

HIDING IN PLAIN SIGHT: LIGHTING AND PROJECTION DESIGN FOR
PETER CHU'S *SMILE MASKING*

by

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Abstract

Smile Masking and Face Her is a new solo suite by 'Chuthis.', the company of dancer and choreographer Peter Chu. This document will examine the methodologies and influences behind the design and integration of lighting and projection within the second half of this program, *Smile Masking*. This show presents a new approach to the use of infrared cameras to produce live generating imagery. *Smile Masking* was Choreographed by Peter Chu and performed by Peter Chu and Jenni Berthelot. The design team included Djeff Houle (Sound Design and Composition), Linda Chow (Costume Design), and myself (Lighting and Projection Design). Additonal music by Fred Hamm, Dave Bennett, Bert Lown, Chauncey Grey, Jerry Jeff Walker, Ern Westmore, and Ólafur Arnalds.

Preface

As the lighting and projection designer for this production, I prepared the initial design materials, drafting, and paperwork used to install the lighting and projection systems for the show described herein, as seen in appendix A. Additionally, I was responsible for the content creation and creative programming the show's projection system. Finally, I programmed a show-control system, integrating all production elements. My advisor for this production and all work I have done in association with UBC was Robert Gardiner. The majority of photographs contained within this document are courtesy of Aaron Felske, or are frames taken from video also shot by Aaron Felske. The production photographs show the final amalgamation of my designs alongside the choreography of Peter Chu, the movement of Peter Chu and Jenni Berthelot, and the costume design of Linda Chow.

Table of Contents

Abstract	ii
Preface	iii
Table of Contents	iv
List of Figures.....	v
Acknowledgements	vii
1 - Introduction.....	1
2 - The Show.....	4
2.1 - Themes in Creation	4
2.2 - Design	6
3 - The Technology.....	9
4 - Scene Breakdown	14
4.1 - Just a Step.....	14
4.2 - Leaning Piano	16
4.3 - Jittery Pills.....	18
4.4 - Facial Exercises	19
4.5 - Clown Car	21
4.6 - Esquevel II.....	23
4.7 - Cutting Masks.....	24
4.8 - Whispering	26
4.9 - Drumming	27
4.10 - Gala Solo	29
5 - Closing Thoughts and Future Intentions.....	31
References.....	33
Appendix A - Production Documents	34
Lighting Plot (not to scale).....	34
Channel Hookup.....	35
Instrument Schedule	36
Cue List	38

List of Figures

FIG 2.1 - <i>Stage Picture from First Residency at The East Vancouver Cultural Centre.</i> Frame capture from video courtesy of Christina Toms	5
FIG 3.1 - System map for <i>Smile Masking</i>	9
FIG 3.3 - Left: Subject lit with both projector and infrared light, photographed within visible light spectrum. Right: Subject under same lighting conditions, photographed within infrared light spectrum. Note how projected image dissapears, leaving only lit subject.....	12
FIG 4.1 - <i>Just a Step</i> Isadora circuitry. Following basic image manipulation (top), video is processed through a ‘freeze’ (image grab) and then is subtracted from itself in the effect mixer.	14
FIG 4.2 - <i>Just a Step</i> , photo courtesy of Aaron Felske	15
FIG 4.3 - <i>Leaning Piano</i> Isadora circuitry. Following basic image manipulation (top), video is processed through a ‘Motion Blur’ with a decay amount of 0. This leads to the production of light trails. The ‘freeze’ allows us to close the network.	16
FIG 4.4 - <i>Leaning Piano</i> . Top: photo courtesy of Aaron Felske, Bottom: photo by Eric Chad.....	17
FIG 4.5 - <i>Jittery Pills</i> , photo courtesy of Aaron Felske.....	18
FIG 4.6 - <i>Facial Exercises</i> , Top: photo courtesy of Aaron Felske, Bottom: Neon chevron pattern built using Adobe After Effects and Adobe Illustrator.....	19
FIG 4.7 - <i>Clown Car</i> , screen capture of video courtesy of Aaron Felske	21
FIG 4.8 - <i>Esquevel II</i> , Top: photo courtesy of Aaron Felske, Bottom: Screen capture from video provided by Aaron Felske	23
FIG 4.9 - <i>Cutting Masks</i> , photo courtesy of Aaron Felske	24
FIG 4.10 - <i>Whispering</i> , photo courtesy of Aaron Felske	26

FIG 4.11 - *Drumming*. Series of screen captures from video provided by Aaron Felske. Top and upper-Middle: and expanding rectangle of light. Lower-middle: imagery of a moving bar of light projected on an eye. Bottom: Peter dancing within the pupil of an eye.....27

FIG 4.12 - Left: Uneffected footage of projected light on an eye. Right: Similar effected footage used to light ‘Drumming’.....28

FIG 4.13 - *Gala Solo*. Series of screen captures from video provided by Aaron Felske.29

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I would never have met Peter had it not been for the Kidd Pivot team. I thank Jeremy, Crystal, and the rest of the Pivot family for building a creative environment where new art can percolate.

To both the McGill and UBC theatre communities, I would like to thank you for experimenting with me. Without relationships like yours no progress can be made in this medium.

I thank my advisor Robert Gardiner for sharing his interests in projection with me, for pushing me into this exciting medium, and for providing me with the space, resources, and time needed to learn all I have.

I'd like to thank my family, without whose support and encouragement I would never have been able to get one degree, let alone two, and who have created an environment so nurturing in both science and art.

Finally, I thank Kate. Without her support this document would be an impossibility. Thank you for keeping me inspired and for sharing this life with me, partner.

1 - Introduction

This document will serve as a record of my involvements in creating *Smile Masking*, the second portion of the evening titled *Smile Masking and Face Her*, a new solo suite by 'Chuthis.', the company of choreographer and dancer Peter Chu. The work closely follows with the research I have done at UBC in the field of interactive lighting and projection design, and provided an excellent canvas to try out my developed system. Much of the discussion regarding the creation of the piece took place while Chu and myself were both working with 'Kidd Pivot' in 2014, and over the span of the following year we realized two of his solos in an evening's performance.

The production consists of two solos: *Face Her*, a solo for Jenni Berthelot; and *Smile Masking*, a solo for Peter Chu, danced by both Chu and Berthelot. The two pieces are bound by themes of obsession, control, and the importance of 'the face put on' in public interaction. Again, this document will look specifically at *Smile Masking*. "Smile masking" is a term used to describe the deep depression and physical illness that can form behind a forced smile. The inspirations for the piece are best described in an artist's statement from Chu:

"initially inspired by the attitudes and passions of performers from old Las Vegas coupled with the famous venues that have a rich history of presenting these iconic artists, this solo work exposes the audience to authentic and unforgiving truths about control and obsession. Doubting reality and running with the danger of glorifying false appearances, a character explores the highs and lows of smile masking" (Chu, "Works")

In a kind of kismet, mine and Chu's interests aligned in such a way to allow me to completely integrate my concurrent research at the University of British Columbia into this production. My research at UBC followed closely that of my graduate advisor, Robert Gardiner. His interests in 'digital illumination', the use of projectors as replacements for conventional lighting instruments, introduced me to the vast world of interactivity and projection design. Specifically to a vein of interactive lighting design most often seen within contemporary dance. As observed in works by companies such as Chunky Move, and Anarchy Dance Theatre, and artists such as Hiroaki Umeda, and Klaus Obermaier, the use of interactivity gives one the ability to tie a medium such as lighting design directly to movement, offering a certain synchronicity that has never before been possible. My goals at UBC were to explore novel options for infrared tracking using methods similar to those used by Freider Weiss in his works with Chunky Move (Weiss, "Infrared") with the intention to apply these methods to newer computation and software options. *Smile Masking* offered the perfect opportunity for this exploration.

There are differences between approaching the creation of a new piece of dance as compared to a piece of theatre. Often in traditional theatre practice one is applying lighting or projection to a written or rehearsed product, although, increasingly, playwrights are now including production earlier in their creative processes. In creating new dance, the lack of a structure or script can allow for a much greater opportunity to integrate new technologies and design ideas during the earliest stages of conception. This openness for exploration, when combined with a good workshopping structure, can lead to final products where the choreography is inseparable from the design and vice versa. We organized our creative process into two, widespread, technical-design residencies. This

timeframe allowed us to explore new design ideas, integrate our technical discoveries into the physical language of the piece, and then return to integrate these changes and polish a completed work.

Our first residency spanned two weeks at The Vancouver East Cultural Centre Historic Theatre ('The Culch') in July 2014. By this point many phrases and segments of the piece were built, but the piece was by no means complete. Structurally, the order of the segments was fluid and many of these segments unchoreographed. Our goals for this phase of development were to create an aesthetic for the piece and begin to explore options for the individual segments. I will speak more of our discoveries from the first residency in Chapter 2.2. The second phase of development took place in March, 2015 at The West Las Vegas Public Library Theatre, which culminated in an avant-premiere performance. I will speak to the final design of the piece in Chapter 4. The production premiered at "Le Festival DanseEncore" in Trois Rivières, Quebec. For this premiere, I worked to make the production simpler to tour, which I will describe in chapter 3. The bulk of what I discuss within this paper will reference the latest version of the production, which was presented in Trois Rivières.

2 - The Show

2.1 - Themes in Creation

The following section summarizes my interpretation of the themes of the piece, gained through conversations with the choreographer. They are not necessarily the direct views Chu, but were my inspirations for creating the design. *Smile Masking* is a piece meant to examine the relationship between a lifestyle of being 'in the spotlight' with the mental and physical anguish, drug abuse, obsessive tendencies, and masked depression which accompany that life. These are issues widely faced by all performers, and by extension by all who have ever been expected to be 'presentable'.

Chu often described this piece a duet between his choreography and my design. This mentality of creating a co-presentation, wherein there is an inseparable interplay between the dance and the design, was an idea we discussed as early as our first design meeting, and was constantly in consideration throughout the creation of the piece. The opportunity to build a show like this is really only possible if the choreographer and the designer have a trusting relationship and a combined clear vision of the piece. In this case, our vision was to hold every element as equal.

This piece was built in response to a swell of technology driven shows that compromise the integrity of the performance in order to present a new technological idea. While this method can present visually interesting elements, their novel qualities run out quickly. We wanted the design and technology to support the structure and narrative of the dance, and similarly we wanted the dance to either create or present the design



FIG 2.1 - *Stage Picture from First Residency at The East Vancouver Cultural Centre. Frame capture from video courtesy of Christina Toms*

content. We hoped to create a show where one could focus on the dance or take a step back and focus on the mise-en-scene and have an equally satisfying experience.

The piece operates through presenting two sides of a central character. The first persona is an extrovert: overly friendly, and presentational. Inspired by the performers of old Las Vegas, most notably the “Rat Pack”, this character represents a pure archetype of a public performer. This is contrasted by a shadow figure who presents the emotional state of this same character, trapped behind his false smile. The two sides are not presented independently: they transition back and forth, showing the constant battle between the performer trying to repress his emotional state, and the consequences of those emotions coming to light. These ideas of the two co-presented persona would strongly influence the creation of the design elements for the piece.

2.2 - Design

Moving into first residency, our goals were to create a cohesive and compelling design structure for the piece. Our show is attempting to present the inauthenticity of emotion in performance. In order to orient the audience towards the internal, human, side of the performer we decided to frame this piece as a show within a show. We rotated the stage such that the audience would view the space through the point-of-view of the performer. This flipped perspective identifies the audience with the performer, and allowed us to highlight the difference between the performer as a presented entity and the performer as a human being.

To build our inverted stage, we started by playing with archetypal iconography of the theatre space. In our first creation residency, we built an image suggestive of a false apron edge upstage of our shrunken performance space (Fig. 2.1). This was a simple image, a curved break between grey and black dancefloor, with a row of bare light bulbs along the division. We played with the image of a performer in a crisp spotlight, spinning this same image around into crisp, steep backlight. We played with the idea of a performer being blinded by stagelight, blinding the audience with a series of upstage booms. The stage image was later simplified to our final image, a small grey rectangle with a row of strewn lamps within negative space upstage. While the row of light bulbs and booms were effective in creating our inverted stage, touring logistics and budgetary restrictions caused them to be cut.

The grey floored area, within our larger performance space, would act as a prison for Chu, trapping our performer onstage. The grey floor served as an excellent projection surface, and its constricted size allowed us to control our projectable area. This allowed

for a predictable and repeatable touring show, which is easy to remount. The high contrast between our grey floor and the black surround allowed my graphics to be clearly displayed, while the overflowing “video black”, the baseline output of the projector, was less noticable.

Constricting the dancing space also allowed me to use fewer fixtures while still maintaining a wide range of lighting angles and colour differences. We used colour and smoke to help set an era for the performative world, that of an old-Vegas smoky lounge space. Through use of colour correction filters, we wanted to present a contrast between modern design and what would have been possible with the lower wattage lamps of the past. The lighting design played along the full spectrum of this difference, often presenting gradients within families of colour. For example, our ground-row consists of multiple members of the CTB (colour temperature blue) and CTO (colour temperature orange) families of colour correction, allowing us to move smoothly between a crisp, cold HMI blue through to a warm, straw, incandescent. The smoke also allowed for beams of light to play a sculptural role within the mise-en-scene, and allowed for the subtle variations in colour choice and beam angle to become pronounced.

Projector light also falls within this exploration of colour temperature and angle. Our projector is inherently colder than our incandescent world and is one of our only instances facial fill light in this piece. The projector light therefore presents a more intimate state in which Chu’s face is directly presented to the audience, and, because it is so contrasting to the performative light, the projection strongly promotes the introspective mode.

The use of projection as lighting opened up a world of opportunities unattainable by conventional lighting fixtures. One major design concept we were playing with was

the use infrared cameras to allow Chu to create his own environment and lighting. By giving Chu agency over the created world we helped to cement the concept that we are witnessing something internal to Chu, his emotional state. The live nature of the generative projection also introduced life into the projection design, strengthening the projection's role in reinforcing the shadow character.

Inspiration and execution for each of our final scenes will be elaborated in Chapter 4. We exited the first residency with a design framework built upon having a blended environment between a presentational, warm, lounge stage world and a colder, projector lit world. These themes would provide a canvas through which we could present the hidden emotional space of the performer.

3 - The Technology

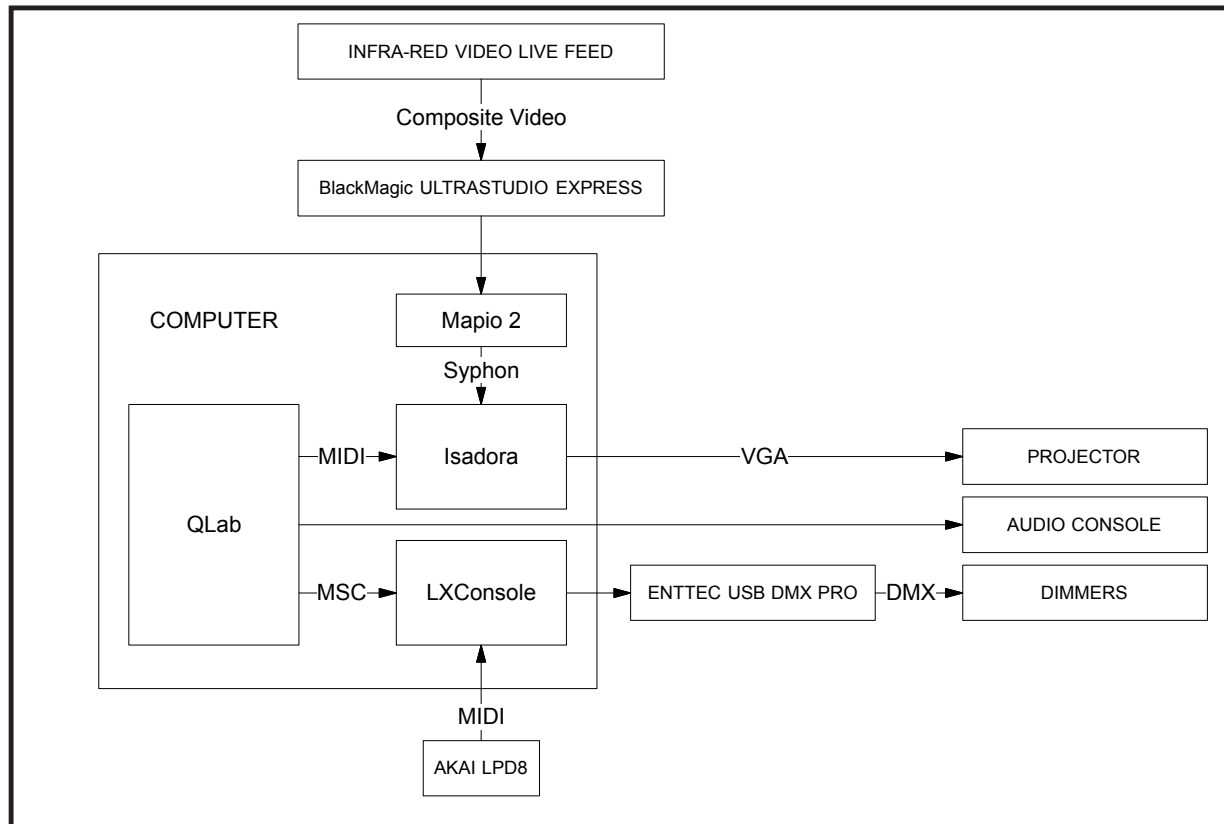


FIG 3.1 - System map for *Smile Masking*

The technical system created for this piece was optimized to be low-cost and tour-able. The company's history suggested that the show would need to be presentable at dance festivals or for one-off performances, so it was important that the show be easy to set up and easy to ship. Additionally, I wanted the show to be presentable with a single operator. In the end, we created a system with interactive content, lighting, sound, and video, all operated through a single space bar.

The heart of our system was a Macbook Pro with a 2.6 GHz Intel Core i7 Processor,

a NVIDIA GeForce GT 750M 2048 MB graphics card, and 16 GB of DDR3 RAM. The operation for this piece was initially divided into two: the laptop computer running video and audio, and an ETC Eos family console running the lighting. I had chosen to ask the presenting venue provide a lighting desk, and a new ETC console seemed to be the easiest option. This eventually proved to be an issue, and lighting control was also integrated into the laptop. The laptop proved to be reliable and robust as a show control computer, but the logistics of having all three technical departments operating out of a single computer took some engineering, which I will describe below.

We rented our projector and input camera from The University of British Columbia. The projector was a Panasonic PT-D5700. This older projector output XGA and provided 6,000 lumens of output with a 2000:1 contrast ratio. The brightness and resolution were adequate for our needs, but the low contrast ratio resulted in a video-black level that proved to be a moderate issue. If this production were to be remounted, a more modern projector would be preferable. This projector was run with a 0.8:1 lens, the widest available to me. We then sized our grey dance floor to match the size of our projection cone with our projector hung at 20ft, a realistic grid height estimate for a mid-size proscenium stage. This lead to a lit floor space of 22ft wide by 16ft deep, and, due to the pyramidal optics of the projector, a dancing space of 16ft wide by 12ft deep wherein Chu's face could be lit (fig. 3.2).

Our input camera for infrared capture was a 'Capture E51WDN2' CCTV camera with a 2.8-12mm zoom lens. The camera was capable of delivering a reasonably low-noise, black and white image of the full dancing space, from the perspective of the projector with wide dynamic range. The dynamic range in this respect refers to the ability

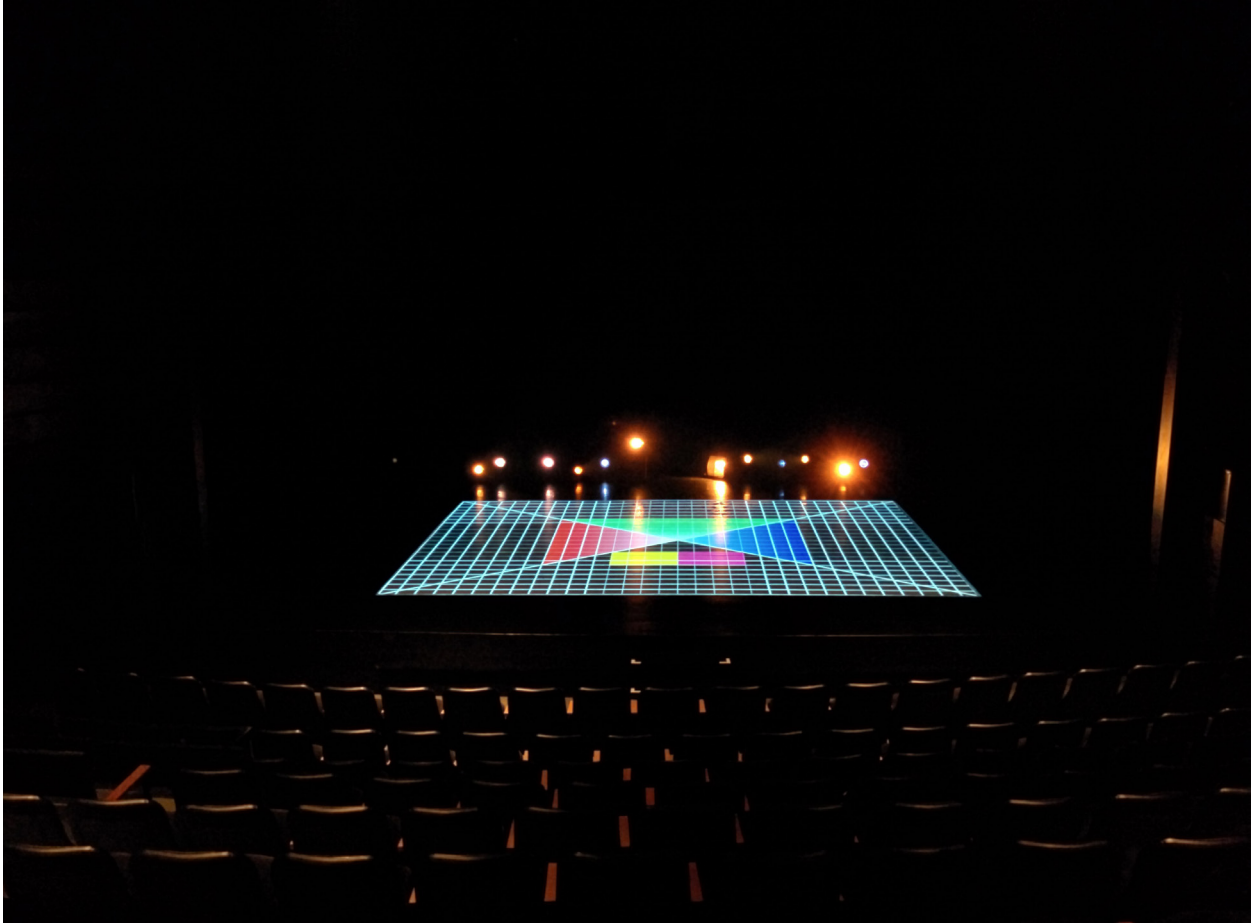


FIG 3.2 - Test pattern and colour tests on grey dancefloor. This image indicates the controlled size of the dancing space. Photographed by Eric Chad.

of the camera to see through the visible spectrum into the low infra-red. Visible spectrum light was further filtered out with a Bower 720nm IR pass filter. To illuminate the dancer, four 48 LED infrared illuminators were used as 'shin' lights. This low angle was chosen so that the side lights would illuminate the performer and not the stage, and would not create infrared shadows on the floor. The camera was then able to see the dancer being illuminated, without seeing the visible spectrum output of the projectors (fig 3.3). This prevented feedback between the projector and the camera, and allowed the camera to see a white-on-black contrasting image of the dancer on a visually dark stage. The image was fed into the computer as a composite signal through a Blackmagic Ultrastudio



FIG 3.3 - Left: Subject lit with both projector and infrared light, photographed within visible light spectrum. Right: Subject under same lighting conditions, photographed within infrared light spectrum. Note how projected image dissappears, leaving only lit subject.

Express capture card. The nature of the composite connection resulted in a latency of around 40ms, which was noticeable, but we were able to integrate it into the design of the show.

Running all technical departments from a single computer required multiple pieces of software running synchronously. QLab 3 was used to sequence and operate the show. QLab allowed for a tight integration between the technical elements and made recalling sequences for rehearsal extremely easy. For video, Isadora 2.0 was used. QLab communicated with Isadora using a MIDI pulse. Within Isadora, the MIDI message would be decoded as follows: pitch would direct to a cue number and velocity would indicate a fade time. This meant that sequencing video cues and adjusting video fade times could all be done within QLab. Live feed from the camera described above was first captured

into Mapio 2, where the fish-eye image could be warped back into square, and anything outside of our dance floor could be cropped out of the image. This was then sent to Isadora over Syphon. Video content for this show was a combination of live and pre-rendered video. All of the live rendering content was built directly in Isadora, while the prerendered content was built using a combination of Adobe Photoshop, Illustrator, After Effects, and Premiere. Isadora was also used to keystone the final projector output to match the rectangular dancefloor.

Lighting was operated out of LXConsole, a simplistic virtual lighting console that benefited the single laptop platform. The software was capable of importing our already built show file via USITT ASCII, and outputting one universe of DMX over of a low-cost ENTTEC DMX USB Pro. Additionally, LXConsole was capable of creating a QLab file from its cue information, so integrating the lighting cues into our master cue list was as simple as sliding the cues into place. QLab then communicated to LXConsole using MIDI Show Control (MSC) to cue lighting. We used an AKAI LPD8 MIDI controller to control lighting submasters such as the house lights, the fog level, and the work lights.

Outside of control, the lighting system was provided by our venues. The simple design requires 28 lighting fixtures and a hazer.

4 - Scene Breakdown

This section will discuss the show broken down scene by scene. Through this chapter I will discuss my motivations, technical patches, and design decisions through key scenes in the show. These will be framed through a description of the key themes of each scene as interpreted by myself through conversations with Chu.

4.1 - Just a Step

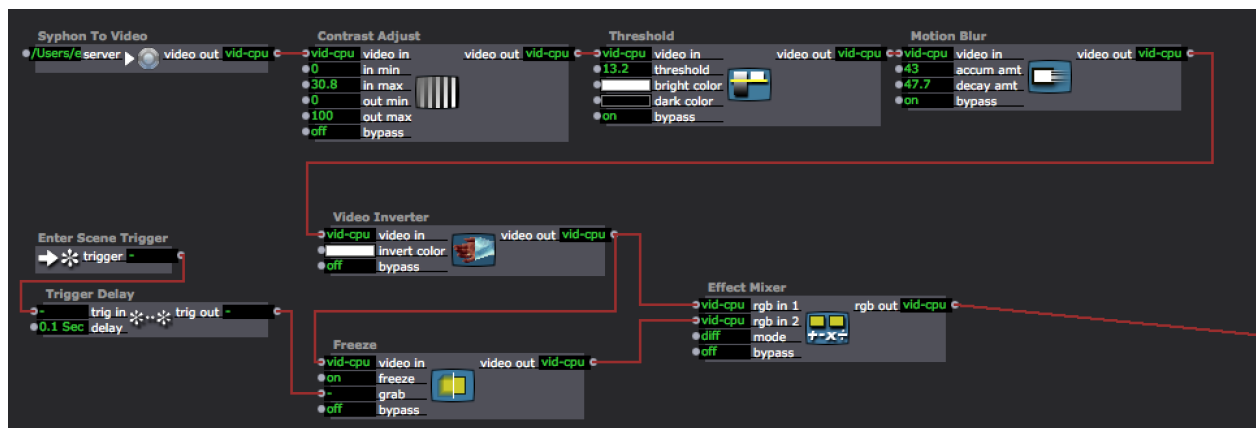


FIG 4.1 - *Just a Step* Isadora circuitry. Following basic image manipulation (top), video is processed through a 'freeze' (image grab) and then is subtracted from itself in the effect mixer.

This opening scene introduces the audience to our created world. The first image is a performer rehearsing in a warm incandescent spotlight. Suddenly he is joined by the projected image of his own shadow, casting his face into light and allowing him to be both seen and heard. As he recites a written text he is lit by the interactive projection element. This sequence introduces the audience to the nature of interactivity within the piece. The interactive shadow tracking is an effect accomplished using a freeze-difference network

within Isadora. Within this patch live fed infrared video is compared with a freeze-frame of the same setting before Chu walks into the image (fig 4.1). By looking only at the difference between these two images, the computer creates a perfect mask in the shape of Chu's shadow (fig 4.2).



FIG 4.2 - *Just a Step*, photo courtesy of Aaron Felske

4.2 - Leaning Piano

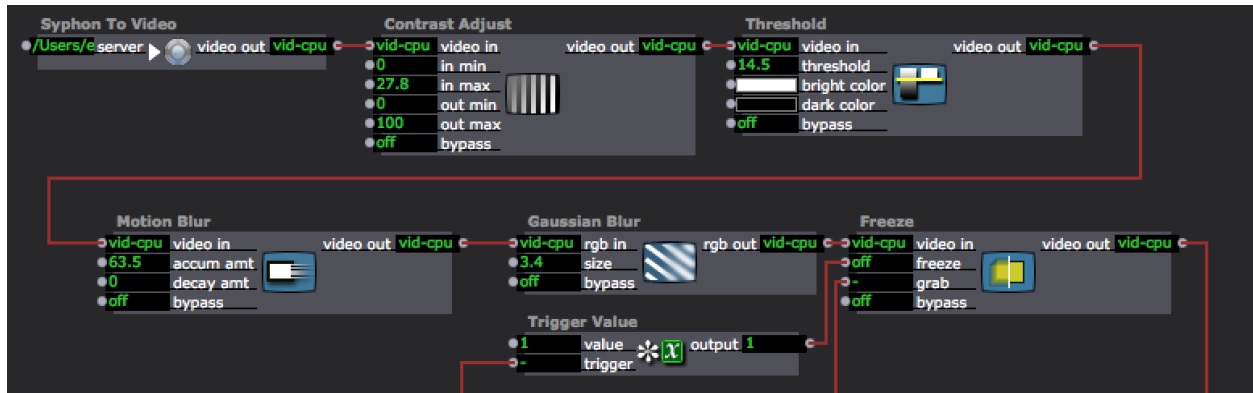


FIG 4.3 - *Leaning Piano* Isadora circuitry. Following basic image manipulation (top), video is processed through a 'Motion Blur' with a decay amount of 0. This leads to the production of light trails. The 'freeze' allows us to close the network.

Starting from a dark stage, this scene begins with Chu painting in his lighting through movement. This is done using a motion blur network with zero decay (Fig 4.3). Isadora accomplishes motion blur through adding frames together and then allowing the summed image to decay at a given rate. By reducing that decay rate to zero, each frame is added together into a continuous smear. Through a feed from the infrared camera, Chu's body then acts like a paintbrush. After a certain amount of light has been tracked in, the motion blur network is closed and no more light is added. He begins dancing within the light he has created, playing between the light and shadow (fig 4.4). The scene plays with memory and shadow and referential of a past performance.

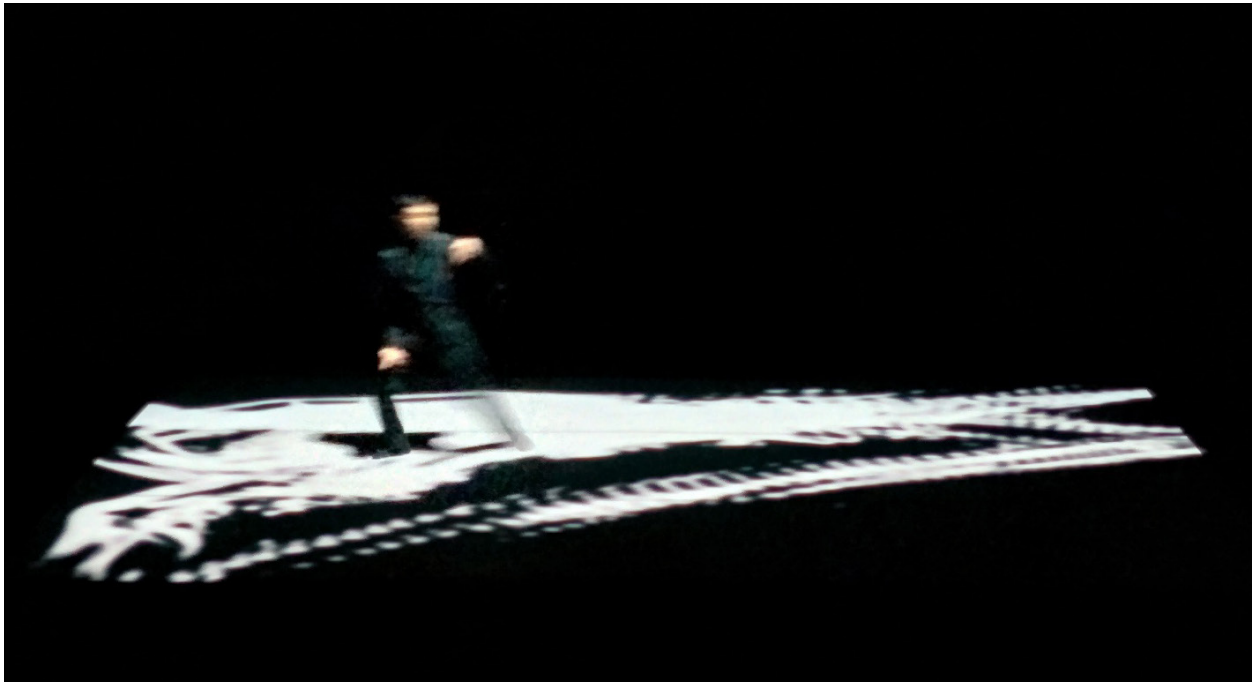


FIG 4.4 - *Leaning Piano*. Top: photo courtesy of Aaron Felske, Bottom: photo by Eric Chad

4.3 - Jittery Pills



FIG 4.5 - *Jittery Pills*, photo courtesy of Aaron Felske

Following a musical transition, the piece turns from reminiscing over past performances to what appears to be an artist's descent into addiction. The movement is very stationary, and the bulk of the choreography is in Chu's face and hands. At the top of the scene, we see a soft and undulating spotlight (fig 4.5, left panel). This light has the quality of a typical incandescent top light, but through subtle movement, it distinguishes itself as projection. This image is therefore more suggestive of the memory of a spotlight and falls into our 'introspective' aesthetic. Due to Chu's black costume, our focus is drawn to his face and his hands. The spotlight slowly shrinks and his face falls out of light. We're left with only an image of his hands floating in space. (Fig 4.5, right panel)

4.4 - Facial Exercises



FIG 4.6 - *Facial Exercises*, Top: photo courtesy of Aaron Felske, Bottom: Neon chevron pattern built using Adobe After Effects and Adobe Illustrator

Our invitation into the internal emotion of our character is closed as Chu enters the stage wearing a smiling, plastic mask. The somber tone of the previous score is replaced by a 1960s era exercise tape for maintaining good facial appearances. This is very much in the presentational world, creating a feeling of golden age Las-Vegas. An actual spotlight replaces what was previously projector light. The image of chasing neon pink lights fills the

floor. Cold projector light is replaced by incandescent warmth. This scene takes on a very different tone than what we've seen so far in the piece, verging on comedic. The second dancer, Jenni Berthelot, enters without a mask and the scene highlights the contrast between a dancer with a plastic smile and one who can be emotionally read. This makes Berthelot the vessel for a doubt that eventually attacks Chu. Following a shift in music the front and side light transitions to a more menacing backlight. We move to a darker space.

4.5 - Clown Car



FIG 4.7 - *Clown Car*, screen capture of video courtesy of Aaron Felske

Now permeated by doubt, yet still trapped behind a plastic smile, Chu, trapped in a spotlight, searches for inspiration amid his memories. (Fig 4.7) This takes the form of a chorus line of perfectly synchronized iterations of himself. By creating a projection mask out of the spotlight Chu is lit by, the disk of light Chu is trapped in appears to float above the surface of the projected image, and the chorus line seems to hide below the

spotlight. This creates a sort of trompe-l'oeil, a falsely three dimensional image, with Chu looking down upon his dancing self. Satisfyingly, we found this illusion by accident while experimenting within our first residency. Finally, Chu dives out of the spotlight and the hiding dancers explode out of the spotlight and wash over him. It is a simple scene, but aesthetically it created an interesting and highly unique blend of incandescent and projector light.

4.6 - Esquevel II

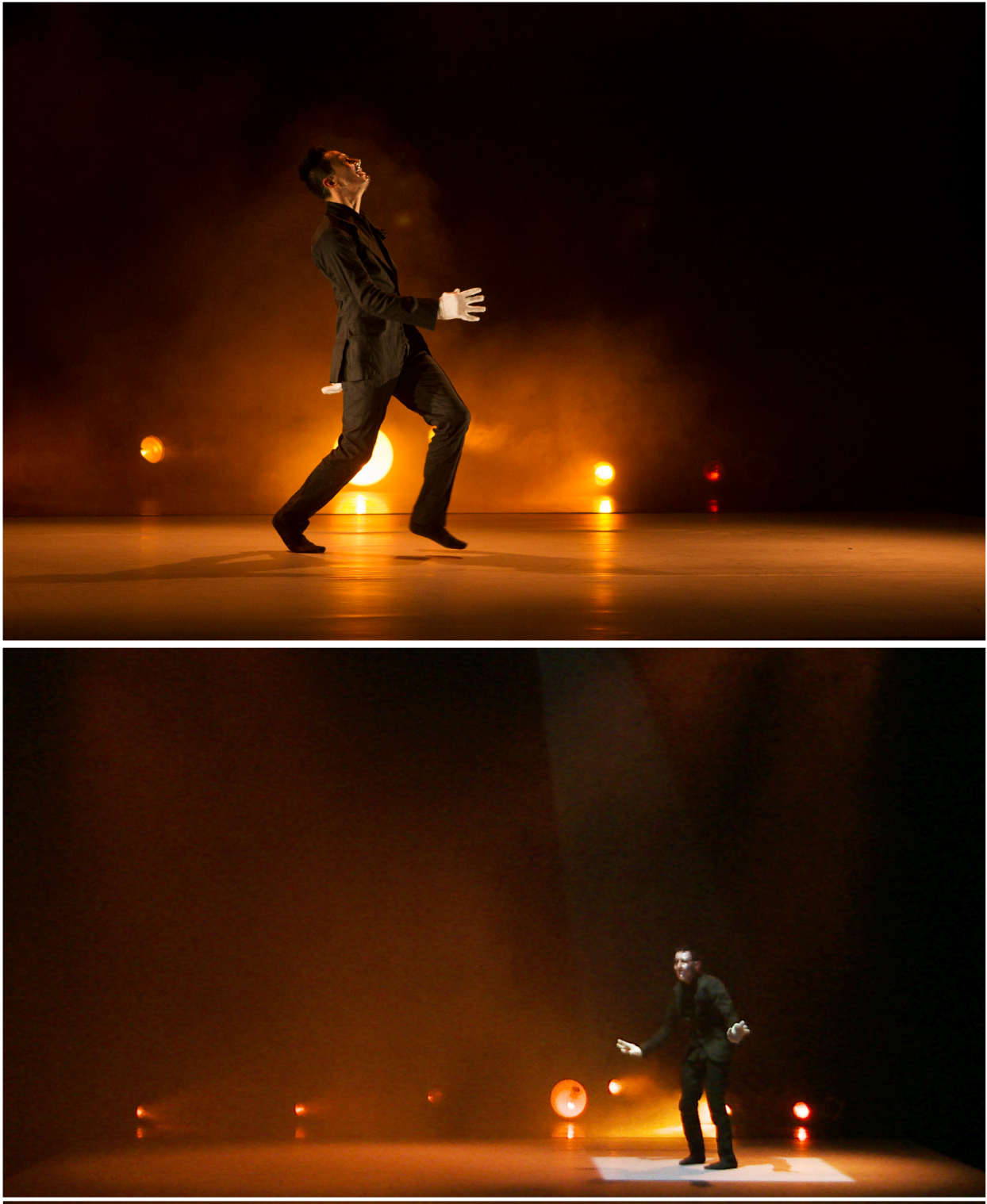


FIG 4.8 - *Esquevel II*, Top: photo courtesy of Aaron Felske, Bottom: Screen capture from video provided by Aaron Felske

The darker stage once again expands out into a big warm dance number. Our plastic performer seems comfortable in this performance environment. Berthelot reenters playing the second figure and joins Chu, once again playing with the differentiation between the two characters. Nearing the end of this scene, Berthelot leaves and Chu is swallowed up into a small projected box he cannot escape from, an indication of mental distress. The scene closes with Chu removing his mask, silhouetted by the row of upstage lights.

4.7 - Cutting Masks



FIG 4.9 - *Cutting Masks*, photo courtesy of Aaron Felske

Now unmasked, Chu re-enters the stage in a pool of projector light. The upstage lighting, that has been a warm symbol in previous scenes, is now cold. Chu begins to obsess over arranging and preparing his plastic masks, an allusion to his outward appearance. The ritual of cutting masks is to get them ready for performance. This is not just to modify how they look, but also to open up the eyes and nose to allow you to breathe and see easier. Berthelot enters and begins to create a more engulfing mask, wrapping Chu's face in saran wrap. While Chu is lit, Berthelot works in shadow. The saran wrap extends off into shadow. Chu, suffocated, moves to the other side of the stage. There is an inversion in the projection, lighting the remainder of the stage. Chu then collapses, and exits the stage, leaving a trail of projected black behind him. This dark trail is accomplished using the same sort of techniques as in "Leaning Piano", the only difference is that the image is inverted and the trail is black.

4.8 - Whispering



FIG 4.10 - *Whispering*, photo courtesy of Aaron Felske

The lighting for “Whispering” experiments with heavy smoke use and the unique opportunities our groundrow presents. Light, in combination with heavy smoke, creates a sort of cyclorama, allowing us to see the performers’ bodies as silhouettes against the beams. The section begins as a solo, eventually Berthelot falls into centre stage, joining Chu. Only now do we see her, even though she has been standing at centre for some time. She is able to hide behind the curtain of light we have created. The scene plays with obsession, through repeated phrases and tightly synchronized movement.

4.9 - Drumming

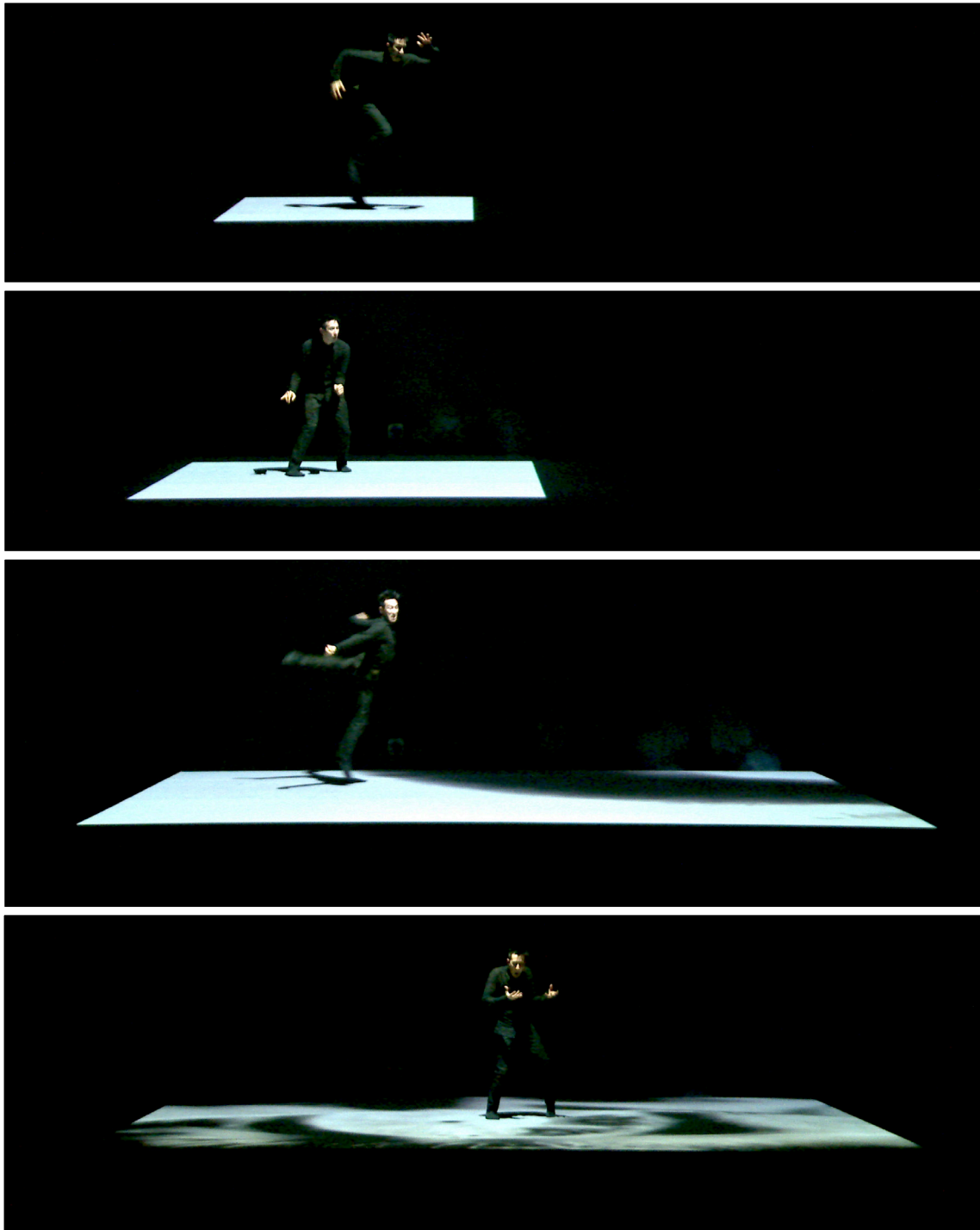


FIG 4.11 - *Drumming*. Series of screen captures from video provided by Aaron Felske. Top and upper-Middle: and expanding rectangle of light. Lower-middle: imagery of a moving bar of light projected on an eye. Bottom: Peter dancing within the pupil of an eye.

“Drumming” takes position as the rhythmic climax to the piece. This is a percussive sequence, wherein Chu is running from something he cannot escape and obsessing over perfection. Initial planning for the design of this sequence was inspired by the thought of being trapped on a four-by-four, a tool used when rehearsing tap-dance. This idea then took form as being trapped in a series of squares and eventually into incorporating imagery of Chu being trapped within his own gaze. Using footage of an eye structurally fit many aspects of the piece. The eye is the gateway to the soul and as such it can express obsession, focus, depression, health, stress, and happiness. The eye imagery is further abstracted to fit the tone of the piece. Through a technique of filming an eye while projecting imagery onto it, dynamic and organic images that are abstract. As the imagery evolves, the abstract imagery simplifies back to a more recognisable eye, and Chu is trapped within a pupil. At the end of “Drumming” Chu collapses, drained. We once again transition into the same infrared painting patch as we had used in both “Leaning Piano” and “Cutting Masks”, but this time the light is painted in by Berthelot, manipulating Chu’s body as a paintbrush. A world which was once manipulated by Chu is out of his control and he is left powerless by his internal character.

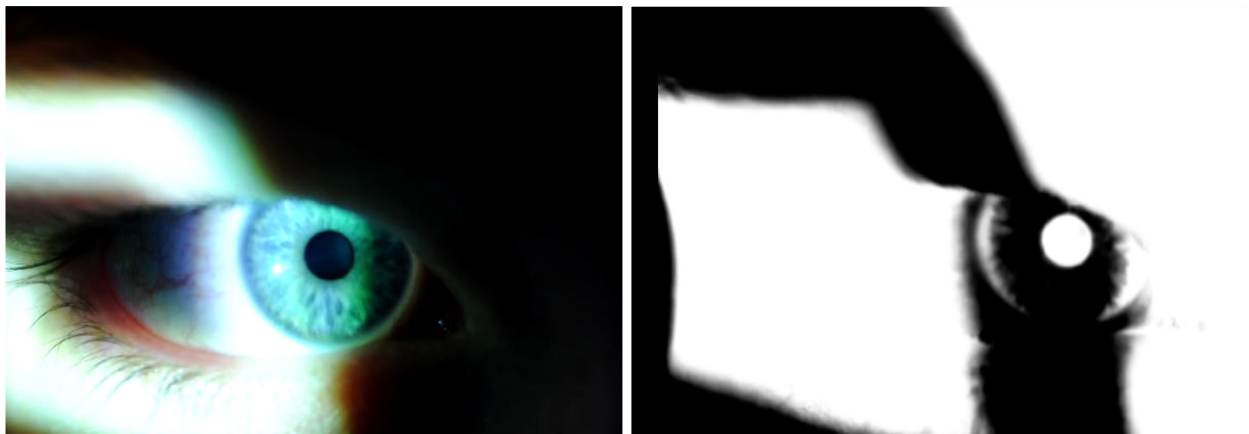


FIG 4.12 - Left: Uneffected footage of projected light on an eye. Right: Similar effected footage used to light ‘Drumming’.

4.10 - Gala Solo

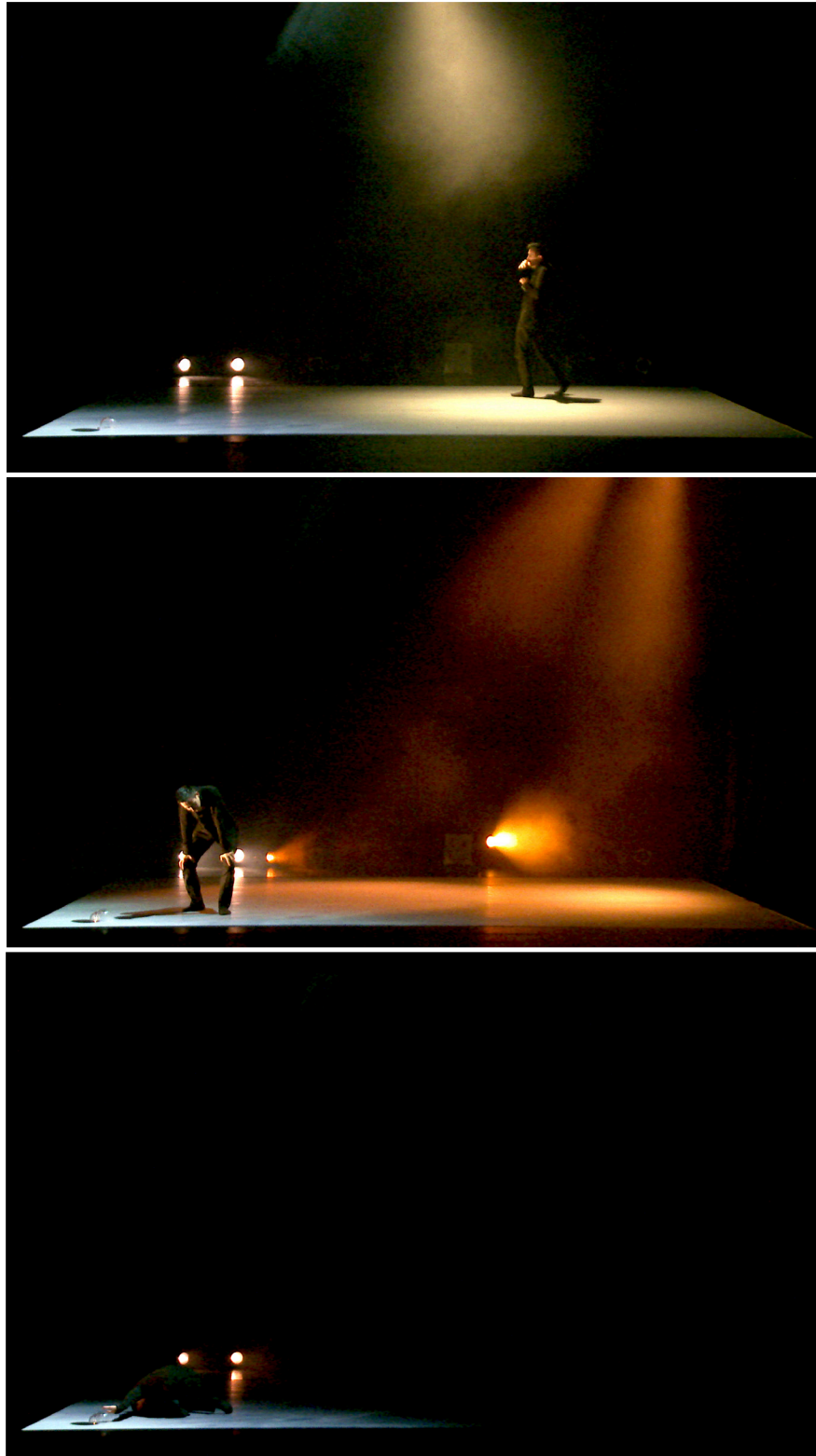


FIG 4.13 - *Gala Solo*. Series of screen captures from video provided by Aaron Felske.

Design for this final scene helps to drive the piece to its cathartic finale. We present a striking contrast along the stage's diagonal. In this way a choice is presented to Chu. Conscious of the mental effects of smile-masking, can the performer abandon his false appearances and continue to perform? Or is he trapped within a mental cage behind this mask? Unlike the rest of the piece, the performative world now seems inviting by contrast to the colder introspective space downstage right. Chu fights to stay in this warm space, but inevitably returns to the mask. The last light doesn't fade out, but rather slides off of the corner of the stage, abandoning Chu's body. The show ends on an image of Chu's outstretched arm reaching for the mask.

5 - Closing Thoughts and Future Intentions

I am extremely happy with the outcome of this piece. I believe it presents a compelling study of the phenomenon of smile-masking and how it applies to the performing arts. I believe the design suits the themes of the piece, and gives the show a unique identity. I believe lighting and projection both exist in the piece in support of the central themes and in support of each other. They are inseparable.

As the production moves into its next life and hopefully into a remount, there are only a few technical changes I intend to make. I will replace the camera we used with one of higher resolution: moving from NTSC to 720p and from composite video to HD-SDI. This should remove most of the latency we observed in this creation. Moving from interlaced footage to progressive scan should also allow for more precise mapping and more responsive mapping in faster moving segments. I believe this will largely improve the interactive content. I would also move to a more modern projector in order to increase the resolution and increase the contrast ratio. However, because the choreography of the piece is formatted for a 4:3 stage, a newer 16:9 projector would require large design changes.

The success of this show was a proof of concept in opting for a single operator, integrated, and interactive, hardware system. It gave me confidence that the same methodologies can be applied moving forward into new programming frameworks such as Derivative's Touchdesigner. Touchdesigner opens many more doors in regards to working with live data, while still being able to apply similar techniques developed in this

show such as using this identical infrared system. The single-computer-single-operator format was successful. This format removes a lot of the variables that come with relying on venue operators and equipment. This was successful largely due to QLab being used as the central cuing system. It's ability to trigger multiple types of media lead to a precise and well bound show.

This build process was an absolute pleasure and an excellent example of what can be created with strong cooperation between creator and designer. I enjoyed being both the lighting and projection designer. It allowed me to search for the balance between the two departments and I was able to achieve the results I had intended. Both departments work within the same medium but with different tools. They have the ability to clash, or even destroy each other, if not considered mutually. In a situation with two independent designers there is always an element of compromise. Alone, I was able to create a blend between projector light and incandescent light that acknowledges, uses, and presents the two mediums' individual assets and limitations.

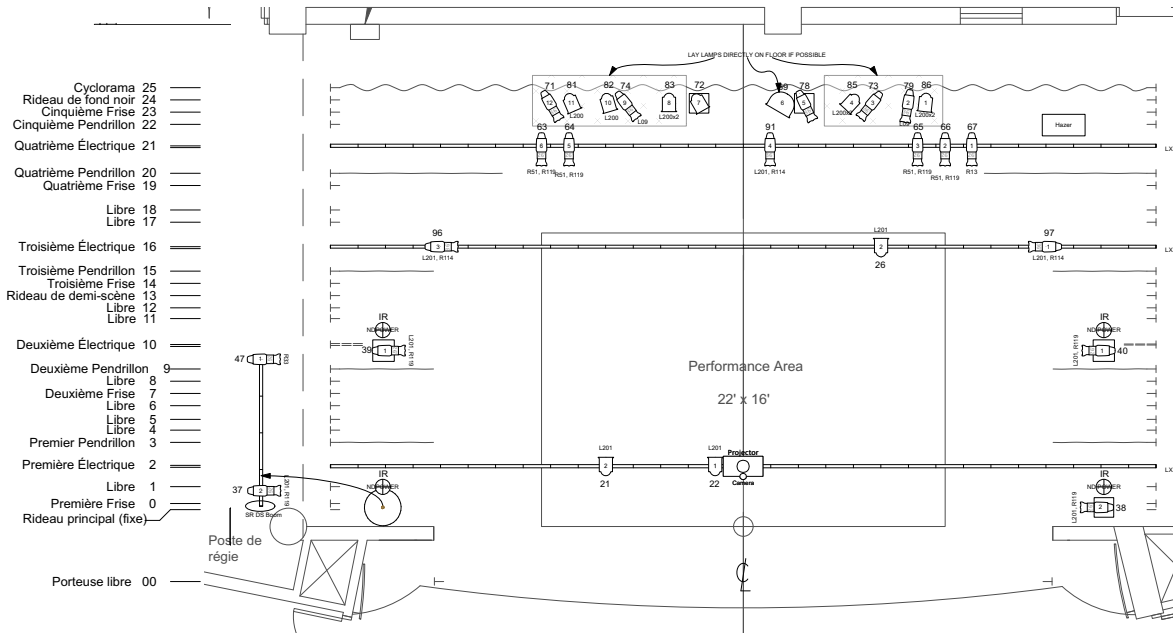
References

Chu, Peter. "Works" *Chuthis*. N.p., n.d. Web. 19 Jan. 2016.

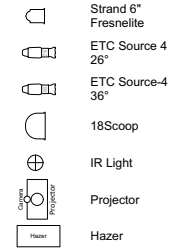
Weiss, Freider. "Infrared." *EyeCon - Video Motion Sensing*. N.p., 23 Dec. 2008. Web. 19 Jan. 2016.

Appendix A - Production Documents

Lighting Plot (not to scale)



Symbols



Typical



Color Summary

Color	Size	Count
L09	6.25"	2
L200	7.5"	2
L200x2	7.5"	3
L201	7.5"	3
L201, R114	6.25"	3
L201, R119	6.25"	4
R13	6.25"	1
R33	6.25"	1
R51, R119	6.25"	4

Notice of Disclaimer of Liability:
This drawing and its associated paperwork, referred to as the "Plot", are intended as a general outline of the placement, purpose, colour, and control configuration of the lighting equipment described herein, referred to as the "Lighting System". It is not intended to provide all the necessary information to safely organize, assemble and use the Lighting System and should not be relied on for such. All applicable local, provincial and federal codes governing the use of of the Lighting System and its components should be followed. Where the Plot indicates any use of the Lighting System that would contravene the aforementioned codes, the Lighting System shall be adapted to meet the applicable code. The designer will not be liable for any claims of direct, indirect, incidental, special, consequential or other damages arising out of use of the Plot and the organization, assembly and use of the Lighting System described herein. Further, Chuthis, Group, by its use of the Plot agrees to hold harmless the designer for any direct, indirect, incidental, special, consequential or other damages arising out of the use. Any written or oral information or advice given by the designer will in no way increase their liability and this notice is expressly understood to extend to all such written or oral information or advice given by the designer to directors, employees, agents, co-producers, contractors, sub-contractors or volunteers of Chuthis, Group.



Production Title		Chuthis. gp presents: SMILE MASKING + FACE HER	
Drawing Title		LIGHTING PLOT (w vertical positions)	
Designer	Eric Chad	Director	Peter Chu
Drawn By	EC	Scale	1/4" = 1'
Version	DansEncore	Drawing No.	1
Date	22/04/15	of	1
CAD File Name	DansEncore		

Chuthis. gp pres... CHANNEL HOOKUP

Page 1 of 1

















PCHU DansEncore.lw5

2015-06-16

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Festival International DansEncore
Trois Rivières

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Chan	Dm	Position	U#	Purpose	Type & Acc & W	Color	Gobo
(21)		LX #1	2	Top	6" Fresnelite 500w	 L201	
(22)		LX #1	1	Top	6" Fresnelite 500w	 L201	
(26)		LX #3	2		6" Fresnelite 500w	 L201	
(37)		SR Boom 1	2		Source 4 26deg 575w	 L201, R119	
(38)		SL Shin 1	2		Source 4 26deg 575w	 L201, R119	
(39)		SR Shin 2	1		Source 4 26deg 575w	 L201, R119	
(40)		SL Shin 2	1		Source 4 26deg 575w	 L201, R119	
(47)		SR Boom 1	1		Source 4 26deg 575w	 R33	
(63)		LX #4	6	Back Fingers	Source 4 26deg 575w	 R51, R119	
(64)		LX #4	5	Back Fingers	Source 4 26deg 575w	 R51, R119	
(65)		LX #4	3	Back Fingers	Source 4 26deg 575w	 R51, R119	
(66)		LX #4	2	Back Fingers	Source 4 26deg 575w	 R51, R119	
(67)		LX #4	1	Float Spot	Source 4 26deg 575w	 R13	
(71)		US FLOOR	12		Source 4 36deg 575w		on floor
(72)		US FLOOR	7		6" Fresnelite 500w		ON SHIN
(73)		US FLOOR	3		Source 4 36deg 575w		on floor
(74)		US FLOOR	9		Source 4 36deg 575w	L09	on floor
(78)		US FLOOR	5		Source 4 36deg 575w		ON SHIN
(79)		US FLOOR	2		Source 4 36deg 575w	L09	on floor
(81)		US FLOOR	11		6" Fresnelite 500w	 L200	on floor
(82)		US FLOOR	10		6" Fresnelite 500w	 L200	on floor
(83)		US FLOOR	8		6" Fresnelite 500w	L200x2	on floor
(85)		US FLOOR	4		6" Fresnelite 500w	L200x2	on floor
(86)		US FLOOR	1		6" Fresnelite 500w	L200x2	on floor
(89)		US FLOOR	6		Scoop		on floor
(91)		LX #4	4	Cold SL Top	Source 4 36deg 575w	 L201, R114	
(96)		LX #3	3	Wide Side	Source 4 36deg 575w	 L201, R114	
(97)		LX #3	1	Wide Side	Source 4 36deg 575w	 L201, R114	

Chuthis. gp p... INSTRUMENT SCHEDULE

Page 1 of 2

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LX #1

U#	Purpose	Type & Acc & W	Ckt	C#	Color	Gobo	Gsiz	D	Chan
1	Top	6" Fresnelite 500w			 L201				(22)
2	Top	6" Fresnelite 500w			 L201				(21)



LX #3

U#	Purpose	Type & Acc & W	Ckt	C#	Color	Gobo	Gsiz	D	Chan
1	Wide Side	Source 4 36deg 575w			 L201, R114				(97)
2		6" Fresnelite 500w			 L201				(26)
3	Wide Side	Source 4 36deg 575w			 L201, R114				(96)


LX #4

U#	Purpose	Type & Acc & W	Ckt	C#	Color	Gobo	Gsiz	D	Chan
1	Float Spot	Source 4 26deg 575w			 R13				(67)
2	Back Fingers	Source 4 26deg 575w			 R51, R119				(66)
3	Back Fingers	Source 4 26deg 575w			 R51, R119				(65)
4	Cold SL Top	Source 4 36deg 575w			 L201, R114				(91)
5	Back Fingers	Source 4 26deg 575w			 R51, R119				(64)
6	Back Fingers	Source 4 26deg 575w			 R51, R119				(63)

SR Boom 1

U#	Purpose	Type & Acc & W	Ckt	C#	Color	Gobo	Gsiz	D	Chan
1		Source 4 26deg 575w			 R33				(47)
2		Source 4 26deg 575w			 L201, R119				(37)

SR Shin 2

U#	Purpose	Type & Acc & W	Ckt	C#	Color	Gobo	Gsiz	D	Chan
1		Source 4 26deg 575w			 L201, R119				(39)

Chuthis. gp p... INSTRUMENT SCHEDULE


Page 2 of 2

PCHU DansEncore.lw5


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SL Shin 1

U#	Purpose	Type & Acc & W	Ckt	C#	Color	Gobo	Gsiz	D	Chan
2		Source 4 26deg 575w			 L201, R119				(38)

SL Shin 2

U#	Purpose	Type & Acc & W	Ckt	C#	Color	Gobo	Gsiz	D	Chan
1		Source 4 26deg 575w			 L201, R119				(40)

US FLOOR

U#	Purpose	Type & Acc & W	Ckt	C#	Color	Gobo	Gsiz	D	Chan
1		6" Fresnelite 500w			L200x2	on floor			(86)
2		Source 4 36deg 575w			L09	on floor			(79)
3		Source 4 36deg 575w				on floor			(73)
4		6" Fresnelite 500w			L200x2	on floor			(85)
5		Source 4 36deg 575w				ON SHIN			(78)
6		Scoop				on floor			(89)
7		6" Fresnelite 500w				ON SHIN			(72)
8		6" Fresnelite 500w			L200x2	on floor			(83)
9		Source 4 36deg 575w			L09	on floor			(74)
10		6" Fresnelite 500w			 L200	on floor			(82)
11		6" Fresnelite 500w			 L200	on floor			(81)
12		Source 4 36deg 575w				on floor			(71)

Cue List

	Number	Q	Target	Pre Wait	Action	Post Wait	
🔊	0	PX 1-1 Blackout		00:00.00		00:00.00	
🔊	1	LX 0.1 house		00:00.00		00:00.00	
🔊	2	▼ SX Preshow		00:00.00		00:00.00	↓
🔊		▼ Preshow Music		00:00.00		00:00.00	↓
🔊		06 The 3rd Man Theme.m4a	+	00:00.00	02:28.96	02:28.96	↓
🔊		08 Gypsy Lament.m4a	+	00:00.00	03:31.47	03:31.47	↓
🔊		11 All of Me.m4a	+	00:00.00	02:17.57	02:17.57	↓
🔊		15 Guadalajara.m4a	+	00:00.00	02:40.20	02:40.20	↓
🔊		22 Fantasy.m4a	+	00:00.00	03:11.60	03:11.60	↓
▶		start 06 The 3rd Man Theme.m4a	06 The 3rd Man Theme.m4a	00:00.00		00:00.00	
🔊	3	SX fade and stop Preshow Music	Preshow Music	00:00.00	00:10.00	00:00.00	↓
🔊		LX 0.2 house to half		00:00.00		00:00.00	
🔊	101	LX 1 BLACK OUT		00:00.00		00:00.00	
🔊	102	LX 1.5 Jenni enters		00:00.00		00:00.00	
🔊	103	▼ Face Her		00:00.00		00:00.00	↓
🔊		SX Face Her 03-21.aif	+	00:00.00	07:08.45	00:00.00	
🔊	104	PX 27-100 Jenni Walk DS		00:00.00		00:00.00	↓
🔊		LX 2 Jenny walk DS		00:00.00		00:00.00	
🔊	105	PX 28-100 Jenni drops to floor (hand in mouth)		00:00.00		00:00.00	↓
🔊		LX 3 Jenny moves to floor		00:00.00		00:00.00	
🔊	106	LX 4 Jenni rushes DS		00:00.00		00:00.00	↓
🔊		PX 29-50 Dimmer Video Follow		00:00.00		00:00.00	
🔊	107	LX 5 jenni walk to SR		00:00.00		00:00.00	
🔊	108	PX 28-120 rubs lip (Portraits)		00:00.00		00:00.00	↓
🔊		LX 6 Jenny portraits		00:00.00		00:00.00	
🔊	109	LX 6.1 Jenni with hops		00:00.00		00:00.00	
🔊	110	LX 7 exit		00:00.00		00:00.00	
🔊	111	PX 1-50 FTB		00:00.00		00:00.00	
🔊	112	LX 8 bow		00:00.00		00:00.00	
🔊	201	▼ Intermission		00:00.00		00:00.00	↓
🔊		LX 9 intermission		00:00.00		00:05.00	↓
🔊		SX Whatchamacallit.m4a	+	00:00.00	02:33.24	00:00.00	↓
🔊		PX 43-64 A moment please		00:00.00		00:00.00	↓
🔊		PX 1-64 FTB		02:25.00		00:00.00	
🔊	202	LX 9.1 house2half intermission		00:00.00		00:00.00	
🔊	203	LX 9.5 FTB intermission		00:00.00		00:00.00	
🔊	301	▼ Smile Masking (go will capture for intro)		00:00.00		00:00.00	↓
🔊		LX 10 open curtain		00:00.00		00:10.00	↓
🔊		▼ Only a step		00:00.00		00:00.00	↓
🔊		PX 2-1 Shadow hat capture		00:00.00		00:00.00	
🔊	302	PX 2(2)-1 Shadow hat fade in		00:00.00		00:00.00	
🔊	303	▼ Leaning Piano Transition (will start Leaning)		00:00.00		00:00.00	
🔊		LX 11 gasp		00:00.00		00:00.00	
🔊		SX Leaning Piano Transition	+	00:00.00	02:23.72	00:00.00	
▶		START Leaning Piano - Jittery Pills (+MIDI) - Facial Exercises	START ABOVE Leaning Piano - ...	02:12.00		00:00.00	
🔊		PX 1-100 B/O		00:00.00		00:00.00	
🔊	304	LX 12 leaning piano		00:00.00		00:07.00	↓
🔊		PX 21-100 Leaning piano capture (with B/O complete)		00:00.00		00:00.00	
🔊	305	▼ Leaning Piano stop capture (will hop down)		00:00.00		00:00.00	↓
🔊		PX 21(2)-1 Leaning piano stop capture		00:00.00		00:00.00	↓
▶		GOTO Facial Exercises MIDI	306	00:00.00		00:00.00	
🔊		▼ START ABOVE Leaning Piano - Jittery Pills(+MIDI) - Facial Exercises		00:00.00		00:00.00	↓
🔊		SX Leaning Piano	+	00:00.00	05:56.00	00:00.00	↓
🔊		▼ Jittery Pills MIDI		00:00.00		00:00.00	
🔊		PX 22-20 jittery pills (fade in izzy)		04:06.00		00:00.00	
🔊		PX 22(2)-1 jittery pills shrink1		04:44.00		00:00.00	
🔊		PX 22(3)-1 jittery pills shrink2		05:56.34		00:00.00	
🔊		▼ Facial Exercises		05:43.00		00:00.00	
▶		START facial 03-24.aif	SX START ABOVE facial 03-24.aif	00:00.00		00:00.00	
🔊		FADE SX Leaning Piano	SX Leaning Piano	00:00.00	00:05.00	00:00.00	
🔊		SX transition pno-facial.aif	+	00:00.00	00:39.88	00:00.00	
🔊		SX START ABOVE facial 03-24.aif	+	00:34.88	07:11.96	00:00.00	
🔊	306	▼ Facial Exercises MIDI		00:00.00		00:00.00	↓
🔊		PX 31-20 facial exercises		00:00.00		00:00.00	
🔊	307	LX 13 facial peter enter		00:00.00		00:00.00	

308	LX 14 facial walk SR		00:00.00	00:00.00
309	LX 15 facial Walk USL		00:00.00	00:00.00
310	LX 16 facial USR corner		00:00.00	00:00.00
311	PX 1-120 FTB		00:00.00	00:00.00
312	LX 17 Floating Circle		00:00.00	00:00.00
313	Esquevel (+MIDI)		00:00.00	00:00.00
	Esquevel III +MIDI		00:00.00	00:00.00
	fade and stop SX START ABOVE facial 03-24.aif	SX START ABOVE facial 03-24.aif	00:00.00	00:10.00
	go to LX 21 Cutting masks	314	00:00.00	00:00.00
	SX part 3-4 - Esquevel 1-3.aif		00:00.00	04:34.93
	fade SX part 3-4 - Esquevel 1-3.aif	SX part 3-4 - Esquevel 1-3.aif	00:00.00	00:05.00
	PX 11-30 Tug-o-dancer		00:53.00	00:00.00
	PX 1-1 FTB		01:40.00	00:00.00
	PX 13-10 Clown Car		01:53.00	00:00.00
	LX 18 esquevel build		02:03.00	00:00.00
	LX 19 esquevel with square		03:37.30	00:00.00
	PX 15-100 Box		03:44.50	00:00.00
	PX 15(2)-1 blurout		04:15.00	00:00.00
	LX 20 all floors		04:22.00	00:00.00
	PX 1-120 FTB		04:22.00	00:00.00
	START cutting masks	SX cutting masks	04:29.00	00:00.00
	Cutting Masks		00:00.00	00:00.00
	SX cutting masks		00:00.00	04:34.00
	start whisper drum	START ABOVE whispering drum...	04:15.00	00:00.00
314	LX 21 Cutting masks		00:00.00	00:00.00
	PX 33-120 Cutting masks USR Spot		00:00.00	00:00.00
315	PX 33(2)-1 Cutting masks Invert		00:00.00	00:00.00
316	PX 33(3)-1 Cutting masks Smear		00:00.00	00:00.00
317	LX 22 jenni cleaning masks		00:00.00	00:00.00
	PX 33(4)-1 Cutting masks Whiteout		00:00.00	00:00.00
318	Black, whisperingLX1 and jumptog		00:00.00	00:00.00
	PX 36-120 Black		00:00.00	00:00.00
	LX 23 repeated sequences		00:00.00	00:00.00
	go to Whispering lx	319	00:00.00	00:00.00
	START ABOVE whispering drumming + MIDI		00:00.00	00:00.00
	SX part 6 - whispering drumming cut new.aif		00:00.00	08:16.66
	LX 27 Drumming		04:10.65	00:00.00
	PX 32-30 Drumming eye vid		04:09.65	00:00.00
	PX 20-50 Drumming2 treadmill		06:57.51	00:00.00
	PX 20(2)-1 drumming2 treadmill 2		07:12.81	00:00.00
	PX 20(3)-1 drumming2 blur to follow		07:37.00	00:00.00
319	Whispering lx		00:00.00	00:00.00
	LX 24 Swhispering cross SR		00:00.00	00:00.00
320	LX 25 Whispering spinning		00:00.00	00:00.00
321	LX 26 Whispering falling		00:00.00	00:00.00
322	Gala Solo		00:00.00	00:00.00
	SX Excerpt From More Than A Piece 02_14_15 - Master.aif		00:00.00	05:27.25
	PX 38-20 gala spot		00:00.00	00:00.00
323	PX 38(2)-1 mask spot (W PETER)		00:00.00	00:00.00
324	LX 28 gala two people		00:00.00	00:00.00
325	LX 29 gala with me now		00:00.00	00:00.00
326	LX 30 gala stab		00:00.00	00:00.00
327	LX 32 gala return to SR		00:00.00	00:00.00
328	LX 33 FTB		00:00.00	00:00.00
	PX 38(3)-120 shrink to black	No MIDI destination.	00:00.00	00:00.00
401	LX 34 bows		00:00.00	00:00.00
402	LX 35 ftb		00:00.00	00:00.00
403	LX 36 house up		00:00.00	00:00.00