

## A microcosm of musical expression

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Quantitative analysis of pianists' dynamics in the initial measures of Chopin's Etude in E major

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## Timing and Dynamics

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- Timing is only one aspect of musical expression, important and easiest
  - Dynamics: The relative intensities of successive and simultaneous tone
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## Methodological problem in measuring the expressive dynamics

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- Difficulties to estimate accurately the relative intensities of several simultaneous complex tones
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## Main questions

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- How many fundamentally different patterns of Dynamic shaping?
  - How these patterns related to the musical structure
  - Identical patterns have any relationship to sociocultural differences among the artists?
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## Method

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- The music
    - Music divided into horizontal voices
    - Melody is the most important voice
  - Measurement and analysis procedures
    - Most relevant horizontal dynamic pattern is that of the primary tones
    - The acoustic complexity of piano tones makes difficult mathematically to predict
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## Three aspects of expressive dynamics

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- Basic dynamic level
  - Range
  - Dynamic profile
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## Dynamic variability and range

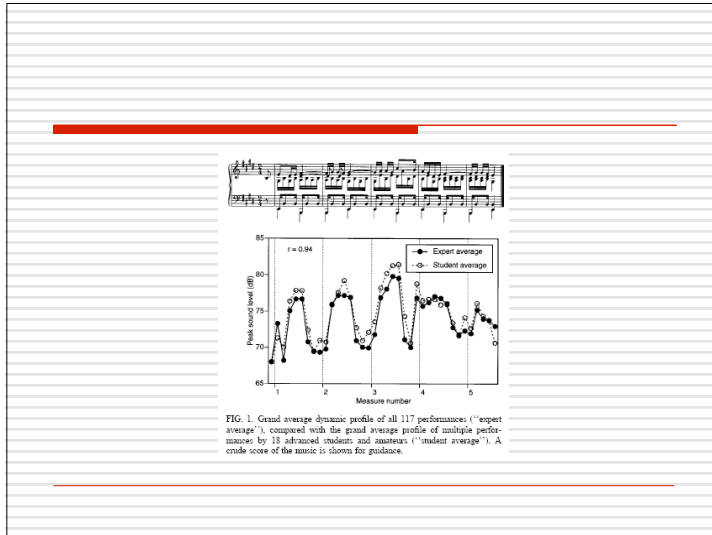
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- Difference between the largest and smallest PSL values in a performance
  - Standard deviation
  - Cherkassky 27dB, Karyakou 6.5 dB, Duchable 5.9 dB
  - Difference between PSLs of melody and accompaniment correlated with s.d. (standard deviation)
  - Computed Standard deviation of the PSLs for melody positions
  - Wildest shown by Kyriakou, Duchable
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## The grand average dynamic profile

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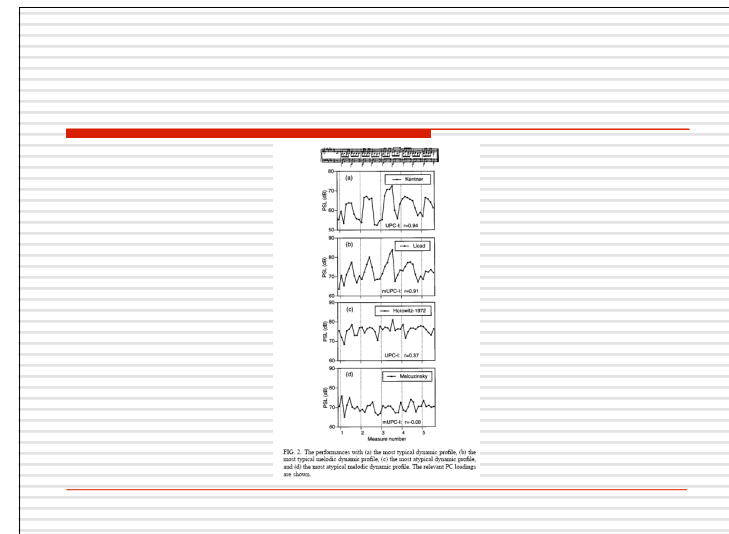
- Averaging the dynamic profiles of all 117 performances
  - First unrotated principal component UPC-I
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- ❑ Lower PSL for the students than for the expert in the final position
- ❑ Grand average profile shows difference between melody (peaks) and accompaniment (troughs)
- ❑ Pitch is only one of the several factors for expressive dynamics
- ❑ Metrical structure
  - Accent in the first and fifth

## Functions of Dynamic variation in the piece

- ❑ Separate the melody from the accompaniment
- ❑ Give the melody expressive shape



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- Horowitz-1972 and Malcuzinsky have the least typical dynamic profiles.
  - Little differentiation between melody and accompaniment
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## Rotated principal components

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- Principal component had to account for more than 100/m% of the variance to be accepted as significant.
  - Five PCs were considered
  - Each standardized dynamic profile (uncorrelated with other PCs)
  - PC-I through PC-V complete profile analysis
  - mPC-I through mPC-V in the melodic profile analysis
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## PCs

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- PC-I Characterized by *crescendi* during all melodic gestures
  - PC-II consistent differentiation of melody and accompaniment, marked decrescendo through bars 4,5
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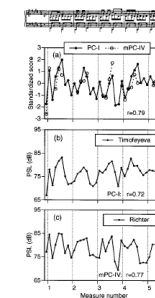
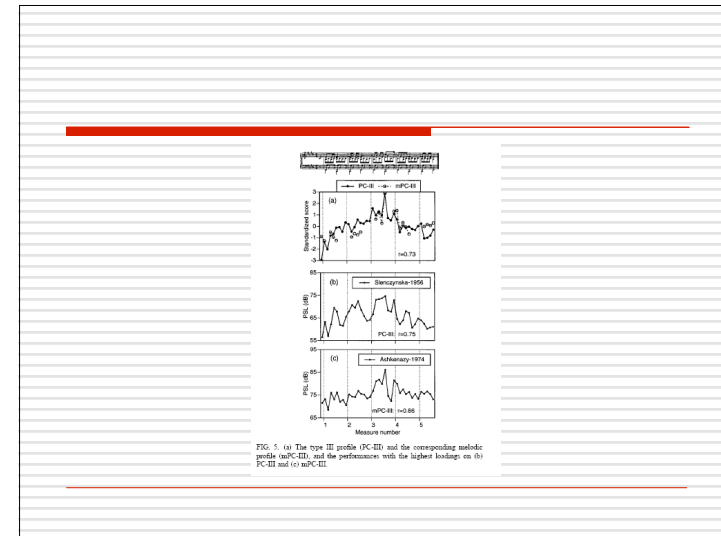
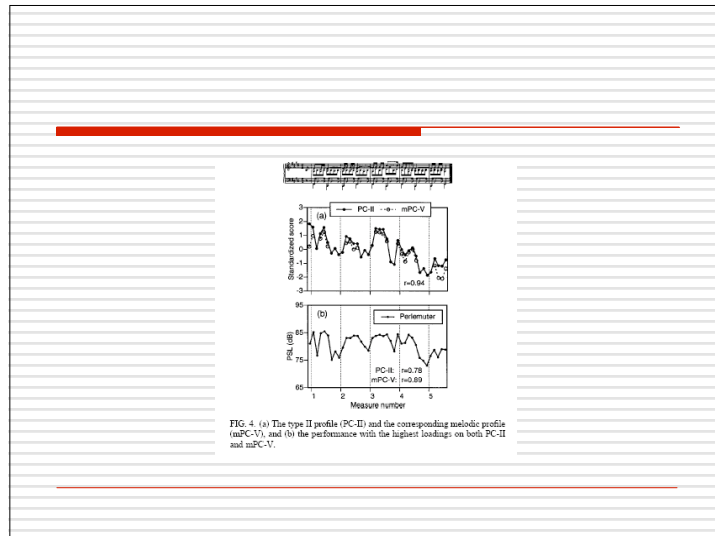
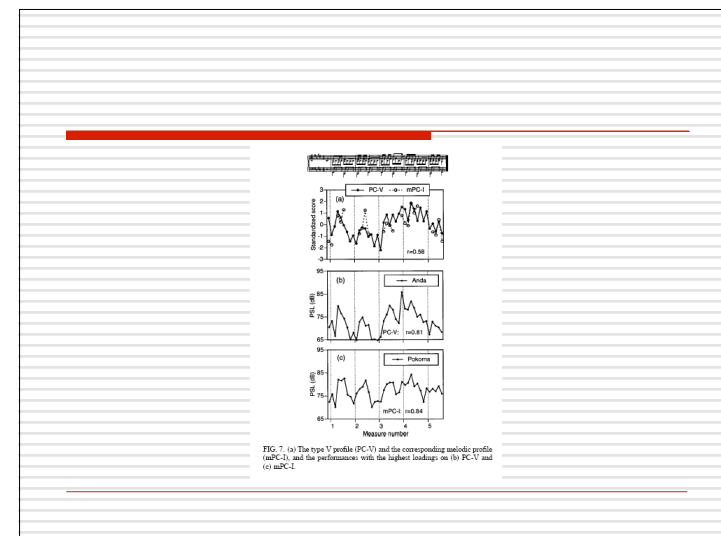


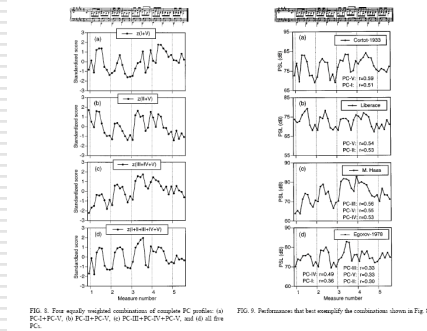
FIG. 3. (a) The type I profile (PC-I) and the corresponding melodic profile (mPC-I), and the performances with the highest loadings on (b) PC-I and (c) mPC-IV.



- ❑ PC-III defined by moderately correlated PC-III and mPC-III profiles
- ❑ PC-IV very soft in beginning but clear distinction between melody and accompaniment in follow
- ❑ PC-V strong initial upbeat, deemphasize bar 2, high dynamic level, final decrescendo



## Linear combinations of PC profiles



## Result of combination

- ❑ Some pairs of PCs ( I-II, I-III, II-V) exhibit higher negative correlations than other pairs
- ❑ Individual performances are fairly uniformly distributed in the multidimensional space defined by the PC coordinator

## Similarity among performances

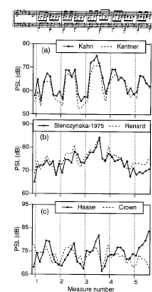


FIG. 10. The two most similar performances in terms of (a) complete dynamic profiles and (b) melodic dynamic profiles; also, (c) the two most dynamic performances in terms of complete profiles.

## Sociocultural variables

- ❑ Artists gender
- ❑ Nationality
- ❑ Birth date
- ❑ Recording date
- ❑ Age at the time of recording

### Birth date , recording date

- ❑ Artist birth date like recording date showed a slight positive correlation with mUPC-I, negative with type II, marginal positive correlation with type I, stronger positive correlation with type V

### Age at the time of recording

- ❑ Positively to type II , negatively to type V .
- ❑ The type II pattern more associated with older artist, the type V with younger artists

### Nationality

- ❑ Chopin performance with strong tradition in French, Polish, Russian
- ❑ One-way analyses of variance ( ANOVAs) revealed no significant effects of this independent variable on any of the dependent variable.

### Gender

- ❑ Female pianists exhibited a significantly greater dynamic range in the melody
- ❑ Female pianists in the sample tended to produce more typical melodic than the male pianists.

### Relationship with expressive timing

- ❑ There was not really any relation between typical timing and typical dynamics within the melody
- ❑ No Non-linear relationship
- ❑ Some interdependence of the two expressive parameters at the individual level seemed possible

### conclusion

- ❑ Expressive dynamics offers more opportunities for the exhibition of individuality than does expressive timing
- ❑ Three independent aspects: basic tempo and dynamic level, modulation, pattern
- ❑ Central norm was identified with the grand average profile
- ❑ Dynamic strategies seem less constrained by the musical structure than timing strategies
- ❑ Psychological status of the expressive strategies remains unclear
- ❑ The negative result may be due to the slow nature of music- which offers maximal freedom in expressive
- ❑ Should be consider : touch, articulation, pedaling

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- ❑ Same norm of expressive shaping underlies performances at different levels of expertise
  - ❑ Expert pianists performances are much more diverse in timing and dynamics than student performances
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### Further study

- ❑ Relation of all this expressive diversity to the perceived quality of the performances
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