

Becoming the Maestro - A Game to Enhance Curiosity for Classical Music

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Abstract—Classical music is associated with a set of social and cognitive barriers that prevent potentially interested novice classical music listeners from attending concerts. The possible strategies to overcome these barriers and make the genre appealing to new audiences are diverse. In this paper, we present *Becoming the Maestro*, a game where users impersonate the conductor of an orchestra during a concert in a way that allows them to better understand musical concepts of symphonic music. A user study of the game prototype with 20 subjects proved that the game succeeded in increasing curiosity for classical music.

I. INTRODUCTION

Classical music halls are mostly frequented by middle-aged highly educated attendees [1]. Orchestras look for various new ways to engage novice and young audiences and to overcome the cognitive and social obstacles these audiences are facing. We can see for example orchestras playing concerts with music from famous movies or initiatives such as The Classical Comeback [2], which proposes to create music video clips for classical music pieces in the style of modern genres. Observation of and interviews with first-time attendees demonstrate that classical music novices often feel a lack of sense of belonging [3], whereas novices point out the importance of having a certain level of knowledge before they can enjoy the music [3], [4]. User requirements studies for classical music applications have shown that creating a rich experience which also provides opportunities for learning can be a successful strategy to motivate users for classical concerts, and that active, physical engagement with the music increases enjoyment [5].

Becoming the Maestro, the game presented in this paper, aims at creating an appealing experience to classical music outsiders based on these two ideas. The game was designed based on the potential of games to motivate users by appealing on their need for competition and engagement in playful experiences ([6]). These motivational affordances are expected to support classical music novices who are not yet intrinsically motivated through engagement with the music alone. Provided that the role of the conductor is usually not well understood and that a better understanding of this role yields a better overall view of the piece, we chose to present the user with the challenge of impersonating the conductor of an orchestra during a concert.

In this paper, we explain the game mechanics and present the results of a user study with its first prototype, which is

designed to measure to what extent the game has the potential of increasing the level of engagement with classical music.

The rest of the paper is structured as follows: in Section II we review some related work; Section III describes the game itself; Section IV depicts an evaluation of the prototype we undertook with 20 participants; in Section V, we discuss the results and point some directions for future work.

II. RELATED WORK

Systems for virtual conducting first appear with Mathew's work, where he uses radio batons to control the beat of music with strokes of the right hand and the dynamics with the position of the left hand [7]. Studies in the field of New Interfaces for Musical Expression have refined Mathew's early work (see, for example [8], [9]). Building on the increased attention for games in research and industry, conducting systems have also started to create game-like experiences. *You're The Conductor* [10] is a well-known example targeted at children, that allows them to control tempo using a baton. The Wii Music [11] video-game also includes a mode which works the same way, using the Wii remote as a baton.

Children have been the target audience of many educational games released by orchestras such as the Dallas Symphony Orchestra (www.dsokids.com), the New York Philharmonic Orchestra (www.nyphilkids.org) or the San Francisco Symphony (www.sfskids.org) [12]. The latter includes a "Conduct" game which, again, follows the scheme from Mathew's work: using the right hand for tempo and the left hand for dynamics.

In general, games using the conductor metaphor have been mainly targeted at children and have used the same scheme for interaction. Inspiration from successful musical video-games such as *Guitar Hero* [13] can help to design more appealing games for broader audiences. Also, recent technological advances in music technology provide tools that make it easier to design game experiences from real symphonic music concert recordings. For example, automatic audio to score alignment technologies [14] give the chance to explore some information from the score (instrumentation, notes being played at each time), while audio source separation techniques allow to emphasize or mute different instrument sections in the orchestra [15]. *Becoming the Maestro* exploits both technologies.

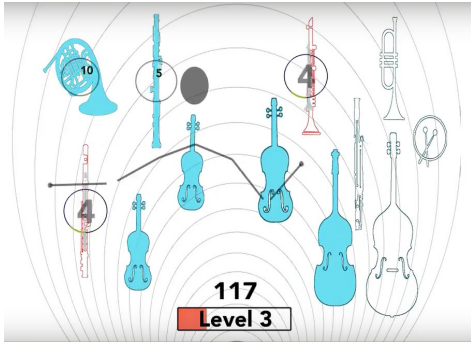


Fig. 1. *Becoming the Maestro*; first task screenshot.

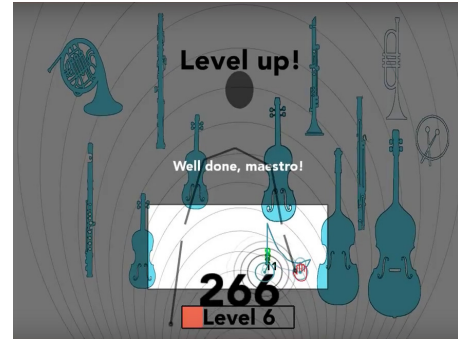


Fig. 2. *Becoming the Maestro*; second task screenshot.

III. GAME DESCRIPTION

In the game, the user employs her body position (mainly the position of her hands in space) to interact with presented challenges using a Microsoft Kinect as input device. A stick figure representing the user is displayed on the screen, mirrored to match the users' expectations. Its hands are used as cursors, and most interaction consists in placing the hands inside circles or moving them following a particular pattern.

Two different tasks are presented in the game: giving entrance to the different instrument sections in the orchestra and performing the appropriate conducting gestures with the right timing. They appear separately in the first levels and combined when the player progresses to higher levels. Points are awarded (or lost) according to the player performance. Score events and the total score are shown on the screen, giving a performance cue to the user. Textual messages are also temporally displayed in order to give the sense of how well the user is doing, from praising messages ("Maestro!") to complaints ("Can't hear the Oboe!").

A. First task: giving entrance to instrument sections

This task is inspired in the mechanics of games like Guitar Hero, in which the user has to perform guitar notes from a popular song, according to the visual annotations progressively appearing on the screen. The correct sound plays when the user plays the right notes in time; incorrect performance results in weird sounds and silences.

In *Becoming the Maestro*, the user has to indicate the entrance to the different instrument sections of the orchestra when needed (and displayed on the screen). The sections are represented by the instrument silhouettes spatially arranged as it would be in a real concert. Whenever a section has to be quiet, its image disappears. If the section is playing correctly, its shape is displayed *vibrating* in tempo in filled with a light color; if it should be playing but it is not, the shape is filled with a dark color and it *vibrates* very fast.

A circle is displayed over the instrument section whenever an action is required from the user. A number of beats (dependent of the difficulty level) before the instrument section is supposed to play, a countdown starts showing the remaining number of beats until the entrance (Figure 1). The user can

give entrance to the section by *touching* this circle. If she fails to do so in time, the separated audio of this section fails to play, resulting in an incomplete and awkward audio mix. The circle also will remain (this time pulsating) over the section until the user gives the entrance. The number of instrument sections that the user needs to give entrance to depends on the difficulty level. The best score (20 points) is achieved when the user is able to give the entrance to the section before it is supposed to play. Then, if the instrument should be playing but is not, the score is decreased by 1 point at each beat. 10 points are added to the score if the user finally manages to give the entrance to the section when it should already be playing.

B. Second task: performing beat pattern gesture

In order to communicate rhythm information, conductors employ a set of gestures that depend on the meter of the music. For example, a 3/4 gesture appears in the screenshot of this task shown in Figure 2. This task challenges the player to perform these gestures with the correct timing. The gesture is introduced as a virtual hand that follows a trace in the screen. A trace is also drawn by the hand of the user, allowing her to check if the gestures match. Each performed gesture is evaluated and rated using a machine learning approach described in [16]. This rating is used to calculate the issued points in the game, from -1 (bad gesture) to 20 (perfect gesture match). The annotated tempo in the piece, for which we use the help of score alignment techniques, is used to compute the actual timing of every gesture, as it changes over time.

IV. EVALUATION

A. Study design

The main research question reflects the main hypothesis of *Becoming the Maestro*: to what extent does the game have the potential of increasing engagement with classical music?

Participants were recruited via convenience sampling through department members and their students. Participants subsequently signed an informed consent form, filled out a brief pre-questionnaire, played a game prototype with the 1st movement of Beethoven's 3rd symphony for nine minutes, and filled out the post-questionnaire. The 30-minute session was concluded with a brief interview.

In the pre-questionnaire, participants were asked about their attitude towards classical music, their concert attendance, and their intention to attend classical concerts in the next three months. In the post-questionnaire, ease of use, hedonic stimulation, fun-of-use, engagement with the game, and estimated impact on attitudes and concert attendance were measured. The pre-questionnaire contained in total 12 questions and the post-questionnaire 26 questions. In the post-interview, questions were asked about aspects that appealed and did not appeal to the participants, suggestions for improvement, and the impact on the attitude towards classical music.

B. Results

Twenty participants participated in the test, of which five were female. Ages were distributed as (21-25) 2, 26-30 (4), 31-35 (10), 36-40 (1) and > 40 (3). Classical concert attendance and musical training were measured with two seven-point ordinal scales based on [17]. Participants visited close to 2 concerts a year, while they received two years of musical training on average. Thus, users were relatively infrequent visitors of classical concerts, and had moderate levels of musical training.

Attitudes towards classical music were measured with seven seven-point bipolar semantic differentials, and two seven-point Likert scale items pointing to the mood regulation potential of classical music (e.g. "Classical music helps me to come in the right mood"). Higher values represent more positive attitudes. Results are shown in Table I.

TABLE I
ATTITUDE TOWARDS CLASSICAL MUSIC. SEVEN-POINT SEMANTIC DIFFERENTIALS AND LIKERT SCALE ITEMS.

	Mean	S.d.
Semantic differentials		
Beautiful - Awful	1.9	.9
Stimulating - Boring	2.6	1.2
Tiresome - Relaxing	5.6	1.2
Hard to understand - Easy to understand	3.9	1.3
Easy to enjoy - Hard to enjoy	2.8	1.2
Easy to learn - Hard to learn	5.1	1.4
Something to enjoy with others - To enjoy alone	4.8	1.2
Likert items		
Classical m. helps me to escape from my daily worries	4.2	1.5
Classical m. helps me to come in the right mood	4.8	1.1

In general, participants had a relatively positive attitude towards classical music. The low values for learnability suggest that novices could benefit from cognitive support to learn to enjoy classical music. Important to note is the potential of classical music for mood regulation, as evidenced from the results on the items about escapism, coming in the right mood, and the tiresome-relaxing continuum.

The participants' concert attendance and their attitudes towards classical music suggest that the participants like the sound of classical music, but do not attend classical concerts often. This is the target population of the game: those that might ultimately be convinced to attend concerts once the experienced (cognitive or social) barriers have been lowered.

Hedonic quality, fun of use, and effort expectancy: Reliability analyses were conducted on the scales that were administered. The Cronbachs alpha levels represent the internal consistency of the scales that were used. The alpha levels for hedonic quality (stimulation), fun of use, and effort expectancy demonstrated good internal consistency (alpha > .85). Hedonic quality was measured using the hedonic quality (stimulation) sub scale from the AttrakDiff2 questionnaire, consisting of seven seven-point semantic differentials. Values could range from 1 to 7.

Fun of use and effort expectancy were measured using the respective sub scales from the UTAUT technology acceptance framework [18] with four and three five-point Likert scale items respectively. Values could range from 1 to 5.

The hedonic quality - stimulation (m=4.3; s.d.=.6) and fun-of-use ratings (m=4.2; s.d.=.7) indicate that the game was both moderately stimulating and fun to play. Fun-of-use was further investigated beyond these high-level indicators by inspecting the mean values for three five-point scale Likert items intended to measure the engagement with the game. The results are shown in Table II.

TABLE II
FUN-OF-USE MEASUREMENT.

	Mean	S.d
I would like to continue playing <i>Becoming the Maestro</i> at home.	3.7	1.2
I expect that <i>Becoming the Maestro</i> gets boring after a while.	3.0	1.0
<i>Becoming the Maestro</i> motivates me to achieve the highest possible score	4.0	1.1

As can be seen from the table, participants in general would like to continue playing the game at home. Additionally, the results suggest that the game has succeeded in appealing to the user's motivation to engage in competition.

Even though participants are outsiders, the effort expectancy levels are still close to the scale average of 3 (m=3.4; s.d.=.9). Further inspection of the underlying items data reveals that the items on learnability (m=3.5, s.d.=1.0), ease of use (m=3.5, s.d.=1.1), and the interaction design (m=3.4, s.d.=1.2) yielded positive values around 3.5, while the item 'It is easy for me to become skillful at playing *Becoming the Maestro*' yielded an average of 3.2 (s.d.=1.2). When we relate this result to the high fun-of-use measures, we can conclude that the user tasks were difficult enough to keep users engaged, but not so difficult that it compromised fun-of-use.

During the interview, participants usually raised the educational aspect of the game as its most interesting aspect. They appreciated how they could realize the effect of giving the entrance to a section in the resulting audio, thus helping them to be more conscious about what different sections in the orchestra are playing (e.g. "I didn't think not hearing the winds would be so weird"). More related to the second task, participants also liked the way in which the game taught them how to perform the conducting gesture (e.g. "It was a bit difficult but it felt very natural once I got it to keep doing

the gesture”). That part was specially challenging for some participants, who often commented how the fast tempo of the song made it more difficult.

Engagement with classical music was expected to impact the perception of the Becoming the Maestro game. However, no significant Pearson correlations were found between on the one hand fun of use, hedonic stimulation, effort expectancy, and on the other hand musical training and classical concert attendance ($p > .06$).

Estimated motivational impact on attitude and concert attendance: Participants were asked to report on the effects of playing the Becoming the Maestro game, in terms of their attitude towards classical music, and their intention to attend a concert. Three five-point scale Likert items were used for this purpose, ranging from ‘Completely disagree’ (1) to ‘Completely agree’ (5). The results are shown in Table III.

TABLE III
ESTIMATED MOTIVATIONAL IMPACT ON ATTITUDE AND CONCERT ATTENDANCE.

	Mean	S.d.
<i>Becoming the Maestro</i> makes me curious about the piece (Beethovens 3rd symphony)	3.6	.9
<i>Becoming the Maestro</i> makes me more enthusiastic about classical music in general.	3.8	1.0
<i>Becoming the Maestro</i> motivates me to attend a classical concert within the next three months.	3.1	1.0

The averages above the neutral point in the scale point to the potential for music manipulation games to increase engagement with classical music. The game increases curiosity, and enthusiasm for classical music in general. In contrast, participants responded neutrally on the impact of the game on the intention to attend a classical concert.

The current data did not reveal significant correlations between the three items on the participants estimated motivational impact and game performance (e.g. final score, the level achieved, and the required time to proceed from level 1 to 2, level 2 to 3, until level 5 to 6; $p > .08$), suggesting that further investigations into the contribution of individual game mechanics to user motivation for classical music and classical concerts are necessary.

V. DISCUSSION AND FUTURE WORK

The evaluation shows the potential of the game to engage classical music outsiders, as it succeeded in offering an engaging experience while increasing their curiosity for classical music. Although it did not have an immediate impact on their intention to attend a concert in the near future, the fact that it seems interesting for classical music outsiders, particularly in its educational aspect, shows that it could have an impact on classical music consumption in the long run, in the same way Guitar Hero increased the sales of records by older artists appearing in the game [19]. There are plans to make the game available in a museum as a permanent installation in the near future, which should allow us to better evaluate the impact of the game. Also, the game will incorporate other tasks where the player is allowed to take control over the music

dynamics, rhythm and articulation using machine learning methods recently developed by the authors [20].

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