

Infusing Technology into the Performing Arts at Cal Poly

By

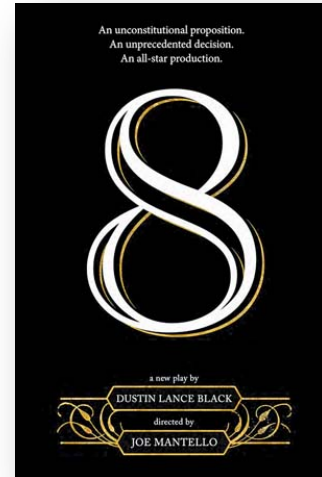
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The following report is a brief summary of my work in fulfillment of the requirements for the Bachelor of Arts Degree in Liberal Arts & Engineering Studies. A great deal of the work was completed in preparation for the performances, which cannot be accurately reproduced in a document such as this.

8 The Play

8 is a play written by academy award-winning screenwriter Dustin Lance Black in 2011. It portrays the legal argument and testimonies in the trial to determine the constitutionality of California's Proposition 8. The Central Coast chapter of PFLAG (Parents, Friends & Family of Lesbians & Gays) acquired the rights to produce the play for a one-night-only performance on October 18, 2012. Although the production was sponsored by the Cal Poly Pride Center and directed by Cal Poly Theatre Professor Dr. Virginia Anderson, many outside community members were also involved in the production of 8.



Official Poster for 8 the Play

Initiation & Definition

8 the Play has a detailed script which outlined the technical needs of the production. Working together with the director of the play, Dr. Virginia Anderson, I was able to determine that the production would need several scenes to be broadcast on a large screen in the theatre, including court depositions, mock newscasts, and real Yes on 8 advertisements from the 2008 campaign. I was charged with creating the new content and preparing the video for use in the show.

Planning

An initial planning meeting was held September 13, 2012, just over a month before the production was to take place. I was able to generate a list of deliverables from this meeting, though very little work could actually be started until the play would be cast on September 29. I had only six rehearsals before opening night, so it was important to be prepared to begin filming actors immediately.

Execution

Most of the filming took place over two nights in the LAES Lab in Building 4 at Cal Poly. Three of the scenes were to take place on a busy street outside the courthouse in San Francisco where the trial took place. Because of time and resources constraints, we were unable to travel to San Francisco to film on location, so the actors were filmed against a green screen to be digitally placed in San Francisco.

The scenes were filmed with a tripod-mounted Canon XHA1 High Definition video camera, which is commonly used by smaller studios in industry for its portability and wide array of shooting features. A Shure SM58 dynamic microphone was used to capture sound in the San Francisco scenes, as it both looked and sounded very similar to microphones that are used by field reporters. Shure PG185 wireless lavalier microphones were used in the news studio scene for their inconspicuousness and good sound quality. The green screen used was simple green cloth hung from a portable brace system. A basic lighting kit with three sources was used to fully illuminate the actors and the screen. The lighting helped to ensure a quality image of the performance and made the green screen easier to remove in post-processing.



Wearing the headphones during filming helped me to ensure that sound levels were optimal for the microphones

The video was edited using Final Cut Pro 7, which is commonly used in industry, recently on such films as *The Social Network* and *The Girl with the Dragon Tattoo*. Animated titles were created in Apple Motion for the news clips. Editing began immediately after filming to ensure that if the video were not usable, there would be time to film it again.



Screenshot of an editing setup in Final Cut Pro for one of the more complex scenes involving three cameras, three microphones, and animated titles

For the actual performance, we wanted to show the videos on the same screen that the digital scenery was to be projected on. I worked with LAES student Ethan Lockwood to

design a way to smoothly transition from the static background images to the videos on the big screen. We animated the video clip appearing from the seal on the backdrop and expanding to fill about half the screen, while the background image dimmed to focus audience attention on the video without completely removing them from the scene of the courtroom. During the show we would be able to fade from the static background to a video clip containing this animation.



A static image was displayed for much of the show, but segued into video clips smoothly

To run the video content in the actual production, it was decided that Keynote would be the simplest solution. It would provide a clean high-definition image both with the video and static images. It was also easy to operate; a major selling point since we found out two nights before the performance that one of the venue's tech assistants would be operating the visuals, not me. The video clips were placed into the Keynote file separated by the background images of the courtroom.

Delivery & Performance

The Keynote file was delivered on a Macbook along with a notated script that indicated to the technician where all of the video cues fell in the show. I sat near the tech during the dress rehearsal to ensure full understanding.

The performance on October 18, 2012 was a tremendous success. The event was held in Spanos Theatre at Cal Poly and over 400 tickets were sold. The proceeds from ticket sales went to the American Foundation for Equal Rights, a non-profit organization that is actively working to support the legal team representing the plaintiffs in the case portrayed in the play.

While the play could have been performed without the use of digital multimedia, it was an effective way to make the play's message more impactful. The sights and sounds add more dimensions to the storytelling. Putting those scenes on screen makes the story more real, and if that realism inspires someone to tell a friend about the production and its message, then the endeavor was a success.

Cal Poly Symphony Fall Concert: Music & Image

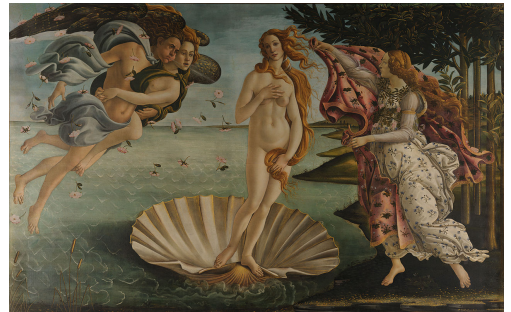
The entire theme of the Cal Poly Symphony's Fall 2012 concert was to revolve around music that responds to images. The finale of the show was to be a piece called *Pictures at an Exhibition*, by Modest Mussorgsky, which is made up of ten movements based on paintings and drawings created by Mussorgsky's friend Viktor Hartmann. The images had been re-imagined by photographer Sky Bergman, who teaches Photography at Cal Poly. The opening pieces of the show were scores from modern video game music, and the central piece was called *Trittico Botticelliano* by Ottorino Respighi.



La Primavera



The Adoration of the Magi



The Birth of Venus

The Respighi piece was based on three paintings by Sandro Botticelli, and as of the concert's inception did not have any visuals to accompany it. I contacted Cal Poly Symphony conductor Dr. David Arriveé to find out if I could design a visual element for this portion of the concert. The idea was received with much excitement.

Initiation & Definition

Because the Symphony concert does not run on a script, and adding visuals to a symphony concert is not done very often, I was given a lot of freedom to create whatever I could in a short amount of time before the concert. My only constraints were that the visuals had to feature the original Botticelli paintings in some way, and I was not allowed to abandon my violin. I've been playing violin with the Cal Poly Symphony since 2007, and I was not going to be excused from playing during my last concert with them. Therefore, whatever was created would need to be simple enough for another student to operate without my help.

Planning

The paintings that the music is based on are beautiful, and I knew I wanted to feature them prominently on the large projection screen behind the orchestra. The equipment for this was already in place in the venue, Harman Hall in the Cal Poly Performing Arts Center. Video would need to be created for this screen that featured the paintings in a dynamic way, but wouldn't distract the audience from the music being played.

I wanted to fill the concert hall with abstract imagery that complimented the paintings and the music, projecting onto architectural features in the concert hall that were not

meant to be video screens. Again, these visuals were to be dynamic and engaging without distracting from the orchestra.

I had only four weeks to complete the work before the concert. I had limited access to the concert hall because it is a professional venue that hosts many other performers in a given month. I had only one technical rehearsal in the hall before the dress rehearsal, so whatever I created had to be stable and ready for adjustment in three weeks.

Execution

I immediately began work on animating the Botticelli paintings for the main screen. I used both Final Cut Pro and iMovie to do some animation testing. The animations were simple: panning and zooming on details of the paintings and wide shots of the entire paintings with very subtle movement. In this case, I found that the simplest solution was the best. I was able to work much more quickly in iMovie and the aspect ratio and HD output were perfect for the projection setup in Harman Hall. For generating over 20 minutes of video, streamlining the process saved a lot of editing time.

Drawing from my experience with *8 the Play*, I knew that Keynote would be the perfect solution for playing the videos of the paintings. Again, the output image was a fine quality and the program was very easy to operate. Since a spare student musician would be triggering these visuals, simplifying the technology was important. I was even able to build in buffer zones in the videos, so that if the orchestra was taking longer to arrive at a key point or arrived there earlier than expected, the video operator would be able to catch up immediately. After all, you can't press play on an orchestra, so pressing play on a video seemed illogical.

One of the most productive activities in this project was a meeting I set up with Eli Zabala, head of the Performing Arts Center's technical staff. His excitement and enthusiasm for the potential of the project were a great help in narrowing down my ideas for the abstract animations in the hall. We were able to walk around in the hall to test projection equipment and determine where best to place it. We also talked about supplementary lighting that could fill spaces in the hall that the projectors could not.



The teal ripples are sound-reactive video from Aeon; the red and blue rays are pre-programmed output from the Vari-Lite moving light heads

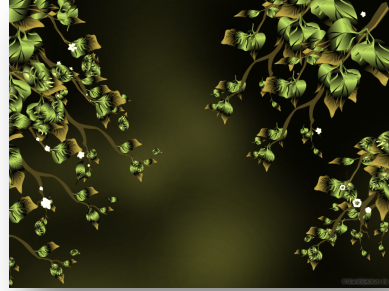
I drew a lot of inspiration from talking to other students about the performance and the potential for visuals. LAES student Max Brown discussed with me the potential for the visuals to react directly to whatever the orchestra was playing, rather than have the visuals “puppeteered” by another student. I began researching visualizers, computer programs that generated imagery in reaction to sound. I eventually settled on software called Aeon, which was very

simple to operate and could react well to the sound of the orchestra. I was able to program in specific scenes, color and texture combinations, that would complement the colors of the paintings best and not distract from the orchestra. Shades of Green were used for La Primavera with floral patterns and tree branches. The leaves on the branches grew more abundant as the orchestra played louder. Shades of teal and gold were used for the Birth of Venus, with nebula clouds and planetary orbits. These scenes could be recalled instantly with specific key

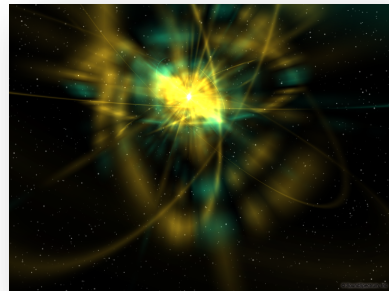
combinations. I created a very clear list of cues for the operator to follow along with the musical score. Because each cue was not dramatically different from the next, there was some margin for error if the operator got lost in the score.

It was decided that for the nicest image possible from Aeon, the smooth white “cheeks” to the sides of the concert hall stage would be the best for projection. This left a lot of blank space above the pipe organ and the president’s box. To fill this space, I worked with a lighting designer on the PAC technical staff to program specific lighting cues for the show. Colors and textures were selected based on the paintings, and the cues were aligned with the cues in the painting videos. Since I wasn’t able to call the show over a headset, I needed another way for the lighting cues to be triggered. The student operating the video of the paintings from the booth would be following along in the musical score where the cues were marked. When they reached each cue, they could announce it loudly and the light board operator could move to the next cue simultaneously.

The final setup in the venue included a Macbook in the theatre control room (booth) running Keynote, which sent video to the 20,000 lumen Barco cinema projector, controlled by a student. This displayed video of the paintings on a 40’ screen behind the Symphony. A technician from the PAC staff operated an ETC Ion lighting console controlling four Vari-Lite moving light heads, which put color patterns and textures on the wall above the president’s box and on the pipes of the organ. A second student operator sat in the president’s box with a Macbook running Aeon. This computer sent video via a VGA distribution box to a 6,000 lumen Panasonic projector aimed at the cheek below the pipe organ, and a 4,000 lumen Epson projector aimed at the cheek below the president’s box. Because the projectors were different models, they had to be adjusted to match brightness and image size. A Shure wireless microphone receiver was connected



Screenshot from Aeon during La Primavera



Screenshot from Aeon during Birth of Venus

to the computer running Aeon, and the microphone was placed near the oboe player in the orchestra. This allowed Aeon to react more dynamically to whatever the orchestra was playing, whether a quiet oboe solo or a loud crescendo from the ensemble.

The dress rehearsal went smoothly, and only a few adjustments were necessary before the performance. Under show lighting conditions it was apparent that the edges of the side projections were very distinct. I taped irises onto the lenses of the projectors to soften the edges of the projections to better blend into the show lighting. It was also clear that certain color schemes worked better than others with the projected paintings, so the colors were adjusted in Aeon to match.



During the dress rehearsal it was easy to see what adjustments needed to be made to the images and colors before the show

Delivery & Performance

The concert was well attended and well received. I was busy playing in the orchestra, so I didn't see anything out of place. The operators both confessed to getting temporarily lost in the music, however, it wasn't noticed by any audience members that I spoke with after the concert. The operator's comfort with the timing of the music could have been a lot better if there had been another opportunity to do a full run-through with the orchestra. But because rehearsal time was limited and the entire piece was 20 minutes, only one full run-through was possible during the dress rehearsal. Luckily, the animations were subtle enough that missing a cue would not make a noticeable impact on the performance.



The final performance in Harman Hall November 18, 2012

eyes as well as the ears. Hopefully it brought a new level of enjoyment to the audience, and opened some doors to new collaborations for the Cal Poly Symphony in the future.

Orchestras have been performing music for hundreds of years without visuals, and adding these projections to the Cal Poly Symphony's concert was an effort to put a 21st century spin on a very traditional performance art. Like the production of 8, the performance could have worked with no digital media. But the media brought new dimensions to the performance that engaged the audience in new ways and appealed to the