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## PERCEPTUAL STUDY OF TOUCH ON A PLEYEL PIANO FROM THE COLLECTION OF THE PARIS MUSEUM OF MUSIC

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### Introduction

The Pleyel piano E.991.16.1 (Inv. No.) from the collection of the Paris Museum of Music was made in 1842 [Pleyel, 1842]. It is an archetype of the romantic piano built by the Pleyel firm in the nineteenth century. This instrument was acquired with all its original parts (keyboard, hammers, strings, soundboard, etc.). However, a facsimile of the hammers was produced in 2005, at the museum request, to make the piano usable for concerts and recordings [Stern, 2010]. The restoration work has raised some problems inherent to the patrimonial status of this instrument: conservation and preservation of authenticity, from both the making processes and sonic potential points of view, were considered very carefully. Later, the laboratory of the Museum undertook mechanical engineering studies on original and facsimile hammers. Wood density measurements showed some differences. It was then decided to choose more similar woods and plan another restoration work. A second facsimile was ordered in 2014 from the French piano maker Maurice Rousteau. To find out if this modification was relevant, a perceptual study was set up with fortepianists who were invited to express their feelings while playing this piano. So, our study was based on a multidisciplinary approach (mechanical engineering, sensory analysis, linguistics analysis and musicology) in order to improve the knowledge of the instrument, as well as practices and expectations of musicians.



*Figure 1: New hammers of the Pleyel piano E.991.16.1 from 1842 (collection of the Paris Museum of Music). Facsimile made in 2014 by the French piano maker Maurice Rousteau.*

### Methods

#### *Interviews management*

Nine pianists participated in the study. The interviews, which lasted about 1 hour 30 minutes each, took place in a well-lit room, usually used for rehearsals and tuning of the museum instruments. They were invited to come for two or three sessions (depending on their availability). The purpose of the study was explained to the musicians only at the end of the last session, so as not to influence their assessments. The tuning of the piano was checked before each session and some settings were made according to Claude Montal's recommendations book [Montal, 1865]. The musicians first played freely the instrument. Then, they had to talk about their own evaluation criteria for such a piano and provide the definition of each specific word they used to describe it [Navarret, 2013][Paté, 2014]. Next, they were asked to perform two works of the repertoire (one imposed, and the other at the choice of the pianist) and play the total chromatic scale with the eighty notes of the keyboard for subsequent studies that the laboratory could lead.



Figure 2: “Salle d’harmonisation”. Room of the Paris Museum of Music where the interviews of nine fortepianists took place in 2014.

### Verbal data analysis

The sessions were recorded to constitute a corpus of sound samples and to make the transcription of the interviews. The processing of verbal data analysis was based on a semantic analysis [Cheminée, 2009][Dubois, 2009] of several complementary corpus: evaluation criteria of musicians, vocabulary definitions, feelings expressed about the Pleyel piano from 1842, shared knowledge about Erard and Pleyel pianos (which were two famous firms in competition in the nineteenth century) and musical repertoires.

## Results

Four evaluation criteria were common to all pianists: sonic properties of each musical range, the key action mechanism, dynamics and pedal response. In addition, the romantic Pleyel piano was described as very different from the modern piano in terms of touch (because of the action mechanism), heterogeneity of ranges (they said that modern pianos were more homogeneous from low to high notes) and dynamics response (the threshold of “saturation” of a romantic piano was lower than that of a modern piano). Furthermore, some musicians and piano makers previously described the touch of this Pleyel piano as relatively heavy. So, the main purpose of the study was to verify this hypothesis. The study showed that musicians did not use the term “heavy touch”. However they were sensitive to various properties of the keyboard touch (or the key action mechanism). Thus comments on “the attention to pay to the articulation of the musical phrasing”, “latency between key release and fall of the hammer” or “the difficulties to control soft nuances” might be in relation to the sensation of heaviness. Of course, they said this piano was well suited to compositions by Frédéric Chopin (1810-1849), but more broadly, to works with high differentiated ranges.

## Discussion

A more thorough analysis of verbal data has to be done. For instance, we have to continue the semantic analysis of the pianist vocabulary and the comparison of discourses about facsimile hammers. However, first results showed musicians’ expectations and how they used to evaluate this type of piano. It gave an accurate description of the sound rendering of the Pleyel piano E.991.16.1 of the collection of the museum, and yielded an extensive corpus of verbal data and recordings for further studies.

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