

The Premio Paganini project: a multimodal gesture-based approach for explaining emotional processes in music performance

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1 Introduction

This paper presents the first results from our recent project on the recording and analysis of multimodal data from musicians in an ecological environment (a concert auditorium). The analysis concerns the emotional behaviour of musicians during a music performance. Two ongoing experiments are presented, which are the result of a joint work carried out at in the framework of the EU-IST project HUMAINE (<http://emotion-research.net>). The first experiment aims at investigating which gestural, acoustic, and physiological cues characterize musicians' emotional processes in two different contexts: (i) when the musicians are induced by a psychologist into a specific emotional state (ii) when they are instructed to communicate the same emotional state to the audience. A form of autobiographical memory technique was chosen because its effects persist. It is known that speech deliberately manipulated to express emotion is not the same as speech naturally coloured by emotion. Our study is the first to consider whether the same applies in music. The second experiment focuses on the synchronization processes which are involved in the communication of the emotional content between musicians. Current work includes the study of synchronization problems, both intra- and inter-personal (both between musicians and between musicians and the audience). The paper focuses on the problems encountered, and on the design of the set-up needed to achieve multi-modal and continuous measurements of the musicians during their performance.

2 The Experimental Setup and Multimodal Archive

We designed and implemented an experimental setup in the auditorium of Casa Paganini (www.casapaganini.org), the new site of the InfoMus Lab in Genova, at the occasion of the Paganini International Violin Competition (see Fig.1). Our goal is to build a reliable archive of synchronized multimodal data useful for testing the emotional processes in musical performance. To achieve this, we needed to design an environment for the

acquisition of synchronized multimodal data from two violin performers. Toward this aim, we decide to use different types of video-cameras, microphones, and special physiological sensors (the BioMuse system designed by Ben Knapp). For the generation of the multimodal archive, we developed a distributed network of computers running the EyesWeb XMI open software platform, each dedicated to a subset of the recording streams. The result was a synchronized recording of all the streams of multimodal data. We obtained an archive of 1500 GB of multimodal high quality data which is the start for subsequent investigation.

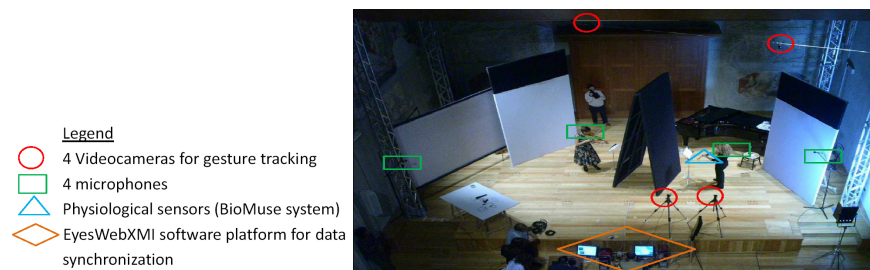


Fig. 1 Setup for the Premio Paganini project

3 Ratings studies with human participants

The part of the experiment involving the audience was a real concert, where a subset of the measurements were shown and explained to the audience in real time during the event. The violin player selected from the semifinalists from International Violin Competition Premio Paganini was asked to perform the selected Bach canon, four times, with the four different emotions: anger, sad, joy, and serenity (verbal instruction was used in this case). Among the audience, 31 spectators performed a rating test in which they were asked to rate the intensity of each emotion (on a scale from 0 to 10). Analysis shows that all the expressed emotions were recognized by the audience: all intended emotions received higher mean ratings. To complete the analysis with between-subject measurements, we computed the number of emotion classes successfully recognized by each spectator. We found that only 20% of the spectators succeeded in recognizing all the emotions, but that 90% recognized at least one emotion.

In sum, the results showed that several spectators recognized some emotional content but sometimes the emotion did not match the emotion intended by the performer. The musician, directed with verbal instructions, thus succeeded partially in conveying emotional content during her performance. These results should be confirmed and extended by subsequent analysis on the multimodal data coming from the larger multimodal archive.