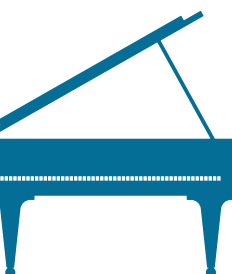


# The *Con Espressione* Game

- Online questionnaire where participants listened to several performances of the same classical piano piece.
- <1500 descriptions (by 190 participants)
- 45 piano performances (9 pieces, 4-7 performances per piece)

| Composer  | Piece   | # | Pianists   |
|-----------|---|---|--|
| Bach      | Prelude No.1 in C, BWV 846 (WTC I)            | 7 | Giesecking, Gould, Grimaud, Kempff, Richter, Stadtfeld, MIDI |
| Mozart    | Piano Sonata K.545 C major, 2nd mvt.          | 5 | Gould, Gulda, Pires, Uchida, MIDI deadpan                    |
| Beethoven | Piano Sonata Op.27 No.2 C# minor, 1st mvt.    | 6 | Casadesus, Lazić, Lim, Gulda, Schiff, Schirmer               |
| Schumann  | Arabeske Op.18 C major (excerpt 1)            | 4 | Rubinstein, Schiff, Vorraber, Horowitz                       |
| Schumann  | Arabeske Op.18 C major (excerpt 2)            | 4 | Rubinstein, Schiff, Vorraber, Horowitz                       |
| Schumann  | Kreisleriana Op.16; 3. Sehr aufgeregt (ex 1)  | 5 | Argerich, Brendel, Horowitz, Vogt, Vorraber                  |
| Schumann  | Kreisleriana Op.16; 3. Sehr aufgeregt (ex 2)  | 5 | Argerich, Brendel, Horowitz, Vogt, Vorraber                  |
| Liszt     | Bagatelle sans tonalité, S.216a               | 4 | Bavouzet, Brendel, Katsaris, Gardon                          |
| Brahms    | 4 Klavierstücke Op.119, 2. Intermezzo E minor | 5 | Angelich, Ax, Serkin, Kempff, Vogt                           |



# The *Con Espressione* Game

Questionnaire on Music Expressivity

Question 1: Franz Liszt – "Bagatelle sans Tonalite, S. 216a"

Please listen to these excerpts, in any order, and as many times as you wish. Please, think of words (if possible, adjectives) that best describe the character of each performance to you. Concentrate on the performative aspects and not on the piece itself. Enter your response in the boxes to the right. You may enter as many words as you wish.

To be able to submit your responses, please fill in all the boxes.

You can also select the performance that you liked best by clicking on one of the radio buttons in the rightmost column.

|   |  |  |                            |
|---|--|--|----------------------------|
| 1 | <div><div></div><div>-0:28</div></div> |  | <input type="radio"/> Best |
| 2 | <div><div></div><div>-0:27</div></div> |  | <input type="radio"/> Best |
| 3 | <div><div></div><div>-0:36</div></div> |  | <input type="radio"/> Best |
| 4 | <div><div></div><div>-0:35</div></div> |  | <input type="radio"/> Best |

Save and next





# Sorting Musical Expression: Characterization of Descriptions of Expressive Piano Performances

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## The *Con Espressione* Game

**Research Aims:** Find the dimensions of musical expression that can be attributed to a performance, as perceived and described in natural language by listeners

- Web based questionnaire: verbal descriptors of expressive performance.
- Different performances of 9 classical piano pieces (45 performances)
- Dataset enriched with score-to-performance alignments

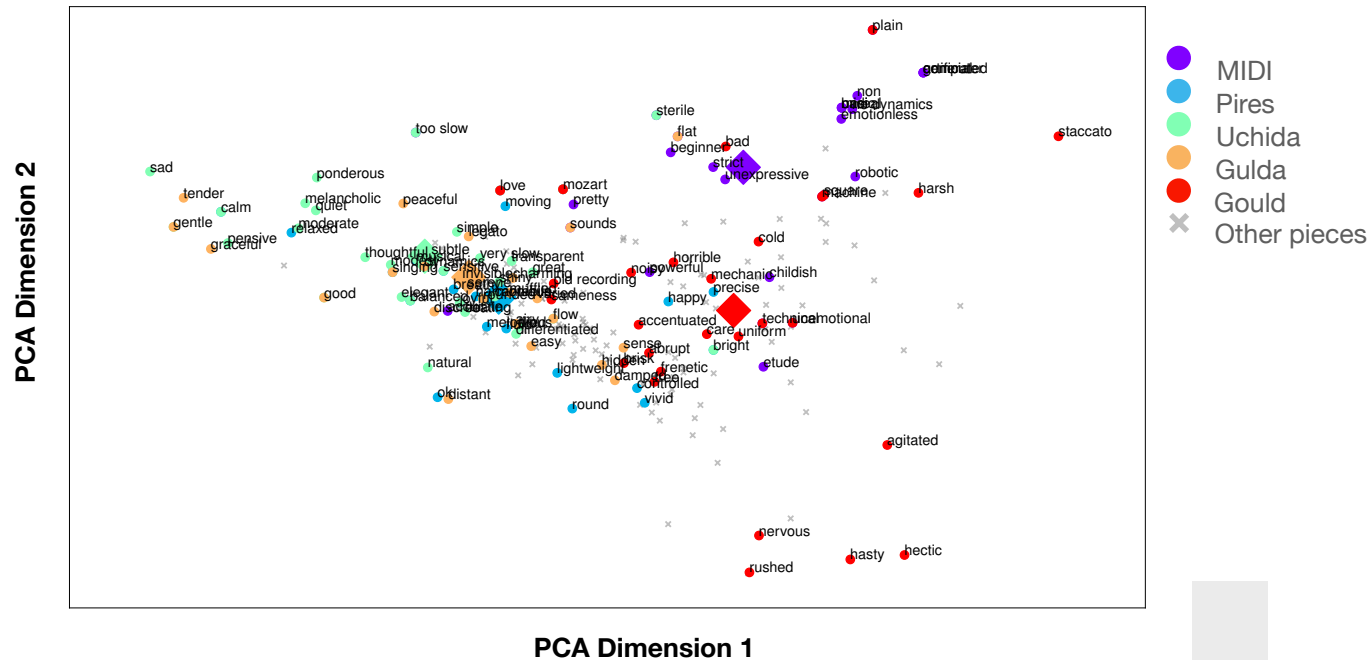
| Composer  | Piece   | # | Pianists   |
|-----------|---|---|--|
| Bach      | Prelude No.1 in C, BWV 846 (WTC I)            | 7 | Giesecking, Gould, Grimaud, Kempff, Richter, Stadtfeld, MIDI |
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| Schumann  | Kreisleriana Op.16; 3. Sehr aufgeregt (ex 2)  | 5 | Argerich, Brendel, Horowitz, Vogt, Vorraber                  |
| Liszt     | Bagatelle sans tonalité, S.216a               | 4 | Bavouzet, Brendel, Katsaris, Gardon                          |
| Brahms    | 4 Klavierstücke Op.119, 2. Intermezzo E minor | 5 | Angelich, Ax, Serkin, Kempff, Vogt                           |

## What are the main dimensions for expressive character?

Principal component analysis (PCA) on the occurrence matrix of the terms and find 4 principal dimensions

| Dimension 1          |      |                      |       | Dimension 2          |      |                      |       |
|----------------------|------|----------------------|-------|----------------------|------|----------------------|-------|
| positive correlation |      | negative correlation |       | positive correlation |      | negative correlation |       |
| hectic               | 0.17 | sad                  | -0.20 | rushed               | 0.22 | hard                 | -0.19 |
| staccato             | 0.15 | gentle               | -0.18 | nervous              | 0.20 | stumbling            | -0.18 |
| hasty                | 0.15 | tender               | -0.18 | too fast             | 0.17 | staccato             | -0.17 |
| agitated             | 0.14 | calm                 | -0.16 | bit                  | 0.16 | ponderous            | -0.14 |
| irregular            | 0.14 | graceful             | -0.16 | hasty                | 0.15 | monotonous           | -0.13 |

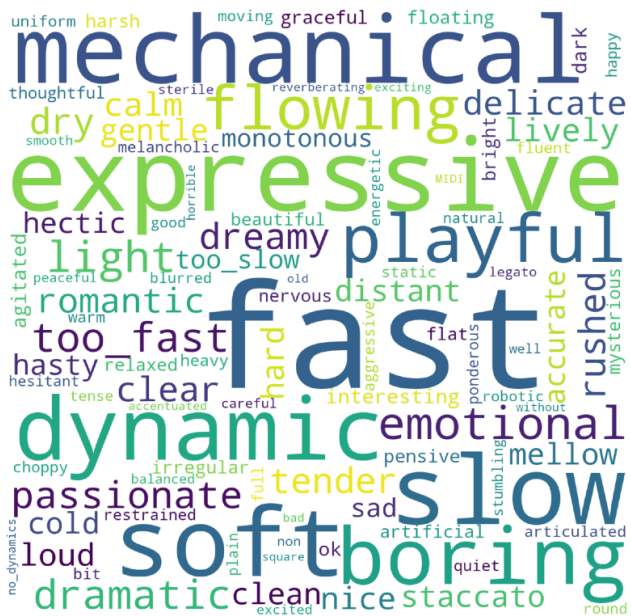
| Dimension 3          |      |                      |       | Dimension 4          |      |                      |       |
|----------------------|------|----------------------|-------|----------------------|------|----------------------|-------|
| positive correlation |      | negative correlation |       | positive correlation |      | negative correlation |       |
| monotonous           | 0.22 | heavy                | -0.14 | ok                   | 0.24 | cold                 | -0.15 |
| bad                  | 0.17 | graceful             | -0.13 | happy                | 0.21 | warm                 | -0.14 |
| warm                 | 0.16 | smooth               | -0.12 | joyful               | 0.19 | floating             | -0.14 |
| peaceful             | 0.16 | ponderous            | -0.12 | free                 | 0.15 | blurred              | -0.14 |
| beautiful            | 0.15 | soaring              | -0.10 | breathy              | 0.14 | mysterious           | -0.13 |



## How similarly do listeners describe the performance of a piece?

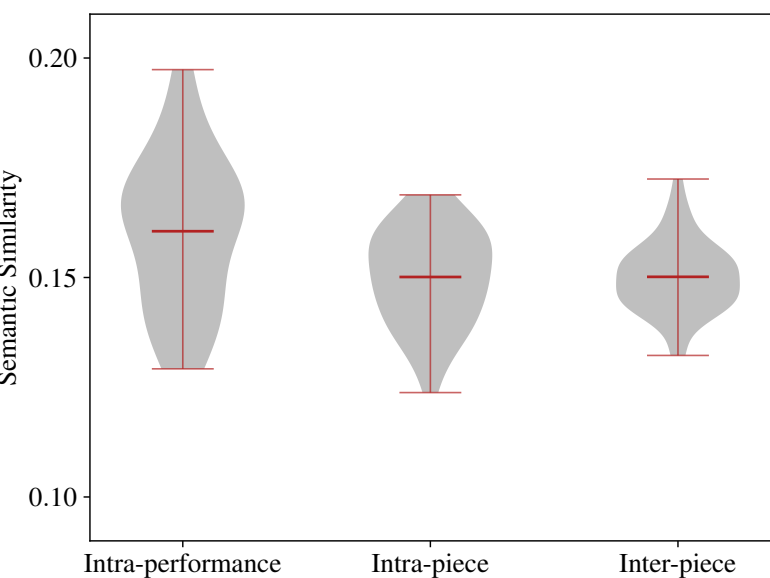
### Distribution of Terms

- 94 participants (on average listened to 4.5 out of 9 pieces)
- 88% had some musical training
- 1,515 individual descriptions, 3,166 terms (45% unique)



### Semantic Similarity

- Semantic similarity for short sentences by [Li et al., 2007]
- **Intra-performance:** same piece, same pianist
- **Intra-piece:** same piece, other pianists
- **inter-piece:** other pieces



## Pile Sorting Experiment

### Participants

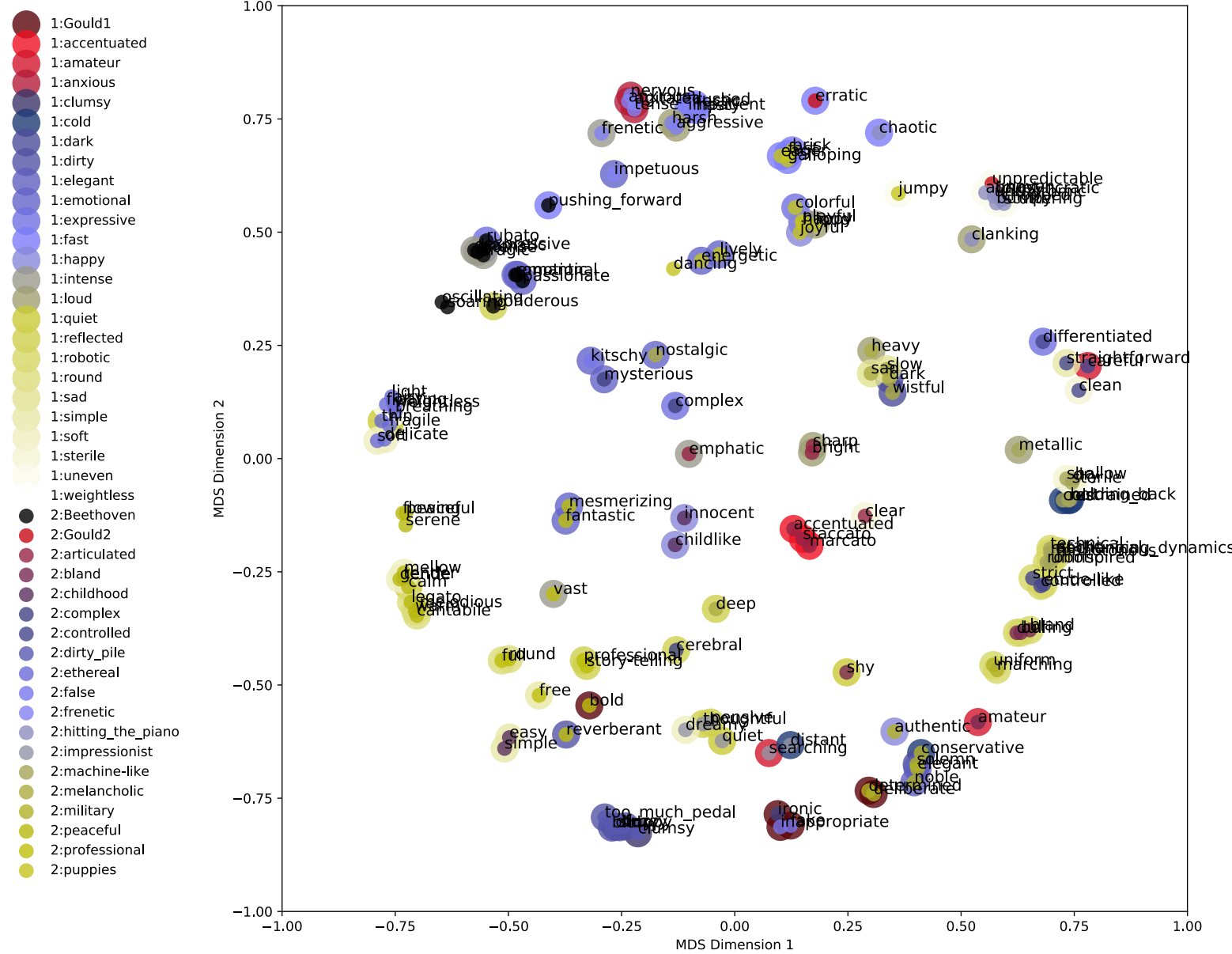
- Two groups of expert musicians (G1 and G2)
- Each group sorted (independently) 150 of the most frequently used terms that had been collected through the CEG.
- The number of piles as well as the types of similarity within the piles were left open.



Explore the interactive visualization!

### Results

- G1 (25 piles), G2 (19 piles)
- Average maximal overlap (Szymkiewicz-Simpson coefficient):
  - 62 % piles G1 with piles G2
  - 65% piles G2 with piles G1
- Multidimensional Scaling (MDS) to explore the structure of the terms



## Get the Dataset!



### Acknowledgements

This research has received support from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme under grant agreement No. 670035 (project "Con Espressione") and by the Research Council of Norway through its Centers of Excellence scheme, project number 262762 and the MIRAGE project, grant number 287152.

