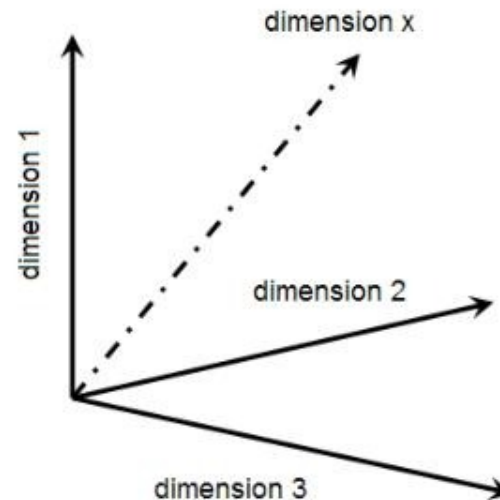
# Analysing timbre

- Pitch → frequency scale
- Dynamics → energy scale
- Rhythm → relative duration (time)
  
- Timbre → ...spectral and temporal aspects of sound...
- Many ways of measuring timbre.

## Therefore...

- Timbre is described as **multidimensional**.

## Multidimensional timbre space



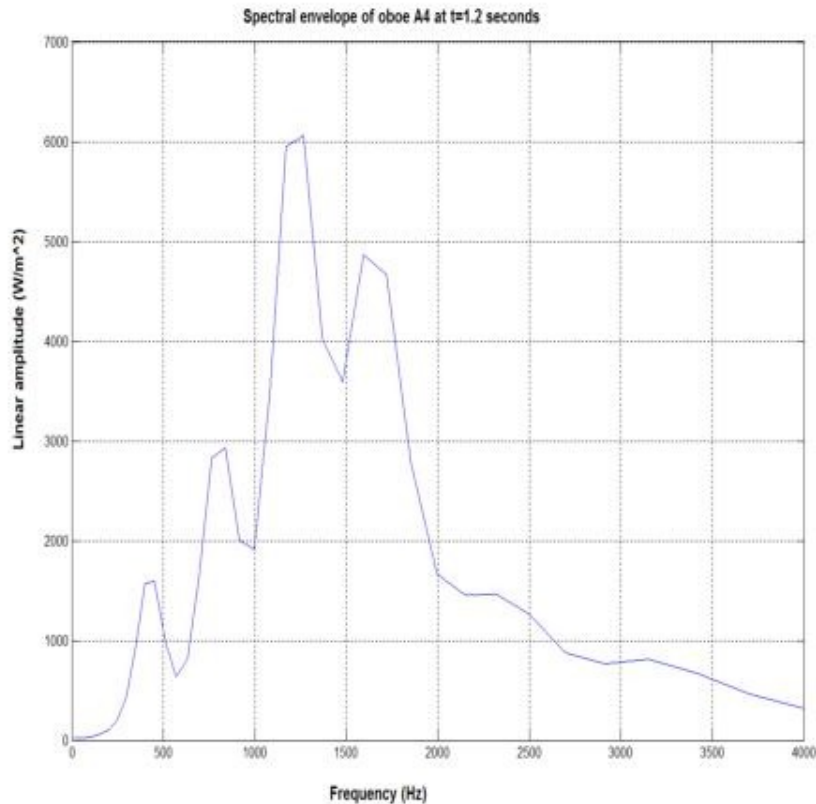


## Spectral and temporal descriptions of timbre

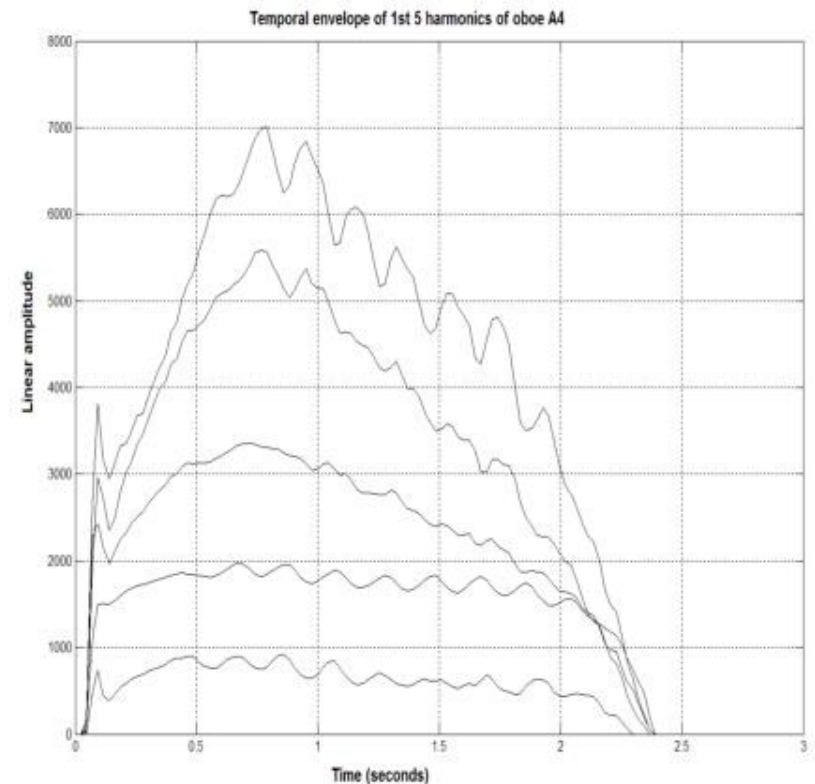
- Spectral descriptions of timbre → **frequency** and **energy** information in the spectrum.
- Temporal descriptions of timbre → the evolution of the **energy** of the spectrum over **time**.
- Spectral descriptions → sustained sounds.
- Temporal descriptions → impulsive sounds, speech



# Spectral and temporal features of sound



Changes in frequency spectral at time  $t$ .



Changes over time (all values of  $t$ )



Name	Type	Physical Correlate	Perceptual Correlate	Description
Spectral centroid	Spectral	Energy concentration in low/high spectral area	Brightness/ Dullness	Balance of energy in spectrum.
Irregularity	Spectral	Fluctuating energy between adjacent partials	Richness	Amplitude variation of adjacent components.
Roughness	Spectral	Beating of overlapping partials	Harshness/ Smoothness	Inharmonic and noise components in spectrum.
Harmonicity	Spectral	Harmonic/ Inharmonic	Cohesive/ Diffuse	Ratio of harmonic to inharmonic spectral components.
Attack/ Decay times	Temporal	Slope of attack and decay	Instrument identification	Time taken to reach max. amp from 0 (attack).

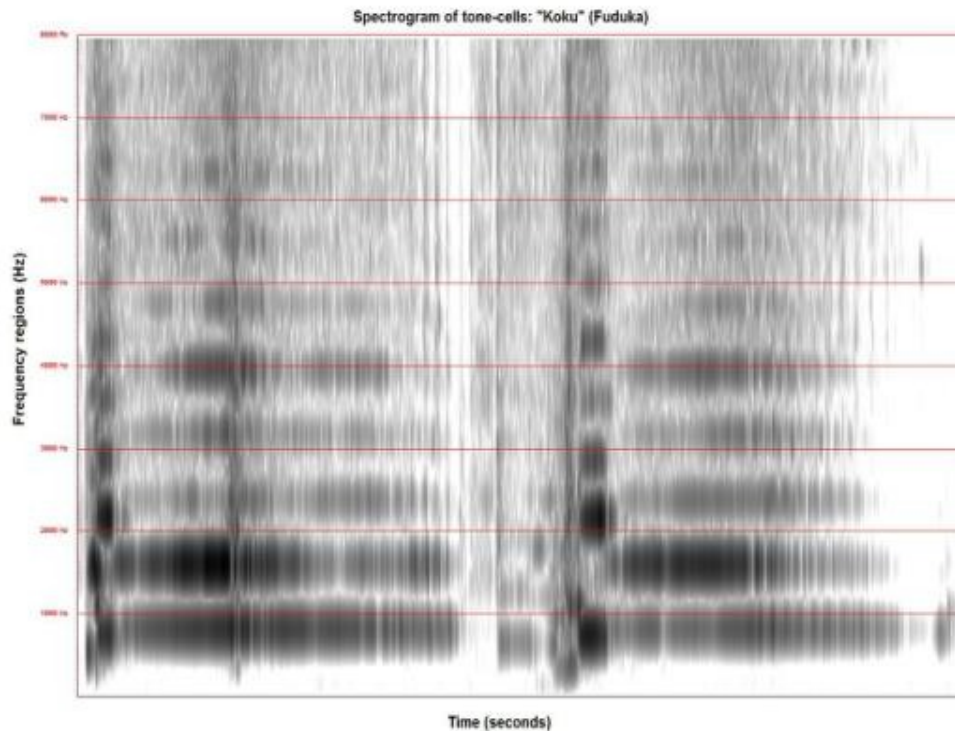


# Exploring tone-cell structure: timbre

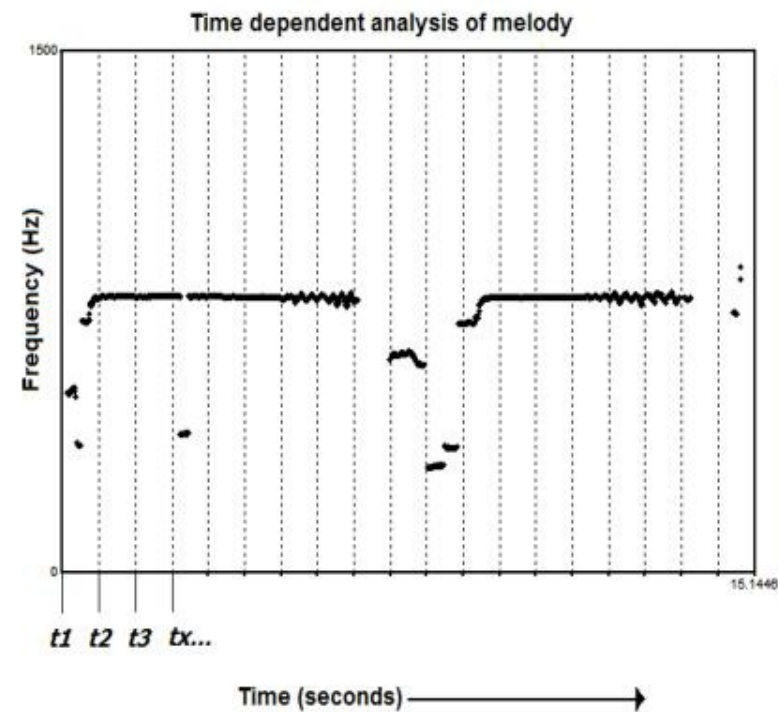
- Four timbre descriptors:
  - **Spectral centroid**
  - Irregularity
  - **Roughness**
  - Harmonicity
- Spectral centroid → brightness/dullness due to *meri/kari* sounds.
- Irregularity → effect of *meri/kari* sounds on energy distribution in spectrum.
- Roughness → characteristic noise.
- Harmonicity → noise and harmonic characteristic of spectrum.



Measured and presented over time,  $t$  (seconds).



Spectrogram of tone-cells:  
"Kokû" by Fukuda



Not analysed as individual notes



## Tripartite tone-cell structure: timbre

According to Gutzwiller and Bennet (1991):

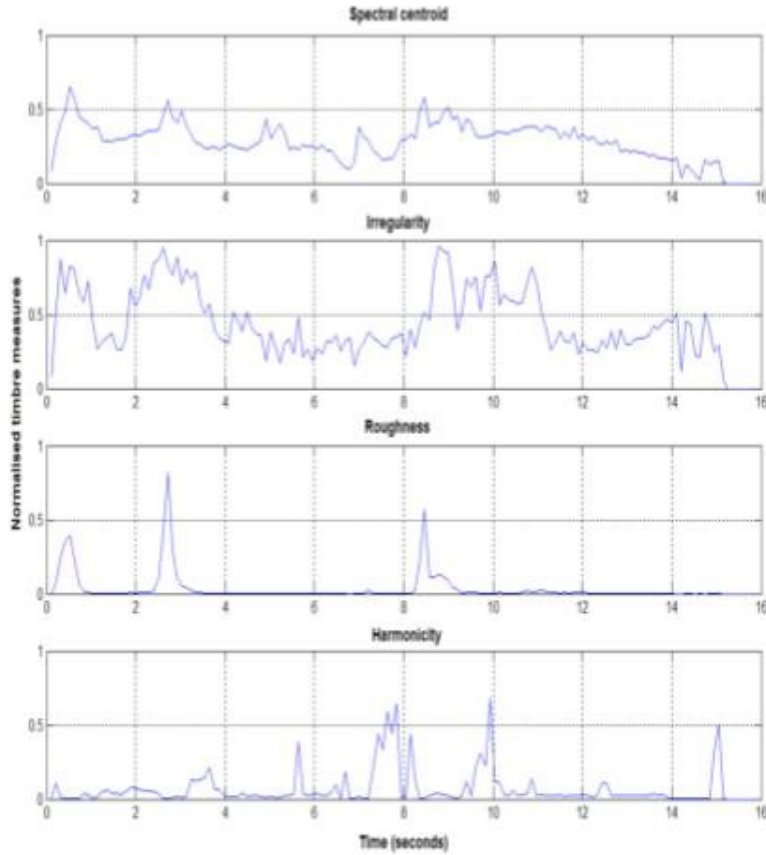
- *meri-kari-meri* structure → tone-cell timbre shows tripartite structure.
- Phase 1 – Phase 2:
  - increase in brightness → increase in spectral centroid?
  - Increased stability of sound → decrease in roughness?  
increase in harmonicity?

But..

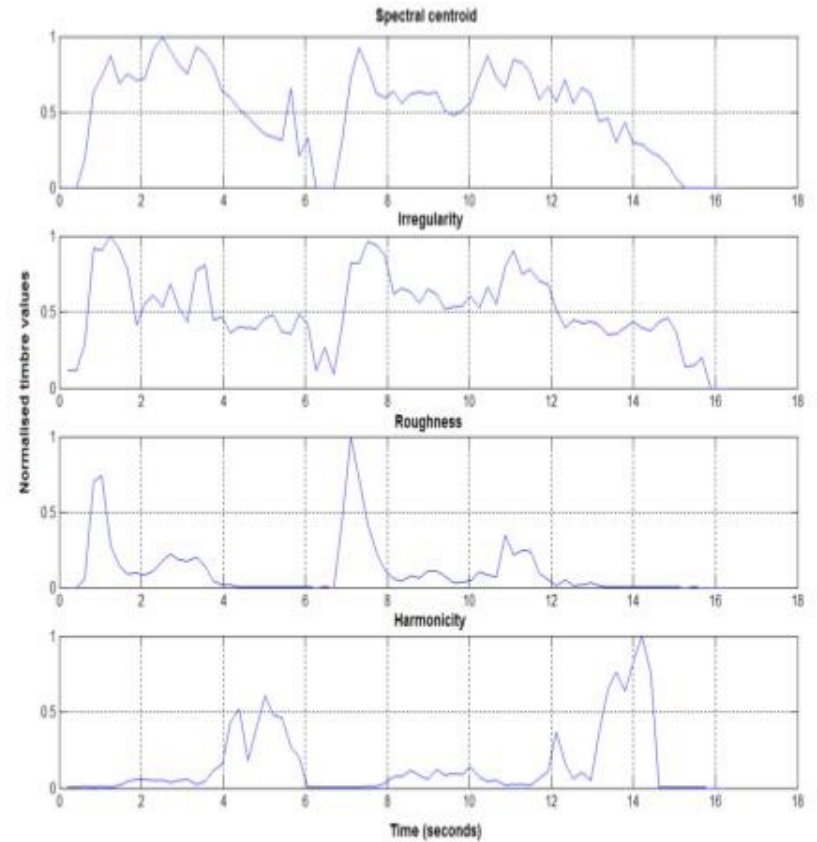
- Forcing of more air into shakuhachi- *kari* or main sound  
→ may be increase in roughness.



# Timbre description of “Kokû” tone-cells



Fukuda



Kitahara



## Analysing shakuhachi honkyoku: summary

- Melodic musical tradition → does not use harmonic pitch relations as main structuring force.
- Analysis of pitch alone not sufficient.
- *Meri-kari-meri* structure of tone-cells → timbre and dynamics also significant.
- Cannot be analysed as single notes → analysed over a chosen time interval.
- Background in oral tradition → differences in performances of same tunes → need to compare many versions.

