

**(In)Determinacy:**

**Incorporating Openness in Programmed Music and Performance**

Sara Wentworth

PhD in Digital Arts and Humanities

National University of Ireland, Cork

School of Music and Theatre - Department of Music

January 2015

Digital Arts and Humanities Head of Department: Professor Brendan Dooley

Supervisor: John Godfrey

## **MOIETY**

extracted

full document:

<https://cora.ucc.ie/handle/10468/4043>

## Introduction

*Moiety* was my second collaboration with Eat My Noise Productions, premiering as part of the 2013 Cork Midsummer Festival, in the CIT School of Music Stack Theatre. The performance consisted of nine pieces, based on the Nine Stages of Democracy often attributed to Scottish historian Alexander Tytler: spiritual faith, courage, liberty, abundance, selfishness, complacency, apathy, dependence, and bondage<sup>1</sup>. The music for this project was co-written by Peter Power and David Duffy, to be performed by two percussionists, Alex Petcu and Tomas Gall. As ‘moiety’ is defined as “one of two equal parts,” or “one of two basic complementary tribal subdivisions,”<sup>2</sup> the piece capitalizes on the two performers’ differing styles and backgrounds. Alex is a classically trained percussionist, while Tomas is a kit drummer, specializing in rock and jazz. Art O’Laoire and I were to handle the interactive aspects of the performance. My role was as projection designer, and his as lighting designer.

## Theory & Structure

As with *A:Volution*, the collaborative structure was to collectively discuss thematic elements, create content separately, and then regroup in the performance space to bring everything together. In the initial meetings, Peter and David introduced the topics, and the idea to video map instruments. I insisted that if we were to map the marimba, there must be a conceptual reason to do so. To have the instrument simply light up when hit would be gimmicky, and difficult to achieve. Alex would not have us attach anything to the instrument, like sensors, and waveform analysis would require careful miking to be accurate. Eventually the composers determined that the electronic elements of the performance —digital music

and projections —came to represent various entities of external control—religion, politics, technology—in opposition to acoustic instruments representing individual agency. They chose to use the marimba map to represent an electronic marimba voice, to avoid the need of waveform or sensor input from live performance, and to fit the overall concept of the piece.

Once in the space, this time with the music composed well ahead of time, the interactive, visual, and lighting elements were built closely around the compositional and live performance elements. The show was performed in CIT's Stack Theatre, which is a black box theater. Because of this, we were able to place the audience on two sides of the performance space. As with *A: Volution*, Peter and David wished to break out of traditional concert staging formats, making the performance more intimate by bringing more of the audience to the periphery of the playing space. As there was no background projection surface in this format, my video design concentrated entirely on animating the stage floor and instruments, using one projector, facing straight downwards from the middle of the lighting grid.

Because Art wished to use a haze machine, I had the additional challenge of designing video not only for the projection surfaces, but for the space in between the projector and the floor, where the haze would reveal the projector beams.

The two percussionists and their equipment were placed mainly along the two sides of the room without an audience. The two composers were stationed with their instruments and controls in the center of the room.

<b><i>Moiety</i>: show structure</b>		
<b>Act</b>	<b>Music</b>	<b>Video</b>
<b>Preface</b>	Dark and ambient	Abstracted texts
<b>Spiritual Faith</b>	Light and beautiful. Alex Petcu on marimba	Blurry stained glass, as if light on floor through a window. Red projector light on all marimba keys.
<b>Courage</b>	Bold, rhythmic: forward-moving momentum. Tomas on kit, Alex on supportive percussion. Ambient background electronics	Sharp bursts of shapes: squares and prism-like lines.
<b>Liberty</b>	Compositional balance between Thomas, Alex, and electronic music. Positive, Hopeful. Additive Processes.	Additive Process using white circles, emulating tools and techniques used in lighting design. Ring of circles, tiny moving spotlights, and target-shaped ripple bursts.
<b>Abundance</b>	Primal, heavy-hitting rhythmic piece, consisting of a duet between kit drums and electronics	Explosions on drum hits. Blue grid corresponding with electronics.
<b>Selfishness</b>	Dark and ominous, drone and percussion, pierced by an high pitched melody	‘Oily’ video compilation, slightly altered by performer input. White spirals emanating from center correspond with high pitched melody.
<b>Apathy</b>	Alex improvises on custom-made glass marimba, Tomas plays blocks and bottles	None
<b>Complacency</b>	Acoustic and electronic marimba	White light illuminating electronic marimba notes on acoustic marimba keys. Dark room to highlight marimba keys.

<b><i>Moiety</i>: show structure</b>		
<b>Act</b>	<b>Music</b>	<b>Video</b>
<b>Dependence</b>	<b><i>part 1:</i></b> Acoustic and electronic marimba, ambient background electronics.	<b><i>part 1:</i></b> White light illuminating electronic marimba notes on acoustic marimba keys. Dark room to highlight marimba keys.
	<b><i>part 2:</i></b> Loud and percussive. Electronics and drum kit.	<b><i>part 2:</i></b> Colorful grid, triggered by MIDI drum pads. Dark room to highlight pad hits.
	<b><i>part 3:</i></b> Mixed acoustic percussion, electronic marimba, additional electronic percussion and melody.	<b><i>part 3:</i></b> White spirals, tiny moving spotlights, to compliment lighting design.
<b>Bondage</b>	Electronic drone.	Grid, animated logo.
<b>Spiritual Faith</b>	Light and beautiful, highlighting Alex Petcu on the marimba.	Stained glass, red projector light on marimba keys.
<b>End</b>	Silent	black

Table 1

As the audience entered the performance space, the abstracted poems *No Ladder Needs the Bird but Skies* by Emily Dickens,<sup>3</sup> and *One's not Half Two. It's Two are Halves of One*, by E.E. Cummings,<sup>4</sup> were projected across the entire performance space, accompanied by dark, ambient music and lighting. Both poems speak of the duality that the term 'moiety' describes.

‘Spiritual Faith’ features Alex on the Marimba. To match the theme of spirituality, I aimed for a stained glass aesthetic for the video element of the piece. The marimba is subtly lighted with red projector light, matching the yellow, orange and red color scheme of this act.

‘Courage’ highlights Tomas on the drum kit. For this, we create a transformation from ambient, natural looking light to clearly determined bursts of shapes. This is meant to illustrate the musicians beginning to engage with and control their environment in a more determinate manner.

Peter and David intended ‘Liberty’ to be an additive process, musically and visually. ‘Liberty’ utilizes a compositional balance between Thomas, Alex, and electronic music. The highlight of Art’s lighting design lay in four programmable moving lights, placed in each corner. With the projector, I chose to mimic the kinds of designs created with these movers, in an effort to develop a unity between lighting and projection to match the unity in musical elements. The additive process in the visuals included the systematic creation of patterns of white circles.

Up to this point in the show, we have created increasingly defined, complex relationships thematically between external forces and individualism, musically between Alex, Tomas, and the electronic element of the composition, and aesthetically between live action, lighting, and projections. During ‘Abundance,’ the relationships built up over the previous acts begin to break down and simplify.. This piece is a primal, heavy-hitting rhythmic piece. When drums are hit, video explosions burst across the floor. Electronic sounds are visually represented by a blue grid pattern assembling across the stage. This one-to-one relationship between drums illustrates a primal simplicity.

Following 'Abundance,' Peter and David wished for 'Selfishness' to be dark and 'oily,' permeated by 'electricity' illustrated by a high pitched melody. I chose white spirals, emanating from the composer's control panel in the center of the room, to illustrate this electricity. 'Selfishness' begins to rebuild the nuanced relationships lost in 'Abundance.'

For the sake of musical continuity within the show, 'Apathy' follows 'Selfishness,' leading to 'Complacency,' changed from Tytler's original order of selfishness, complacency, and then apathy.

'Apathy' once again returns to simplicity, and is intentionally juvenile and playful. 'Complacency,' and its successor, 'Dependence: part 1,' are comprised of a duet between electric and acoustic marimba voices. When the electric marimba voice plays, each note of the electric composition is illuminated, in real time, on the physical marimba, lit by the projector on the ceiling. The trajectory of the narrative leads from Alex discovering the electronic marimba as an entity, learning that he can teach it to play his compositions, and then coming to the realization that the marimba might have a mind of its own after all, ending with Alex following the lead of the electronic marimba voice.

In 'Dependence: part 2,' Tomas gains control of the electronics, creating bright bursts of projection light across the floor with his drum hits, breaking the momentum of the marimba piece.

In 'Dependence: part 3,' Alex temporarily regains control of the electronics with a single marimba hit, sending projected ripples leading from the control panel outward. Peter and David leave the control panel, and join Alex and Tomas on percussion to demonstrate

that the electronics were now self sufficient, and that at this point in the performance, the musicians are a supplementary aspect of the automated environment.

Entering 'Bondage,' the lights fade, and the musicians stand still. 'Bondage' is dark and ominous: a projected grid appears across the stage, symbolizing that all involved are gridlocked and cannot control the situation. In the center of the stage, around the control station, I used the logo which was used on the promotional material, and animated it to look like gears rotating at varying speeds.

As music, lights, and projections fade, we transition once again to 'Spiritual Faith,' ending the performance.

## **Technical Devices**

We programmed the show so that the video and lighting were entirely triggered by MIDI via the same Ableton file use to play the digital compositional elements, as well as by two drum pads controlled by Tomas. The live video aspect was structured and programmed to receive these MIDI cues via Isadora.<sup>5</sup>

Additionally, I created the video mask for the marimba using OpenGL and JavaScript within Max/MSP/Jitter, in which each key of the instrument could be independently highlighted with the input of the corresponding MIDI note.<sup>6</sup> This was imported to Isadora via Syphon,<sup>7</sup> and controlled with MIDI from Ableton. The mask was painstakingly matched to the instrument from the ceiling-mounted projector using javascript variables for key width, height, spacing, and 3D keystone correction in Isadora.

To abstract the poetry by Dickens and Cummings, I re-purposed the Processing sketch used in *A:Volution* used to do the same within that piece.<sup>8</sup>

To create a stained glass effect in ‘Spiritual Faith,’ I created two video states meant to simulate light as it would appear on the floor after entering through a stained glass window, using a combination of Motion and Final Cut Pro. One was a slowly fluctuating overall wash of orange and yellow color.<sup>9</sup> The other formed a circle around the two composers in the center of the room.<sup>10</sup> During the beginning of the piece, while Alex plays the marimba, the stained glass circle slowly fades in over thirty seconds. As Tomas begins triggering digital tones via a midi drum pad, the second video fades in and out over five seconds, triggered by each hit. The marimba is subtly lighted with red projector light using the marimba mask.

The video design for ‘Courage’ comprised of simple one to one triggering of two videos<sup>11</sup> according to live input from two MIDI drum pads. Envelope Generators in Isadora control the luminance of the videos via an HSL adjust actor. The first video, comprised of squares, is set to go from full luminance to none over one second. The second video, comprised of prism shapes, is set to fade over two seconds. As the videos are looping even when not visible, a different segment of the video appears on each hit, creating variation in the imagery. Halfway through the act, two new videos<sup>12</sup> of similar shape and form to the previous videos are assigned to each drum pad under the same parameters.

For ‘Liberty,’ I mimicked the kinds of designs created with moving lights with the projector. The opening of ‘Liberty’ consists of a quartz composer patch given to me by Art.<sup>13</sup> This patch, when viewed on a screen, looks like a generic snow simulation. However, when

projected from the ceiling, through haze, it appeared as if a thousand little moving spotlights were coming from the center of the ceiling, with each beam visible in the haze.

To create an additive process, I programmed a ring of circles,<sup>14</sup> one appearing after another as triggered by the music, around the two composers in the center of the performance space. With Isadora, I made this circle rotate, fade in and out, and fluctuate in diameter triggered by MIDI triggers given by Peter.

On the entry of the final chorus, the ring of circles fades briefly, and is then brought back, accompanied by an animated loop of bursts of target-shaped circles,<sup>15</sup> which erratically cover the entirety of the performance space. Though these circles are in no way triggered by the music in real-time, due to similar rhythmic speeds and previous video interactions, they give the illusion of being connected to the music.

In ‘Abundance,’ when the MIDI drum pads are hit, the luminance value of a video illustrating explosions<sup>16</sup> is set to full luminance, fading to black over half of a second. When Peter sends me MIDI representing the electronic melody of the piece, a blue grid pattern representing electricity similarly triggered and faded.

In ‘Selfishness,’ to achieve the ‘oily’ look Peter requested, I combined two videos given to me by Art from a bank of generic VJ clips he had on file: one which was a smooth, silky-looking dark blue,<sup>17</sup> and one of a swarm of jellyfish swimming underwater.<sup>18</sup> I combined these in Isadora, using the latter as a displacement filter on the former. After slowing both videos to less than half of the original speed, the resulting composition resembled a slowly moving, bubbly oil slick. In Isadora, I programmed MIDI inputs to control the displacement parameters on these two videos. First, I programmed an increasingly

wide range of displacement, with a minimum value increasing from five to thirty, and a maximum value increasing from ten to eighty over the course of two minutes. I then set a MIDI input to trigger a ramp value from the current minimum value to the current maximum value over half of a second, returning to the minimum over two seconds. In this manner, MIDI triggers sent by Peter created increasingly more evident displacements in the video over the course of the first two minutes of the piece. To represent electricity, I created a video in Motion using a spiral generator, further layered and looped in Final Cut for texture, as an additive layer to the existing video composition.<sup>19</sup> On a MIDI trigger from Peter, this video is brought in at full luminance, fading to black over one second.

‘Apathy’ is simply lighted, with no corresponding video. ‘Complacency’ is completely dark, save for lighted marimba keys, created with the marimba video map. The lights do not return until the third part of ‘Dependency.’

The first part of ‘Dependency’ makes use, again, of the marimba video-mapped keys. The second part of ‘Dependency’ is comprised of one video of an animated grid<sup>20</sup> generated with Motion, triggered by the MIDI drum pads. This time, the video is brought in at full luminance on a MIDI note-on message, and turned off with a MIDI note-off message. Each time a note-on message is received, the hue offset of a HSL actor is randomly assigned, changing the color of the video each hit.

The third part of ‘Dependence’ is brought in with a short video of a single ripple<sup>21</sup> which I triggered manually on the cue of Alex’s marimba note. Subsequently, the marimba map returns, visualizing the electronic marimba part, and the Quartz Composer patch provides tiny moving spotlights. In addition to these, a video created with similar parameters

to that which represented ‘electricity’ in ‘Selfishness’ enters,<sup>22</sup> rhythmically triggered by Peter’s Ableton file.

The video element of *Bondage* is comprised of a grid, which I created in Motion, and an animated *Moiety* logo. To animate the logo, I separated all elements to different video clips. In each video, the elements rotate from the center at the same speed. Using Isadora, I layer these videos in an additive process so that all are equally visible, and on a trigger from Peter, these slowly fade in over the grid. The speed of each video accelerates at differing rates over the course of two minutes, and decelerates over the course of 30 seconds, before all video fades out, returning to ‘Spiritual Faith,’ which employs the same video setup as used previously.

## Summary

*Moiety* is a piece that deals with balances between oppositions; those between two compositional styles, between two percussion styles, between the competing light sources of stage lights and projections, the opposition between individual will and natural and societal forces, and between digital composition and acoustic musicianship. The piece serves as an analogy to our relationship with technology: how we are involved in its development, and how we develop according to its influence.

The piece uses networked technology to create close relationships between sound, image, and environment. Video is generated and appropriated from a multitude of sources, and then programmed together in an interactive collage triggered by live performance elements.

## **Conclusion**

As at this point all parties involved had a better understanding of each other's aesthetics and creative processes, this collaboration felt more streamlined than the previous year. We were able to create a more solid structural framework with which to work, and we were able to achieve more in regards to interactivity and reactivity within the technology through better planning and closer communication.

Notes

1. See Loren Collins for discussion about attribution, and John Eberhard for discussion of the 9 Stages of Democracy.

2. See Moiety.

3. See Dickinson (1709).

4. See Cummings (72).

5. On the accompanying USB drive see `Moiety/showdocs/Moiety_Show1.izz` for project file.

6. On the accompanying USB drive see `Moiety/showdocs/Max_Marimba/marimba3.js` for JavaScript code, and `Moiety/showdocs/Max_Marimba/marimba3.maxpat` for its use within Max/MSP/Jitter.

7. See Syphon

8. On the accompanying USB drive see `/showdocs/Processing/poetry_announce/poetry_announce.pde` on the A:Volution DVD for source code.

9. On the accompanying USB drive see `Moiety/showdocs/clips/ripple2.mov`.

10. On the accompanying USB drive see `Moiety/showdocs/clips/stainedglass4.mov`.

11. On the accompanying USB drive see `Moiety/showdocs/clips/blockburst1.mov` (square) and `showdocs/clips/Dan_Wise-AndroidDreams_001.mov` (prism).

12. On the accompanying USB drive see `Moiety/showdocs/clips/pulse_square2.mov` (square) and `showdocs/clips/lines_prism.mov` (prism).

13. On the accompanying USB drive see `Moiety/showdocs/clips/confetti.qtz`.

14. On the accompanying USB drive see add0.jpg through add16.jpg in Moiety/showdocs/clips for frame by frame in-order additive process. For 'random' additive process, see random00.jpg through random16.jpg.

15. On the accompanying USB drive see Moiety/showdocs/clips/circles\_pulse\_spiral.mov.

16. On the accompanying USB drive see Moiety/showdocs/clips/lightburst.mov.

17. On the accompanying USB drive see Moiety/showdocs/clips/smooth\_curves.mov.

18. On the accompanying USB drive see Moiety/showdocs/clips/jellyfish.mov.

19. On the accompanying USB drive see Moiety/showdocs/clips/electric1.mov.

20. On the accompanying USB drive see Moiety/showdocs/clips/tron.mov.

21. On the accompanying USB drive see Moiety/showdocs/clips/circle\_pulse\_singleripple.mov.

22. On the accompanying USB drive see Moiety/showdocs/clips/electric2.mov.