

ANIMATED NOTATION IN MULTIPLE PARTS FOR CROWD OF NON-PROFESSIONAL PERFORMERS

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ABSTRACT

The Max Maestro – an animated music notation system – was developed so as to enable the exploration of artistic possibilities for composition and performance practices within the field of contemporary art music, more specifically, to enable a large crowd of non-professional performers regardless of their musical background to perform fixed music compositions written in multiple individual parts. Furthermore, the Max Maestro was developed in order to facilitate concert hall performances where non-professional performers could be synchronised with an electronic music part. This paper presents the background, the content and the artistic ideas behind the Max Maestro system and gives two examples of live concert hall performances at which the Max Maestro was used. An artistic research approach with an auto ethnographic method was adopted for the study. This paper contributes new knowledge to the field of animated music notation.

Author Keywords

Animated notation, Non-professional Performers, Audience participation

CCS Concepts

• **Applied computing** → *Sound and Music Computing*; • **Human Centred Computing** → *Information Visualization*;

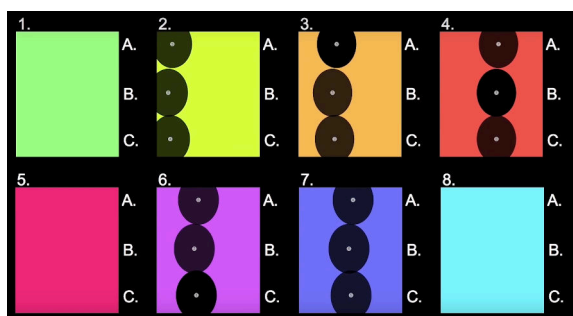


Figure 1. Screenshot of the Max Maestro – Animated notation

1. INTRODUCTION

The Max Maestro is an animated music notation system, which I have developed to enable the exploration of artistic possibilities for compositions with crowds of non-professional performers. By using simple animated graphics presented on a screen, it can give musical instructions and conduct a performance of a fixed composition in multiple parts. Indeed, animated music notation has, due to the development of technology, become an expanding field among composers and researchers, with the aim of developing new artistic expressions. However, the systems are often designed for professional musicians in small constellations

and ensembles dedicated to performing contemporary art music. Indeed, there are examples where animated notation have been addressed to non-professional performers both in artistic and educational environments. Still, to my knowledge the Max Maestro is unique in addressing a crowd of non-professional performers and yet provides a diverse musical material after limited rehearsals. Furthermore, the system is developed to conduct a fixed composition in multiple parts in sync with an additional electronic music part. Two concert hall performances of my compositions with different settings, which both included the Max Maestro are highlighted in this paper: (1.) Voices of Umeå III: Everybody Scream!!! – Music for electronics and a large crowd of non-professional performers using their voices. (2.) Put Your Hands Together – Music for handclapping audience and electronics. An auto ethnographic method was used for the study. Audio recordings of the performances and my experiences of participating as a composer in the performances were used as the main empirical data. This paper presents the background, content and the artistic visions of the Max Maestro and reports from the two performances at which the Max Maestro was used. The results contribute new knowledge to the field of contemporary art music, more specifically, the field of animated music notation.

2. ANIMATED NOTATION

The development of technology has led us to the possibility of having moving graphic scores, so-called animated notation for composers to engage in new paradigms of music creation [24]. For instance, this opens up opportunities for synchronizing non-pitched abstract sounds between musicians in an ensemble by using moving graphics presented on a screen. Furthermore, animated notation could facilitate performances of a fixed composition, but still communicate musical ideas not routed within the tradition of the western music notation system. In recent years, animated notation has become an emerging field for dedicated composers and researchers, with the aim of developing new composing and performance practices for contemporary art music. In the web forum *animatednotation.com* [20], created by composer/researcher Ryan Ross Smith, an attempt has been made to gather information about this field. The Australian-based composers/researchers Cat Hope and Lindsay Vickery together with the Decibel new music ensemble have developed the Decibel Score Player [8] software that enables synchronised scrolling graphic scores and parts on multiple computer tablets. Located in Reykjavik, Iceland, the composer collective S.L.A.T.U.R have since 2005 been working on various kinds of musical experiments, including animated notation using computer graphics. Shane McKenna discusses in a paper for ISEA2011 his use of animated graphic notation to encourage collaborative music-making for a wide range of performers with different musical backgrounds [14]. McKenna has also developed *Dabbledoomusic* [15], a musical education application for primary schools. I have developed the Max



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Maestro with an aim of exploring new artistic possibilities for me as a composer, more specifically, having crowds of non-professional performers create musical textures found in contemporary art music as: various densities of polyrhythmic/polytempic textures and approximate pitch cluster textures. Ryan Ross Smith highlights in his PhD thesis the ability of animated notation to “...represent complex, persistent (non)structures and layered, malleable tempi”. Smith also points out the democratization aspect of a music performance, which occurs when an animated score is accessible to performers of any ability [19]. His examples of compositions such as Study no. 30 and Study no. 40 show how non-professional performers could perform intricate polyrhythmic and polytempic textures, when conducted by animated notation. Most of the systems made by various composers and researchers collected on the animatednotation.com site by Ryan Ross Smith are, however, mainly developed for professional musicians dedicated to performing contemporary experimental music. Most of them were also created for solo performers or small ensemble settings.

3. RESEARCH SETTING

The research reported in this paper draws on insights mainly generated through a broader artistic research project entitled Voices of Umeå [11], which took place between 2012 and 2015. The project was geared towards exploring different methods for how non-professional performers regardless of musical background could participate in performances of contemporary art music. The artistic outputs and publications created within the Voices of Umeå project included performances of large-scale music compositions and the development of novel technology innovations [e.g. 12; 21]. The Max Maestro was one of these novel technology innovations, and Voices of Umeå III: Everybody Scream!!! was the grand finale composition within the project. The other composition, which is also discussed in this paper, was performed as part of another research study, which emerged as a result of the findings from the Voices of Umeå project. The aim of that study was to develop the Max Maestro as an animated music notation system. The research approach applied can be broadly characterized as artistic [e.g. 2; 6], since the aim has been to contribute new knowledge to the field of artistic practice by looking at the artistic results of two concert hall music performances. More specifically, the research method is auto-ethnographic, since I play a double role, both as a composer participating in the concerts and as a researcher looking at the concerts as data. The two specific performances were chosen as data as they both featured the Max Maestro and non-professional performers but had different points of departure in terms of the sound sources used. Audio recordings made of the concerts were examined as the primary data for the study. Furthermore, my experiences of participating as a composer in the performances were taken into consideration as complementary data. The artistic output of the two performances was the main focus in the study of the empirical data. The examination was conducted through the lens of myself, allowing my background, knowledge and experience as a composer to affect the results.

4. THE MAX MAESTRO

4.1 Artistic Ideas

The artistic ideas for the Max Maestro were a reflection of my own artistic ideas, experience and knowledge as a composer, and more specifically, the idea of creating musical textures in various densities in multiple parts, by organising individual simple-to-

perform sounds made by non-professional performers: what do hundreds of children humming “mmm” in their lowest possible pitch sound like? Or: how does a crowd of non-professional performers screaming together with an electronic music part sound? And so on. These artistic ideas of using large textures in multiple parts as musical material could be linked to the work of composers such as Györgi Ligeti, Iannis Xenakis and Krystoff Penderecki. Ligeti coined the term micropolyphony. Xenakis talked about his sound-clouds, while Penderecki was working with tone-clusters. These approaches invented in the 1960s, which are now common in contemporary art music, were the main artistic ideas for me to explore with the Max Maestro. Furthermore, animated notation was for my artistic visions thought to be the right approach, since it could both show performance instructions for large crowds of non-professional performers and conduct a fixed composition in sync with an additional electronic music part. The specific artistic ideas related to the development of the Max Maestro were divided into three sections:

4.1.1 Performers: large crowd of non-professional performers

Within the field of contemporary art music, the compositions are predominantly created for specialist highly-skilled and classically trained professional musicians. They are often very difficult to play and place great demands on the technical skills of the performers. Of course, there are several advantages of having highly-skilled musicians for the performance of a new composition, but there could also be situations where the artistic musical idea might even benefit from having performers from other backgrounds. For instance; a crowd of non-professional performers would probably better suit performing textures of screaming voices than a professional choir, since the choir would probably not risk their voices in the same intuitive manner. Multiple layers of individual “simple-to-perform” sounds with an attended raw and naïve expression would probably result in an interesting artistic output if performed by non-professional performers. However, at least twenty individual non-professional performers – and preferably hundreds of them – were sought as needed to accomplish an interesting artistic output, mainly because one of the overall artistic ideas included creating large musical textures divided into multiple parts. Having non-professional performers to enhance an artistic expression was seen as a novel idea within the field of contemporary art music, at least when it comes to performing musical textures in multiple parts including large groups/crowds of performers. Indeed, examples which could be linked to the approach are Moths by Hasse [7], in which an audience whistles as directed by a conductor and a graphical score, and La symphonie du millenaire by Chénard [3] in which the audience members ring handheld bells at designated times. The S.L.A.T.U.R collective member Áki Ásgeirssonæ’s composition 268° for a large crowd of nine-year-olds is another example with a similar approach [1]. Jason Freeman is a researcher who has worked a lot with audience participation, both with the role of influencing a musical performance [23] and as actual performers [10]. Still, I would argue that the Max Maestro is unique, since it was developed to conduct a fixed composition to be performed by novices divided into multiple parts and yet to provide a diverse musical material after limited rehearsals.

4.1.2 Sound sources: Easy-to-use instruments (human voice, single percussive sounds)

The idea was to use “simple-to-perform” instruments as musical sound sources in compositions involving the Max Maestro, mainly to enable anyone regardless of their musical background to participate in the performances. However, it was also seen as artistically interesting and challenging to work with “simple-to-perform” sounds so as to create interesting musical structures. For instance – How to create varied and interesting musical textures with only the sound of handclaps? The limitations of the sounds were deemed likely to inspire and facilitate their innovative use and result in interesting artistic expressions. The two different sound sources for the compositions featured in this paper included: The human voice in *Voices of Umeå III: Everybody Scream!!!* and handclaps in *Put your hands together*.

4.1.3 Musical Material: Polytempic/ polyrhythmic textures, Static and moving approximate pitch cluster textures, Noise textures, Rhythmic accents

Polytempo is a term used to describe music in which two or more different tempos occur simultaneously [4]. The idea is to apply the parameter of tempo in similar ways, applying the compositional techniques of polyphony when creating polytempic music [9]. Classic examples of the implementation of polytempic structures in musical compositions can be found in *Gruppen*, by Karl-Heinz Stockhausen and *Rituel in memoriam Bruno Maderna*, by Pierre Boulez. Other examples include composers such as Conlon Nancarrow, Henry Brant and John MacCallum. Static and moving approximate pitch cluster textures refers to textures when a thick stack of several continuous pitches (close to each other) are played simultaneously. The term was originally invented by American composer Henry Cowell and can now be seen as very common in contemporary art music. Noise textures refer to the technique of making noise sounds with traditional instruments or the human voice, which are also very common in contemporary art music, since introduced by classical composers such as Helmut Lachenmann, John Cage, r. Murray Schafer and Luciano Berio. Making rhythmic accents in this case means to accentuate the musical material of an electronic music part.

4.2 Graphic Interface

The Max Maestro animated music notation system was created in the visual programming environment Max/MSP/Jitter [13]. It is an application with a graphic interface, which could be run as a patch within the Max/MSP/Jitter program, but also as a stand-alone application. The graphic interface of the Max Maestro resembles the graphic design of a videogame. Graphic balls are animated to give musical instructions to the performers. Musical instructions include when to trigger a sound and at which dynamics, pitch and duration. The instructions given when to trigger a sound are very accurate, while the instructions for dynamics, pitch and duration are approximate within a limited frame. The graphic interface was more inspired by intuitive music video games such as *Sing star* [17] or *Guitar hero* [5] than traditional or extended/experimental music notation systems; mainly because of the fact that the target group of non-professional performers, which may include schoolchildren and a cross-section of the population, are generally more familiar with videogames than musical notated scores and as Rui Rolo puts it: [... *fun games increase learners' motivation and foster collaboration, crucial issues in*

music practice.] [16]. The Max Maestro has two different versions of graphic interfaces, one for the human voice and one for single percussive instruments. The differences between the two relate to the number of individual parts and more extended modulation instructions in the version for the human voice, since the sound source used is capable of adjusting pitch and duration. The behaviour of the Max Maestro is controlled with a midi controller device, which means you can run the Max Maestro live in real time in order to test musical ideas with a group of performers. However, for the two compositions reported in this paper the midi was first recorded into a music sequencer program and then played back into the Max Maestro to finally be recorded into a single video file using Quicktime and a screen video capture function. The additional music part was embedded in the single video file containing the animated music notation of the Max Maestro.

4.2.1 The Max Maestro for human voice

The fundamental atomic components of an animated score according to the terminology of Ryan Ross Smith often consist of a static atomic symbol as a node or attack line and a dynamic atomic symbol, which will move against the static node [18]. In the Max Maestro, the static atomic symbol for each part is a coloured rectangle (1) and the dynamic atomic symbol for each part is a simple animated ball (2), which moves from left to right within the rectangle. The moment the ball reaches the right wall of the rectangle is the point of contact (3), which instructs the performer to trigger a sound. The fundamental sound to be triggered is instructed by the text (4) and symbol (5) on the right-hand side of the rectangle. The text instructions include sounds on consonants, vowels and short percussive sounds as tongue clicks and different letter combinations as *Ta'*, *Da'*, *Ke'* and so on. A symbol under the text indicates the duration of the sound to be triggered: a dot means a short percussive sound and a line indicates a long sustained sound. When a dot is present the ball disappears immediately after the point of contact with the right-hand wall, and when a line is present the ball is glued to the wall, which indicates the duration of the sound to be sustained until the ball finally disappears. The dynamics of the sound to be produced is determined by the size of the ball: a tiny ball calls for soft dynamics and a large ball calls for loud dynamics. The instructions for pitch are approximate and in relation to the voice register of the individual performer. The vertical placement of the ball on the wall determines which approximate pitch to use for each triggered sound, where up means high pitches and down means low pitches. Eight parts with individual performance instructions are available in the Max Maestro version for the human voice, where each part is given a numbered coloured rectangle (6).

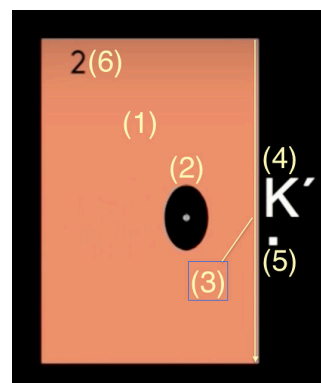


Figure 2. Close-up of one individual part of the Max Maestro for human voice

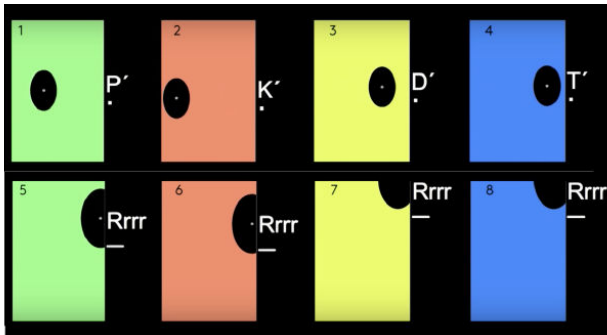


Figure 3. Screenshot of the Max Maestro for human voice in eight individual parts.

4.2.2 The Max Maestro for single percussive sounds

The fundamental behaviours of the second version of the graphic interface meant for single percussive sounds are practically the same as in the version for the human voice. The differences relate to the number of individual parts and the available modulation instructions for the two versions. In this version, the approximate pitch and duration control of the sounds are not included, but as a consequence the available space of the graphic interface enables more individual parts. The parts are divided between the numbers from one to eight and then further divided within the eight coloured rectangles into *a*, *b* and *c*, making a total of twenty-four individual parts. The performer/s within a part only triggers their percussive sound when a ball reaches the right-hand wall in parallel to their defined letter in their defined numbered coloured rectangle. As in the version described previously the dynamic of each percussive stroke is determined by the size of the ball.

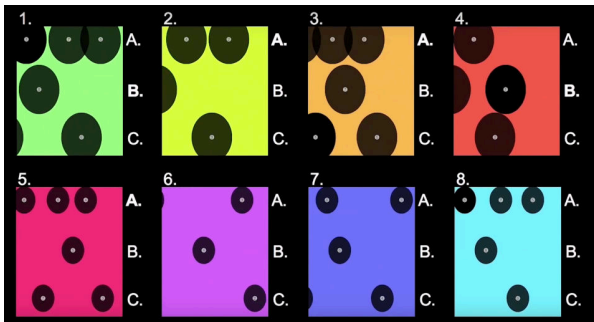


Figure 4. Screenshot of the Max Maestro for percussive sounds in twenty-four individual parts.

5. EXAMPLES FROM TWO CONCERT HALL PERFORMANCES

5.1 Voices of Umeå III: Everybody Scream!!!

5.1.1 Artistic Intentions

In *Voices of Umeå III: Everybody Scream!!!* the idea was to compose musical textures as described in an earlier section, consisting of layers of individual “simple-to-perform” sounds performed by a crowd of non-professional performers. The individual sounds were supposed to have a raw and naïve

expression. Primarily, extended techniques for the human voice were used for the composition rather than something we could call normal singing. For example, the crowd were instructed to: – sing approximate pitches, – speak in various amplitudes (including whispering), – make noise sounds (hiss on “s”, “sch” “f”), – use of isolated syllables/phonemes, – scream, make vocal glissandi and so on. An attempt was made to use the human voice as a musical instrument making isolated sounds rather than communicating a text with a melody of different pitches. Electronically pre-processed sounds of voices were mixed with the crowd in the live performance. The artistic idea was to combine these two opposite musical elements: – the human voices as the natural acoustic sound source and – the electronic voices as the processed electronic sound source into a new musical body. The composition had a total duration of forty-five minutes and was organised in eight movements, where four of them were conducted by the animated notation of the Max Maestro. The premiere of *Everybody Scream!!!* was performed by a crowd of approximately two hundred residents of Umeå, mainly children/ young people between the ages of eleven and fourteen. The crowd was divided into eight parts, which were given individual performance instructions from the animated notation. Two rehearsal sessions with a total length of approximately three hours had been held with the crowd, which during rehearsal was divided into separate groups. The whole crowd was first gathered together for the grand rehearsal only two hours before the premiere performance. The visual output of the Max Maestro was projected onto the upper left- and right-hand sides of the balcony of the stage in the concert hall. One output was also shown on a computer screen not visible to the audience.

5.1.2 Reflections

The audio recording of the concert hall performance showed that the crowd conducted by the Max Maestro was able to perform polytempic textures in various densities, static and moving approximate pitch cluster textures, noise textures and rhythmical accents. As a composer, I would like to highlight the polytempic textures in various densities and dynamics in movement four, where the crowd made sounds on isolated syllables and consonants. Another section of special interest to me was found in movement one, which ends with a dynamic climax and a canon where the crowd performs glissandi figures from low pitch to high pitch in sync with the electronic music part. Furthermore, movement six contained static and moving approximate pitch cluster textures with the performers humming on “mmm”, which I found interesting as musical textures. However, one reflection was that in rehearsal the performers had an instinct to connect the instructions of pitch to dynamics, conducted by the Max Maestro. If the pitch was conducted to be a glissando from low pitch to high pitch, the natural instinct was also to follow with performing from low to high amplitude even if the dynamics were conducted to be the same during the same particular glissando figure (the size of the ball was the same). Although after making the performers aware of this natural instinct during the rehearsal and being able to rehearse these figures, the sounding result became better. Another reflection I made during the rehearsal and the concert hall performance was that the crowd was really focused and had no issue with creating expressive sounds using their voices. A thing that I learned during the *Voices of Umeå* project was that people could really feel inhibited by using their voices to the extreme, but the animated notation of the Max Maestro seemed to overcome this barrier. Furthermore, the huge number of performers within the crowd both added effect to some material such as the static and moving pitch cluster textures and the high density polyrhythmic

textures, while other material as the rhythmic accents were harder to get distinct and precise. Especially rhythmical material to be executed in sync with the electronic music part was shown to be difficult to perform as intended. However, considering the forty-five-minute duration of the performance, a very short rehearsal time was needed for the non-professionals to perform their musical material when conducted by the Max Maestro.



Figure 5. Concert Hall Performance of Voices of Umeå III: Everybody Scream!!!

5.2 Put Your Hands Together

5.2.1 Artistic Intentions

In Put your hands together the ambition was to explore the artistic possibilities of using the sounds of handclaps as the only sound source for the composition. The electronic music part consisted of recorded and electronically pre-processed sounds of various handclaps, which was presented in two channels to be mixed with the live sounds of the handclaps from the concert hall audience. Furthermore, the concert hall audience was divided into twenty-four individual parts so as to facilitate various densities of polyrhythmic and polytempic textures conducted by the Max Maestro. Spatialisation of sound was also a parameter for the composition, having the sounds of handclaps from the twenty-four parts of the audience moving in the physical space of the concert hall. The animated music notation of the Max Maestro was projected onto the back of the stage visible to the audience, showing each individual part when to trigger a handclap and at what dynamics. The premiere of Put your hands together took place in the spring of 2016. The composition had a total duration of six minutes. The concert hall audience was approximately two hundred people with a diverse background in terms of gender, age and most likely musical skills. Before the concert, I gave a five-minute introduction with instructions on how to interpret the animated music notation of the Max Maestro.

5.2.2 Reflections

The performance started with single rhythmical accents performed at loud dynamics by various groups in the audience. The accents set the start and end points of some granular texture patterns of the electronic music part. As in the performance of Everybody Scream!!!, the rhythmical accents conducted by the Max Maestro were hard to perform totally in sync. The audio recording showed that the handclap hits conducted by the animated notation were performed within an approximate timeframe of 200 milliseconds and probably less. However, the large number of performers not performing the hits in total sync actually made the artistic output quite fascinating in the context: long sounding percussive handclap hits, at least when it came to

isolated rhythmic accents. The composition continued with low-density textures at soft dynamics performed by the audience together with the electronic music part. The individual hits of the twenty-four-part audience were spatially spread in the physical room of the concert hall. Moreover, the handclap textures were further varied at different densities and dynamics performed by various groups in the audience. Quiet spontaneous laughter could be heard in the audio recording at some spots and my experience from the concert hall was also that the audience seemed engaged and thrilled to be part of the performance. As in the performance of Voices of Umeå, my experience from the concert hall was that the animated notation of the Max Maestro seemed to get the audience to focus on the performance. In the middle of the performance, a polytempic texture appeared. The audience performed eight different pulses at various tempos simultaneously with the polytempic texture of the electronic music part. The more pulses that appeared simultaneously in the music, the more indistinct the hits came together as a result. However, this is not surprising since it is quite hard to perform hits at a regular pulse, within a texture where various tempos are performed simultaneously. My experience from the concert hall was that the audience was confused by the different tempos, and my reflection was that they were not used to the artistic approach. Furthermore, the polytempic section in the composition was finally dissolved into a rhythmical beat in one common tempo. The audience was enhancing the beat by clapping rhythmical accents mainly at the first bars of the beat. However, as in the performance of Everybody Scream!!!, it seemed hard to follow the fixed straight beat of the electronic music part. The hits of the audience were not performed totally in sync with the electronic music part, but the result was still acceptable. Finally, the composition reaches its climax with a high-density texture at loud dynamics performed by the audience divided into twenty-four individual parts together with the electronic music part. The performance ends with a final hit of the audience followed by a short diminuendo handclap texture sound of the electronic music part.



Figure 6. Concert Hall Performance of Put Your Hands Together

6. CONCLUSION

This paper has presented the content and the artistic ideas of the Max Maestro and reported from two live concert hall performances at which the Max Maestro was used. The aim of this study has been to contribute new knowledge to the field of animated music notation, more specifically, presenting a multiple part animated notation system developed to conduct a large crowd of non-professional performers. The findings from this study have shown that the animated notation system of the Max Maestro could conduct musical material as polytempic/polyrhythmical textures, static and moving pitch cluster textures, noise textures and rhythmic accents in sync with an electronic music part. Indeed, the Max Maestro would not be able to conduct the non-professionals to perform every single sound as

accurately as a professional musician interpreting a detailed score. Still, the approximate notation of the Max Maestro gives instructions to make sounds within a limited frame, which in this study has been shown to facilitate in my opinion interesting artistic outputs. The study has also shown that some improvements need to be made to the Max Maestro regarding animated instructions for rhythmical material to be performed to a common beat. To resolve this issue future experiments will be made with the animated notation to also display a pulsating tempo of the beat by, for instance, adding a bouncing feature to the ball or blinking feature to the whole screen of the Max Maestro. Furthermore, the animated notation was showed to engage and have the performers focus in both of the concert hall performances highlighted here. The use of game-like elements with performance instructions more resembling a videogame than a traditional score most likely contributed to the high-level of engagement [22]. Since the ability of the performers to focus is crucial to an artistic result introducing gamification as an element of the animated notation was here seen as a strategic decision. Still, the aim of the Max Maestro is not to replace the traditional notation system and the professional performers, but to enable new and unique expressions with non-professional performers as a complement to that. Moreover, since the Max Maestro was shown to be very intuitive to follow and to facilitate the performances with a short rehearsal time, it is possible to include it in large audience participation settings. However, I encourage new research within the domain of animated music notation in order to further explore possibilities for new artistic expressions when including a large crowd of non-professional performers in fixed compositions within the field of contemporary art music.

7. ACKNOWLEDGMENTS

I would like to thank all the people who participated in the performances mentioned in this paper: Voices of Umeå III: Everybody Scream!!! And Put Your Hands Together.

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9. Appendix

Relevant video documentation from the concert hall performances and the animated notation of the Max Maestro:

Voices of Umeå III: Everybody Scream!!! (movement 4-8). Concert hall performance. <<https://youtu.be/cxEkvz0wgBk>>

Put Your Hands Together. Concert hall performance. <<https://youtu.be/FL0dUGpJBLE>>

Voices of Umeå III: Everybody Scream!!! (presentation in Swedish + movement 1-3). Concert hall performance. <<https://youtu.be/GvLZ4xntVRQ>>

The Max Maestro (for human voice) <<https://youtu.be/4iePLi5uQzU>>