This study aims to characterize representative performances by experienced pianists in order to determine main influential trends in performance, derived specifically from traditional piano practices referred to as National Piano Schools. The methodology of this exploratory study departs from a musicological empirical analysis in articulation with recent technological developments for metric methods. It allowed an analysis of gesture and musical semantics by applying a multimodal approach for capturing the pianist performance based on the extraction of features’ sets specifically targeted to each piano school. In this paper we describe the quantitative analysis approach based on motion capture.

Keywords: Music performance; European Piano Schools; Motion Capture; Multimodal analysis

Background
Previous research by Lourenço (2005, 2011, 2012) has shown strong musical correlation of particular characteristics, namely the aesthetic, the technical, the historic and the repertoire. Overall the main National Piano Schools consist of three essential branches: the Russian school; the French school; the German school. The identification of National Piano Schools provides a powerful framework of study and awareness of the main influential European music intangible heritage.

Aims
Therefore, the methodology departs from a musicological analysis in articulation with recent technological developments for metric methods that allow an analysis of gesture and musical semantics by applying a multimodal approach for capturing the pianist performance based on the extraction of features’ sets specifically targeted to each piano school and significant results from correlating the extensive multimodal datasets. With this data it is possible to analyze and process the acquired descriptors data mining computational models.
In this paper we describe the motion capture results of quantitative analysis of data of the chosen repertoire works by J. S. Bach Präludium C– Dur BWV 846 (1722) and F. Chopin, Nocturne Es Dur op. 9 no. 2 (1830–31). Other modes of data are there for further multimodal analysis.

Materials and methods
This technique combines acquisition of capture of movement and post-processing of data (it can appear as two-dimensional or three-dimensional objects) 9 pianists playing on a Disklavier Piano (Yamaha Grand Piano that provides logic data from finger stroke pressure) using MOCAP (Motion Capture). The figures extracted from MOCAP device show amplitudes (percentiles) for each pianist, on each piano piece performed, 4 piano mainstream repertoire works which have been chosen for the tests with the
9 pianists. After pre-processing of this data, we went on to a quantitative importing data to Matlab. The extraction of features continued, different percentiles calculated on the trajectories of different points of the body, on each axis allowing to compare pianists and reveal their national piano schools.

Conclusions

Further investigation with new data should thus be done. Nonetheless, the features that we extracted and analyzed seem to be relevant to compare pianists' way of playing, and maybe reveal different main national interpretation schools. More tests will be necessary in order to deep analysis and to confirm or infirm this tendency. As an ongoing project of the precise quantitative analysis of musical movements and especially of national piano schools, further studies would benefit from a multimodal approach.