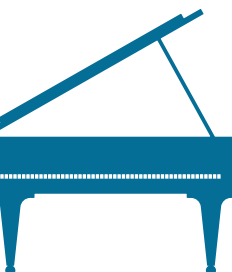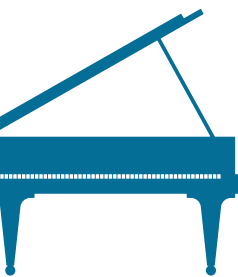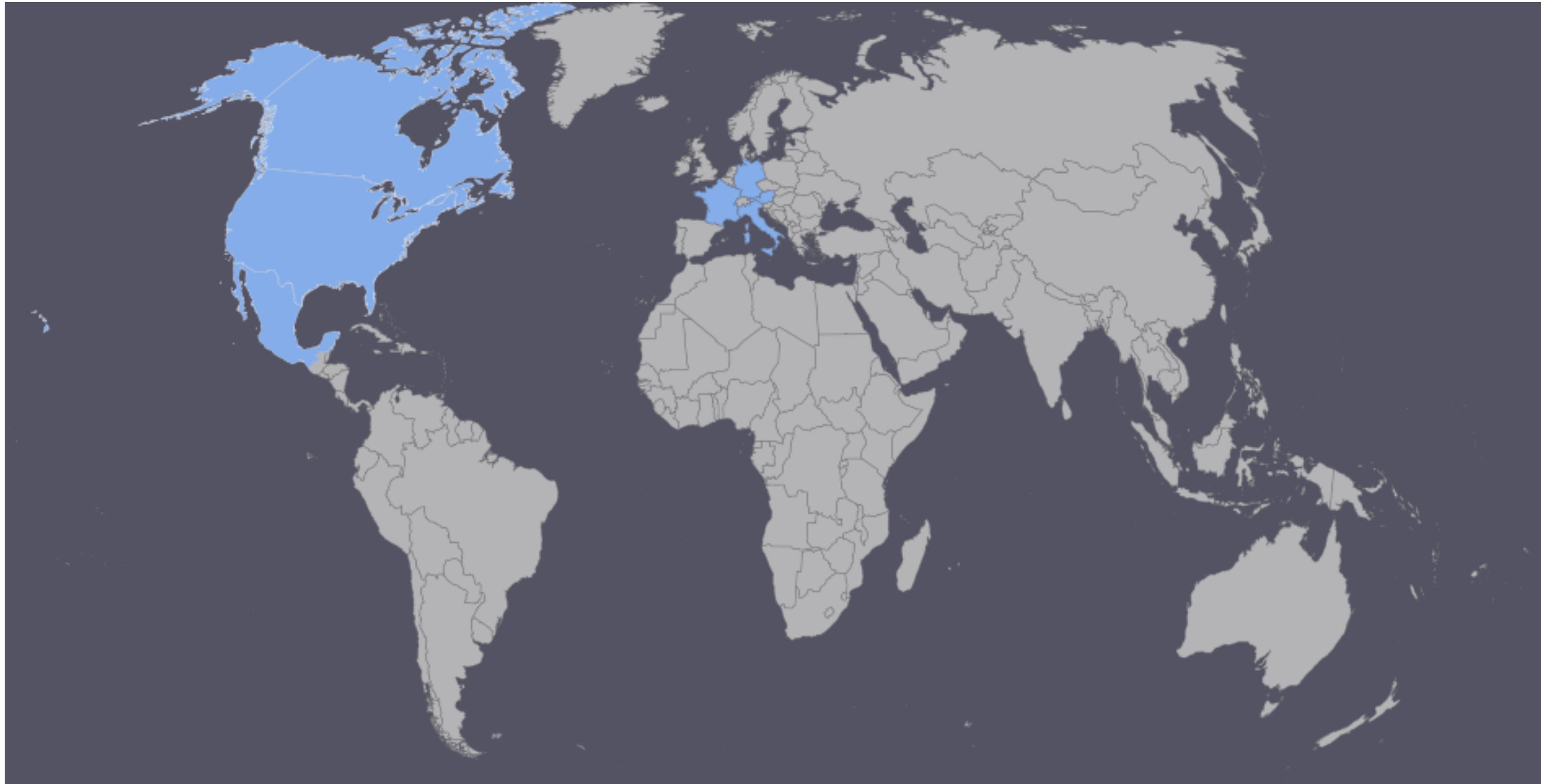# Pile Sorting Experiment

1. The terms are drawn randomly
2. For each term you have to decide whether it belongs to an existing pile (category) or create a new one (you have to discuss and get an agreement)
   - **Similarity**: put terms in the same pile if you think that they could be used to describe similar performances
   - Each term can be in **only one pile**
   - You can create as **many piles** as you want (but we would prefer as **few as possible!**)
3. You can **rearrange/split/merge** the piles as you wish at any time
4. At the end, you have to **name the pile** (either select the most representative term or give the pile a name)
5. There will be time to rearrange the piles at the end

Pile Sorters Assemble!

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	Gieseking, 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

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.

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

Explore the interactive visualization!

Get the Dataset!