Techno Performance and Audience Perception

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Abstract
Aiming to create more engaging live performances for audiences, this research project investigates how audiences interpret musical performances which implement reactive visualizations, and what interactions best increase a performance's immersive effect. Our study analyzed audience reactions to two models of performative visual interaction comparing a system activated by the music to another which responded to the performer’s physical movements. While respondents expressed a general intrigue generated by the visual components, results indicated no radical difference between the two models. Limitations in terms of the study’s systems, setting and scale indicate potential fields for extended research.

Author Keywords
Immersion, audience experience, multimedia performance, audio/visual, reactive visualization systems

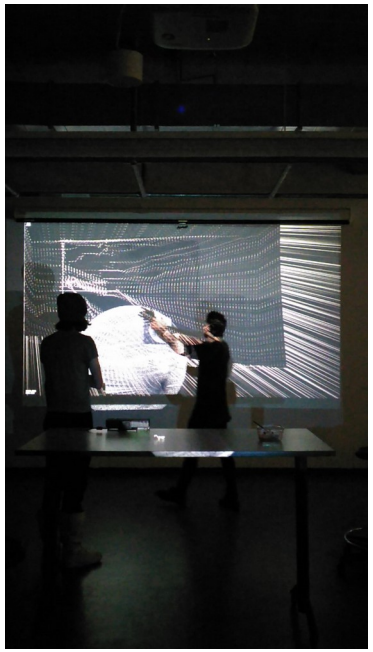

Figure 1: Initial prototyping and design experimentation.

Introduction

This research study was designed to test immersion in live audio-visual environments. Explorations in the media arts have been aimed at developing new ways to engage audiences. These include methods such as skeletal tracking, ambient intelligence, proximity sensing, audio reaction, projection mapping, etc. Many audiovisual experiences often leave out these novel research concepts and opt for a non-reactive show, favoring traditional stage lighting or static projections. live electronic performances, we constructed a study that compares two types of reactive audiovisual systems to test against audience perception and immersion. One audiovisual system was audio-reactive, one reacted to the performer's movement via Infrared tracking. Each test group was randomly assigned to watch one of the two performances without knowing there was a reactive element. In each case both visual systems were present but the interactivity of one system was turned off. The audio reactive system used Max and Jitter to determine the musical performances frequencies and respond accordingly. The movement-based system used skeletal tracking to follow the performer’s position and adjust the visuals to their coordinates and was built inside Processing and used a Kinect sensor.

Our hypothesis for the study was that the movement-based AV system would be innately more immersive than the audio reactive system, as it offered the novelty of a less conventional interaction while directing audience attention towards the physicality of the performance. We hoped the results would indicate clear strategies for developing more immersive systems, centering our research on creating more engaging audio-visual experiences through an increased understanding of how audiences understand and interpret these types of presentations.

In order to reach a larger test group, we divided our research further by having not only two systems but two methods of study. One method was live performance, one was an online study group (hosted on a website for the project). Each group was given the same questionnaire and form to fill out regarding the performance to avoid discrepancies in the data.

Prototyping

The audio-reactive visuals were created inside Max using Jitter. Within Max OpenGL objects were designed to independently react to audio input. These objects had a variety of elements to capture audience perception including various shapes that moved and increased in brightness according to different frequencies read in. The audio was passed from Ableton into the visual code for direct real-time engagement.

For the second visual element, a particle system was chosen as they enable sophisticated manipulation via inputs, essential when those inputs are something as varied as body movements. The particle system was created in Processing, inspired loosely be work done by

Masaki Yamabe http://www.masakiyamabe.com/. For getting motion input from the performer, we used a Kinect v2 and the Open Kinect for Processing library to track the performers body and use their motion and position to influence the particle system.

For the motion influenced performance, the particles are attracted to the form of the performer, creating an aura of swirling particles that follow them as they move around the canvas. For the audio influenced performance, the beat of the song creates gravitational hotspots on the canvas that pull the particles to and fro in time with the music.

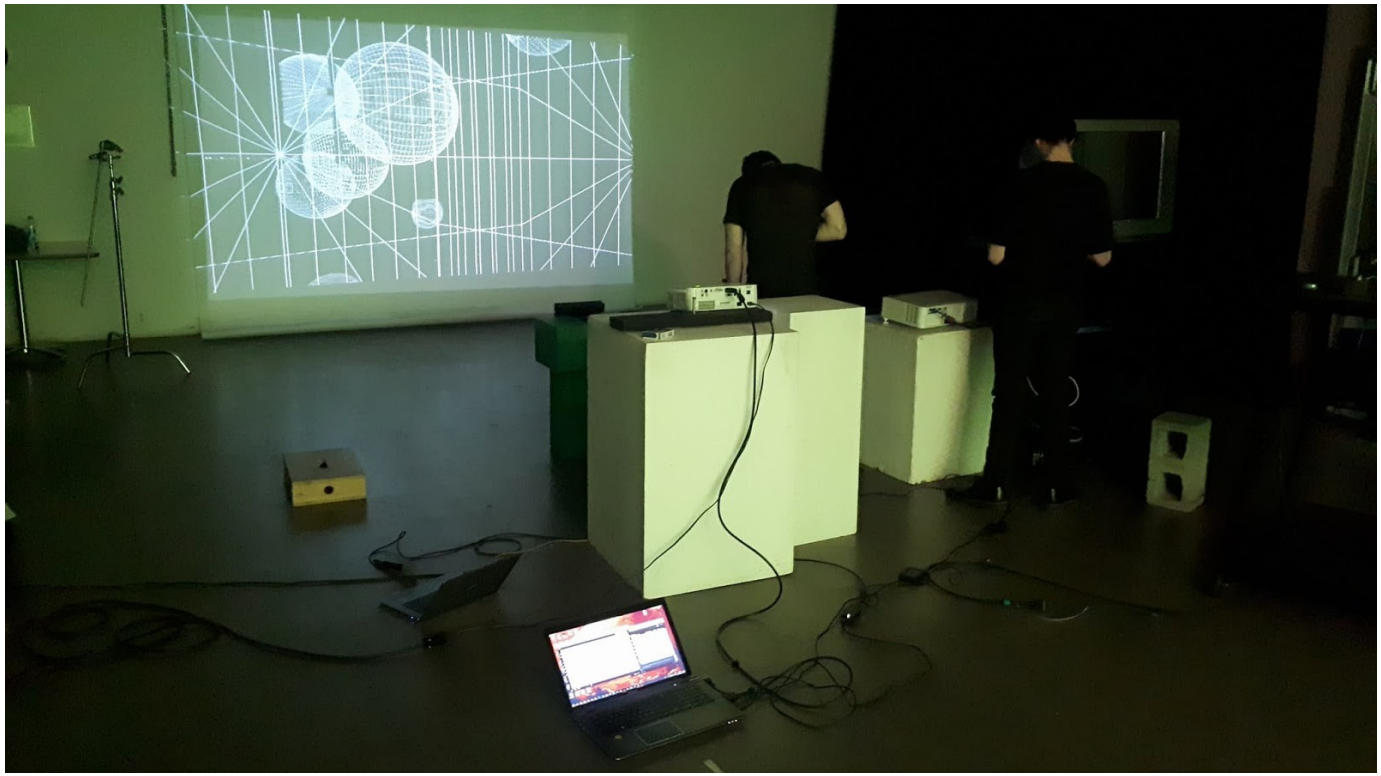

Figure 2: Prototype testing and documentation for online version.

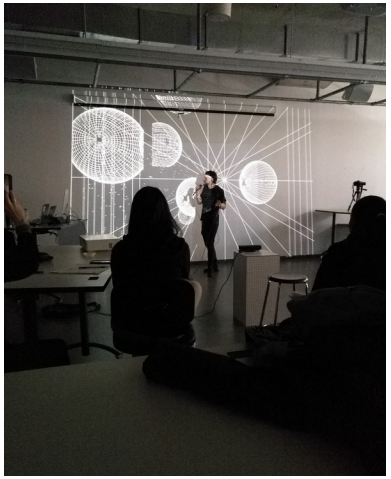

Figure 3: In class performance

Design

We wanted as minimal a staging as possible to not distract the viewer, so the only forms in front of the projector wall were the performer and his microphone. This minimal arrangement also facilitated tracking the performer for the Kinect version. Many different variations were tested when it came to colour palette, but we ultimately decided on a neutral white/grey/black to more easily blend our two projections into one cohesive image.

One team member provided the performative content, singing an original unreleased song accompanied by the visualization systems and a backing track. The song was written and produced for this project with the intention of providing new musical material which audiences would have no previous familiarity with. The song was designed as a mid-tempo pop ballad with simple melodic structure. The song heavily features vocals with instrumentation consisting of synthesizers and drum machines. For the project we wanted something a variety of listeners might find pleasing by excluding any overwhelming aggressive or energetic elements. Performances were carried out in a karaoke style where live vocals were mixed over the recorded track.

Testing

We rented a production studio to film the performances that would be used for our online testing. This was also a chance to work out the kinks in our technical layout for a smoother setup when it came time to do the live testing.

We used the speakers already installed in the room for playing back the prepared instrumental, and the performer brought his own audio interface for recording his voice and mixing it with the instrumental. The two visual elements were displayed using separate projectors projecting onto the same section of a blank wall. The Kinect was setup facing the projection wall, and calibrated to detect the performer’s body and ignore any background noise. The performance was captured with a single camera.

We recorded each performance back to back from using the same camera angle, song, and aesthetic, only changing the input which would impact the visuals. Once the videos of the performance were edited, we posted them online and had friends and acquaintances watch one of the two versions selected at random, followed by a questionnaire made using Google Forms, which allowed us to collect the data for review at a later time. We were satisfied with how the performance went, so we knew we were going to use the same setup for the live version.

The setup for the live performance mirrored that of the recording session of the previous night, except it was done in a different room. Unlike the recorded session which was performed for a camera, the live version was performed twice for an audience, each time consisting of approximately 10 of our classmates. Each group was exposed to a different version, one reactive to the audio, the other reactive to the performer's movement. After each performance, we distributed the questionnaire (with the same questions as the online form) and got each audience member to fill it out and return to us.

Questionnaire

The accompanying questionnaire gathered feedback from participants in the form of short answers indications on a scale of 1 to 5 whether participants strongly agreed or disagreed with provided statements. Statements and questions were aimed at generating insight and data as to how reactions differed between our two models regarding both the legibility and effect of our designed interactions. Questions inquired participants as to where their attention was directed during the performance and if their attention was sustained throughout.

We were curious to see if one element of the performance would dominate the others or if one system better achieved a cohesion of composite parts. Wanting to facilitate an audience's immersion into the experience we also asked about their personal interpretation of the performance concerning what emotional, social or cultural connections participants made to the material, hoping to discern how our models might have impacted this.

Results

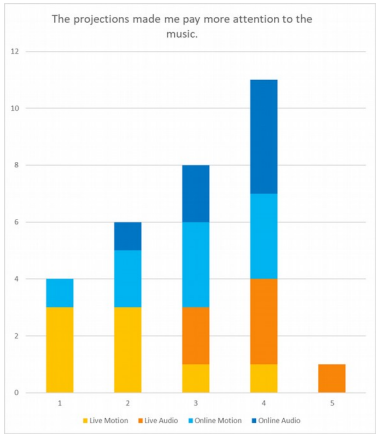

Figure 4: Viewers from all groups except the those who saw the live motion-controlled performance generally found the visual element made them more attentive.

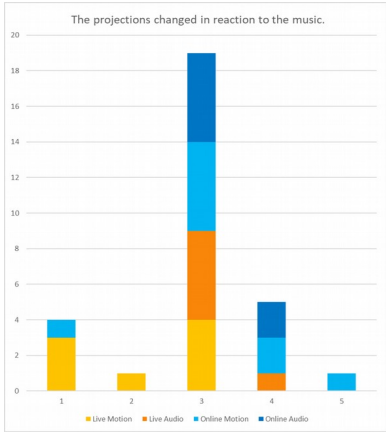

Figure 5: Results show that the reactivity of the audio-controlled visuals were not perceived, indicating they may have been overly subtle

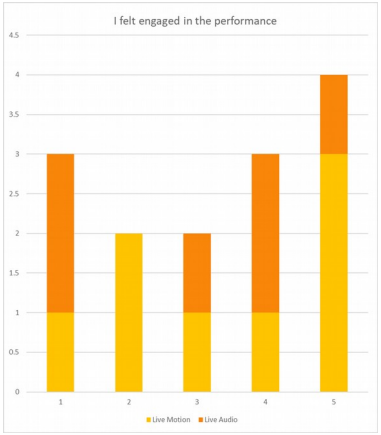

Figure 6: Among those who saw the live performance, there was no consensus on engagement with the performance. This was potentially due in part to the unideal setting of a university classroom and the fact it was done during class time.

Audio / Motion Results

There was very little to differentiate the groups that viewed each version of the reactive performance. As can be seen in Figure 5, even participants who viewed the audio reactive performance largely didn't notice that the visuals were being affected by the audio, in both the live and online groups. While the motion reactive visuals were perceived by slightly more participants, there were still plenty who gave mixed or inconclusive responses when asked if they had perceived any reactive visuals. We have two primary theories about what may have caused these mixed responses. One possibility is that the visuals used were overly subtle, particularly the audio reactive performance. The other is that since the visual portion of live music performance is often premade and static, viewers are not expecting reactivity and thus are not looking out for it.

Both of these theories also explain a general lack of great differentiation between the groups who watched the audio reactive performance, and those who saw the motion reaction performance. The responses from each group differed slightly on certain questions, like seen in Figure 4 where audiences viewing the audio reactive performance generally described themselves being more attentive to the music, but the quantity of participants and severity of their differences were not such that we could make conclusive observations on the results.

Environment / Online Results

In the online results the polls for reactivity where more ambiguous than the live results. When participants were asked whether the visuals were reactive to either the audio or the performer online results were consistently lower. The live audience participants polled slightly less ambiguously to reactivity, specifically for movement based immersion. The results seem to indicate that the test environment has an affect on user perception. This might also contribute to ambiguity in both polls when asked about subtleties in the reactive portion of the visuals. Since the spaces were not built for performances the user's attention was not as focused as it could have been. The online videos polled better for audio interaction than movement based reactivity, an opposite statistic to the live polls. Again this seems to indicate a shift in perception depending on the platform.

A trend was also noticed within the written online result that indicated less participation than live participants. The online responses were shorter, often non-serious, and rarely commented on the goal of the study. Its possible an online test group, although it has a farther reach, is not an ideal environment compared to live tests.

Further Work

The scope of the project had to be quite limited due to this whole thing being a class project done alongside plenty of work in other classes. Ideally, If expended upon further, the first improvements would be in acquiring more test participants from more diverse backgrounds, and a more rigorous testing session.

As our group of test participants was composed of classmates or friends, the majority of them were familiar with the digital arts, techno performance, or both. While this gives us a good idea of the opinions of those most likely to come across this kind of spectacle, we have very little information on those without prior knowledge of such performances. We also only tested with one song/performer, which creates bias in our test results. Most participants personally knew our performer, which could potentially influence their questionnaire.

Being the preliminary foray into testing our hypothesis, our prototype design was both narrow and unproven, in the sense that our visuals were created with no particular theme in mind and we had no way of knowing if our responsive visuals were done in a way that effectively communicated to an unaware audience that they were indeed responsive to audio or movement.

We were also dependant on the equipment available to us. Rooms, projectors, and the overall installation were done with what was available to us as students, which prevented us from creating ideal testing scenarios, like blacked out rooms or more elaborate visuals. In relation to the environmental limitations previously mentioned, future iterations would ideally have several performers mixed within different venues designed for performance. This would eliminate any bias towards the performer and at the same time eliminate any potential distractions in the space. Additionally, as the music itself is a pivotal component of our prototype and the hypothesis in general, testing with only one song introduces bias into the results as well: If you don’t like the song, you’re likely to respond less enthusiastically to the questions, and vice versa. A more thorough test would involve multiple performers, visuals, and songs, to eliminate as much of the bias as possible.

One distraction we had that was commented on by participants in the live study was the fact the study had projectors out in the open creating noise and heat in a very noticeable location (opposed to hidden in a theatre space). With better spaces we could then more accurately rely on the results to determine how immersive the visuals without disruptive factors

Conclusion

As visual artists and performers ourselves, we undertook this research project to get a better understanding of what audiences reacted well to and what the effectiveness was of different strategies for creating engaging experiences. While both the quality and quantity of the data we collected was not strong enough to make any definitive statements about the effectiveness of different strategies, it did provide us

with a clear plan of action were we to take this project further. We already suspected the environment would play a large role when it came to audience engagement, and generally apathetic response to our questions of immersion reinforced the need for better venues to conduct experiments pertaining to musical performance. Additionally, further refinement of the visual and reactive portion of the performance is required to properly gauge the importance of these elements when it comes to engaging audiences of artistic performances. We hope that in the future, with consideration taken to the preliminary groundwork laid out here, there will be advances made in the study of audiences of live performance, for both the benefit of performers looking to attract new fans and viewers looking for more memorable experiences.

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