

FEEDBACK ON FORCE, SOUND AND VIDEO SEQUENCE OF KEYSTROKE DURING PIANO PLAYING

Henriette Gaertner(1), Renzo Pozzo (2)

1. University of Music Trossingen, Germany
2. University of Medicine Udine, Italy

INTRODUCTION

An understanding of the force and impulse acting on the key by the finger associated to the sound generated is important because it makes the difference between interpretation and pure mechanical played notes.

Using pressure sensors applied on the key surface, it was possible to analysis the relationship between the force-time characteristics and the performance of pianists (Gaertner 2010, Kinoshita 2007).

The aim of this study is to demonstrate a new way to improve the didactics and methods of piano playing using biomechanical methods.

METHODS

A complete set of 2 octaves of pressure sensors (S2125, 20x45 mm², <1,2 mm, 10-600 KPa, Pliance-Novel) were developed. They can be attached to the most relevant keys and collected at 300 Hz. Video records are taken via normal CCD at different sample rates (50 to 300 Hz) Sound track are recorded via professional tools.

A dedicated software allows the calculation of efficiency index according to the force impulse up to the peak force and to the total impulse. This index reveals the capacity of the pianist to produce the desired loudness without exert unnecessary force (Gaertner 2013).

RESULTS

Three piano students with different level of expertise were involved in the experimental procedure. In the classical elements of piano playing (accords, octaves, etc.) subjects could hear the quality of sound and look to the corresponding force-time curves and to the video sequences. Then they were asked to improve the quality of sound at defined passages (key stroke combinations) and to verify the corresponding changes in the force-time curves.

In that case of no substantial changes, the same passages were played and recorded by a very high qualified pianist and compared with the profile reached by the student. Finally, the student had to become confident with the relationship between force-time curves and sound quality in the different situations.

In most cases, after the application of these feedback method, the students were able to directly improve their consciousness about the motor control mechanisms and the quality of sound.

In separate sessions values of the efficiency index and others parameter concerning the kinematics and kinetics of fingers and arm can be discussed with the subject.

REFERENCES

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 Kinoshita H. et al, J. Acoust. Soc. Am. 121, (5) May 2007

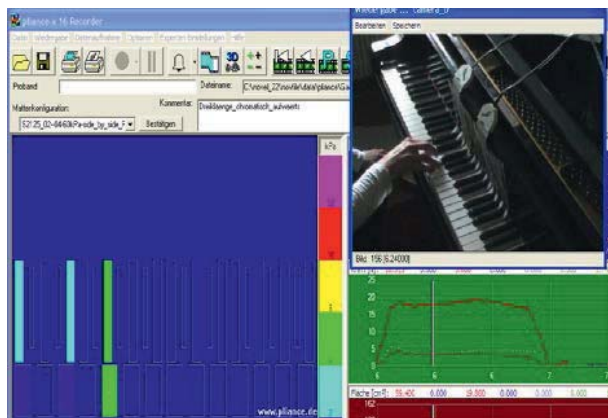


Figure 1: Example of feedback about key stroke force, sensor position and video shot sequences.