

Game-Space: Unfolding Experiments in Subjectivity

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ABSTRACT

Using computer vision techniques and game engine technology, the interactive installation, *Game-Space*, explores subjectivity in mediated environments. The paper discusses the development of this work and its current conception as a machine for the experimental production of a new subjectivity in the form of a machinic hybrid.

Categories and Subject Descriptors

H.5.1 [Multimedia Information Systems]: Artificial, Augmented and Virtual Realities.

General Terms

Documentation, Performance, Design, Experimentation, Theory.

Keywords

Art, installation, body, affect, interaction, subjectivity, representation, immersion, aesthetics.

1. INTRODUCTION

Embodiment and subjectivity have long been focal points in art and philosophy. Contemporary art provides a laboratory to experiment with these concepts in ways that have a direct bearing on our understanding of the man/machine interface and how we might construct the future. As critic Thierry De Duve says, "one of the functions of contemporary art is to construct models of the contemporary subject." [1]

In his book, *Two-Way Mirror Power*, Dan Graham discusses how he explored the subject through film, video, performance and installation. He traces the development of his work from the 60s through the 80s, relating the embodied viewer to architecture and technology; describing his work as games that are "philosophical models of consciousness." [2] In particular, with pieces such as *Roll* (1970) and *Body Press* (1970 -1972), he describes his use of the camera apparatus in very literal terms, labeling them alternately as "subject," "object," "subject and object," depending on the proximity of the body and the relationship of the camera to architectural space. Graham would likely acknowledge the camera object is never truly "objective" but today, with the computer as intermediary, this is a foregone conclusion. This paper will discuss how the interactive installation, *Game-Space*, by Jack Stenner and Patrick LeMieux, plays with subjectivity, much as Graham did, exploring the effects of new technology. We desire to augment our understanding of embodied, intersubjective

relationships, in order to uncover alternative modes of being and lines of flight. While Graham was interested in the conflation of self with the object of desire, our work is concerned with the dissolution and dispersion of the self in mediation. We explore this through the construction of an experience that traverses critical moments in the history of Western image making. The following section will discuss the current version of *Game-Space* from a conceptual and experiential point-of-view, creating a mental image of the work. Section 3 will discuss the components of the work and describe how they are conceived to support the whole. Section 4 will address the nature of *Game-Space* as an experiment, revealing problems and solutions that have led to the current iteration of the work. Finally, Section 5 will briefly describe the techniques used to produce the project.

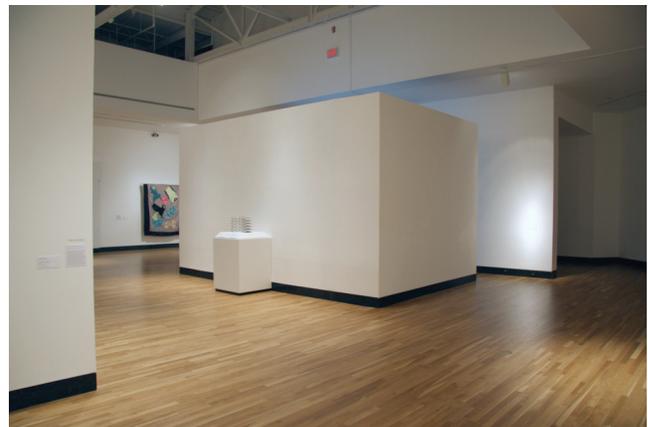


Figure 1. "Exterior" architecture of the installation as installed at The Harn Museum of Art.

2. AFFECTIVE PORTAL

Game-Space is a simulation of a simulation; it is an affective portal exploring the perception of perception. It functions, not as representation, but as a factory for the construction of a hybrid subject. It is a machine for exploring deterritoriality. The path of a subject, contemplating artworks within a gallery, drives a parallel representation in the form of a videogame. Each reflects the other, questioning our construction of "reality." What games are played? Whose point of view is represented? What relationships exist between the notion of play as expressed in the videogame and the play of the artist, viewer, work, and institution? How is subjectivity transformed when the artwork returns our gaze? How

might mediated experience create new subjectivities that extend and complicate our understanding of the world?

As the viewer approaches the work, they notice a pedestal and sculpture (see Figure 1). The sculpture appears to be an abstract architectural form composed of consumer-grade plastic. They may recognize that the structure bears a resemblance to Jeremy Bentham's design for the Panopticon (1785). As they look closer, they may also recognize that each floor of the architectural form is composed of cells or rooms that appear to be perspective machines such as those made famous by Dürer in the sixteenth century. The work appears to be a typical, object-based sculpture one might expect in this environment, but as they continue their movement through the gallery space they enter a room with two video projections arranged as a diptych (see Figure 2).



Figure 2. "Interior" view showing two projections.

One projection, framed from a three-quarter view, presents a video image of people observing the "panoptic" sculpture discussed previously. Only something is not quite right; the human forms in the video appear "real," but they are embodied within a virtual simulation of the space. The adjacent video projection appears to be the first-person viewpoint of the same subject, traversing the space in front of the sculpture, outside the room. They immediately recognize that the exterior is in collusion with the interior; they may even see themselves observing the sculpture moments earlier.

Some participants in this experience will assume the role of the voyeur, observing how others "play the game." Other participants will engage critically by mapping relationships between the components of the work, following lines of flight that suggest new understandings. They may go so far as to seek additional information and find that there is a networked component of the work that allows one to remotely engage the "hybrid subject" created by *Game-Space*. They will find that the "panoptic" sculpture "had eyes," constructing a database subject in the form of an affection-image. Yet others will turn and walk away.

3. GAME-SPACE

Each component of the *Game-Space* environment is titled independently. The titles reflect the content of the element and provide hints to its reading. As presented, linearly, in the context of a paper (this text), it might seem that a viewer must understand

the work sequentially and in total to understand the whole, but that is not necessary. Each component can be thought of as layers contributing to the potentiality of the whole, but not necessarily contingent. In a Deleuzian sense, they are "folds" in the continuity that is *Game-Space*.

3.1 After Diboutades

The "panoptic" sculpture one views while approaching *Game-Space* is titled *After Diboutades* (see Figure 3). According to the myth told by Pliny the Elder in *Historia Naturalis*,^[3] Diboutades invented projective drawing by placing a lamp on the far side of her lover and tracing his shadow projected on the opposite wall. This image immediately raises issues of virtual and real, absence and presence, abstraction and representation, embodiment and desire. Diboutades turns her back on her lover to commit his memory to form. Diboutades introduces us to the classical problems of mimesis.

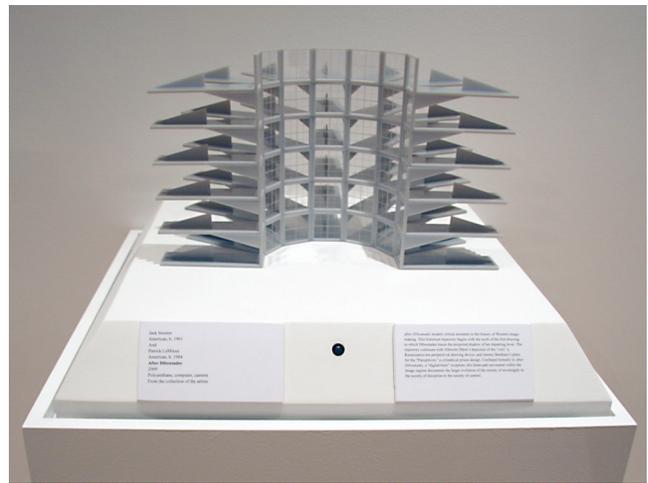


Figure 3. *After Diboutades* concept model.

Superficially, *After Diboutades* functions in the manner of traditional sculpture, providing a locus of contemplation through metaphoric and metonymic suggestion. It functions as a doorway, linking historical notions of subjectivity with the new. The visual references to perspective machines and the Panopticon conjure relationships that provide a feedback loop into an understanding of *Game-Space* as a whole. In this version of the Panopticon, there is no central guard tower; instead, the subject position of the viewer is implied to be that of omniscience. The gray plastic surface suggests a utilitarian or commercial purpose. It appears to be some type of mass-produced optical device. Tactically, however, the piece is not as innocent as it may seem. Embedded within the work is a video camera that captures images of the observer. The work "looks back" at the viewer and co-opts her representation for its own purposes. The images it collects are used to compose the "affection image" discussed later (see 3.4.1).

After Diboutades models critical moments in the history of Western image making. Conflated formally as a "digital-born" sculpture, this three-part movement from Diboutades, to Durer, to Bentham, constitutes an image regime that mirrors the larger evolution, described by Deleuze, as the traversal from the society of sovereignty to the society of discipline to the society of control [4]. With its internal capture apparatus linked to a networked

database, and its function as the locus of a computer vision system driving a simulation visualized in *GS-FPV003* and *GS-TPV003* (see Figure 4), *After Diboutades* leads us to consider emerging subjectivities only recently made possible, and more importantly, imagine how might we operate within this new image regime.



Figure 4. Video tracking feed with camera positioned over *After Diboutades*.

3.2 GS-TPV003

The third-person view of *GS-TPV003* (Game-Space Third Person View 003) is the only view in the exhibition space that includes images of the body. Live video, operating on a strategically timed delay, is retrieved from the “view camera” mounted to an overhead truss. Bodies are extracted from the live feed and are composited with a simulated version of the space (see Figure 5). The viewer recognizes *After Diboutades*, and in a hypermedic event, recognizes they were observed. Their own “panoptic” role as guard is mirrored and subsumed by the actions of the machine. They recognize the perception of the machine (video surveillance) as well as that of others viewing the work. They witness the act of perception, while thinking of their own perception. This is the moment of intensity that initiates an affective chain reaction.



Figure 5. *GS-TPV003* still image showing live video composite with computer generated background.

Here subjectivity is represented as a multiplicity of intersecting folds. Discussing Deleuze’s concept of the fold, O’Sullivan explains that, “subjectivity might be understood as precisely a topology of these different kinds of folds.” [5] In this case, the folds of materiality (bodies) and time (memory) intersect and multiply. On the one hand, we identify with the bodies displayed in the imagery, particularly our own, and on the other we are distanced observers. The image is divided into quadrants reminding us that this is a surveillance image. The bodies are “real,” but easily duplicated and manipulated. Information is extracted from these bodies and used for other purposes. Their motion through a space that is at once real and virtual, forms choreography that is simultaneously individuated and yet uniform. The body’s absence and presence is manipulated by the speed of motion through the space. The longer one contemplates, the more “solid” their manifestation on screen. Those who rush leave “vapor trails,” hardly registering at all. *GS-TPV003* is a mashup of subjectivity, inducing us to imagine lines of flight that extend from its fractured image. By proximity to the adjacent work, *GS-FPV003*, it becomes a hybrid, bridging the traditional subject/object relationship of *After Diboutades* and the new subjectivity, which is *GS-FPV003*.

3.3 GS-FPV003

GS-FPV003 (Game-Space First Person View 003) presents an image that suggests the first-person viewpoint of a subject traversing *Game-Space* (see Figure 6). Initially, it is not obvious that the image is a simulation of the physical space. The image is practically photo-real, but there are obvious discrepancies. The human eye is rarely fooled. It is an image whose viewpoint is determined by the trajectories of embodied subjects who are, or have, experienced the work. Using coordinates determined by a computer vision system, the simulated first-person view is match-moved to the primary body image displayed in *GS-TPV003*. As such, it is a mapping from organic to inorganic, simulating the subjectivity of the observed, using the *Game-Space* apparatus to construct a new, hybrid subject. It is a fractured image, jumping and stuttering as the machine latches onto subjects, attempting to match their viewpoint. It aspires to indexicality, but inevitably fails. In any case, it forms a new subject that is simultaneously transformed and transformative. We recognize that this subject is closely coupled with the embodied viewer, yet we are alternately amazed and troubled by the ramifications of its behavior. This relationship creates a sense of ambiguity that constructs an affective response to the work. We are not sure if we are comfortable with this new subject. It raises more questions than answers. It is this new subject that invites us to investigate our own subjectivity.

Using Hansen’s term, *GS-FPV003* might be thought of as a Digital Facial Interface (DFI), “a vehicle of contact between our bodies and the domain of information that would otherwise remain largely without relation to us.” [6] In this case, the point of contact is a mediated interface between two beings in space/time. Viewing the first-person image we cannot help but place ourselves in the position of the eye. We view what another being views, mediated by the machine, conflating our own subjectivity with the machinic simulation of another. Before viewing *Game-Space*, viewers experienced the exhibition in a particular mode. How is that mode transformed as viewers leave?

In tandem with the visual component of *GS-FPV003*, the dynamics of motion created by the hybrid subject is used to generate ambient audio. This heightens the affective quality of the work by reinforcing the tension communicated by the first-person view. A baseline, low frequency tone accompanies



Figure 6. *GS-FPV003* still image showing first-person view, looking at *After Diboutades*

the default, empty space. As the simulated viewer moves into the space and approaches *After Diboutades* the frequency is raised to heighten tension as one approaches the work. The longer the subject views the artwork, the sound is increasingly modulated to produce a drone suggestive of a sort of fixation. During periods where a physical person is experiencing the space, an overlay of distorted and compressed voices augments the ambient audio. Overall, the sonic component of the work serves to mark temporal changes and sets an emotional tenor that guides an overall understanding of the operations of the machine.

3.4 GS-DB003

Game-Space takes an ecosystems approach to create a symbiotic system fostering feedback between its various components [7]. The *Game-Space* database housed at <http://www.game-space.org> is an integral part of the ecosystem and is intimately tied to the installation. Our goal from the beginning has been to break down the conceptual barriers that privilege physical experience over virtual, blending them through a porous membrane. It is intentional that we do not make explicit the presence of the website in the physical exhibition. Other than mentioning the networked component by listing the URL on the artwork title/description plate, this component is left for visitors to discover as yet another layer of the ecosystem. Previous versions of the website enacted Manovich's notion of space as a data type, by allowing visitors to download 3D replicas of the exhibitions [8]. But that has always been an intermediate step, a process of artifact creation as opposed to the true integration we are seeking. For *Game-Space* 003, the visitor to game-space.org will see a new section devoted to The Harn Museum exhibition. In this section of the website, they can download a client application that allows them to view a diptych composed of two image streams displayed adjacent to one another (see Figure 8). These image streams dynamically pull from the live exhibition, or if the exhibition has closed, are stored and displayed as artifacts retrieved from the server database. These image streams are titled, respectively, *Facials* and *The Hybrid Subject*.

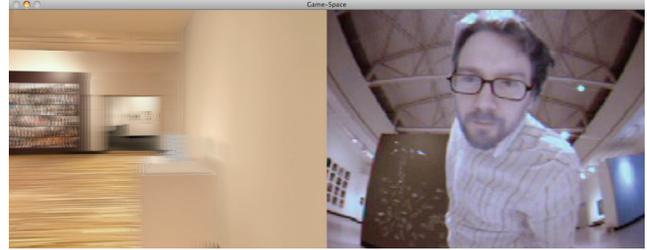


Figure 7. Still image of *Game-Space* client showing *The Hybrid Subject* (left) and *Facials* (right).

3.4.1 *Facials*

In *Cinema I – The Movement Image*, Deleuze discusses the Hollywood close-up as the “affection-image” and with Guattari subsequently develops the concept of “faciality” in *A Thousand Plateaus* [9, 10]. The face is conceived as a relationship between subjectivation and signification, and while they call for a return to the body via the obscuration/abstraction of the face, they warn of the risks of falling into the Black Hole of schizophrenia (or lack of subjectivity). In *Game-Space*, *Facials* is generated by the gaze of viewers as they peer into the *After Diboutades* model. Each gaze becomes a single frame within a continuous, looping animation that is displayed on the website. The speed of this animation serves to obscure the facial individuality of viewers, while simultaneously communicating the similar, yet never quite identical, registration of their heads in space. This abstraction creates a simultaneously fractured and unified body. Rather than an emphasis on the interpretation of facial gesture, the focus is returned to the body and its relation to space and time. The shifting alignment of their silhouettes reminds us of their unique viewpoints while reinforcing an overall sameness and repetition. *Facials* is conceived as a diptych relying on the associated work, *The Hybrid Subject*. As a pair, they act as new subjects, organic and inorganic, that extend from the *Game-Space* machine.

3.4.2 *The Hybrid Subject*

The Hybrid Subject is an online reflection of *GS-FPV003*. It is the simulated first-person view associated with viewers as they traverse the space. It is a machinic subject, derived from human behavior, and produced by the *Game-Space* computing apparatus. While the exhibition is open, website visitors will see the current 3D simulation that is being produced by the *Game-Space* tracking system. The coordinates driving the simulation in physical space drive a concomitant visualization in the form of a computer application. In this form, there is an indexical relationship between *The Hybrid Subject* and *GS-FPV003*. The website visitor will witness the subjective simulation of a physical body currently traversing the exhibition site (The Harn Museum). When the exhibition is closed, website visitors will view the virtual *After Diboutades*. Following the end of the exhibition, they will be given the option to select particular subjective experiences they would like to view, using a typical browser, pop-down list.

Conceptually, *The Hybrid Subject* is similar to *GS-FPV003* in its attempt to create an affective response based on the circumstances of its existence (see Section 3.3). Online, however, juxtaposed with *Facials* it operates differently. In this pairing, there is no hope of actually seeing the bodies of viewers. There is no identification with other presences within the exhibition space except as mediated by database. There is only an eerie, halting machinic linkage with the bodies of anonymous and unknowing

viewers. Juxtaposed with the Deleuzian affection-image of *Facials*, the Digital Facial Interface of *The Hybrid Subject* is clearly articulated.

4. ITERATION

The *Game-Space* project was initiated in early 2008. The current iteration, discussed in this paper, is the third major version of development. The serial numbers following the titles of the primary projections reference the serial nature of the project. As is the nature of many digital works, it is more concerned with the process of discovery than the production of a completed “object.” Previous versions of the project approached the same issues, but were less successful in some respects, suggesting technical and conceptual improvements that would have been impossible to anticipate in other modes of practice.

4.1 Previous experiments

In both prior versions, the video tracking system monitored the entire space of the gallery/museum. Rather than two independent projections, versions 001 and 002 presented a single image split into two panels. The leftmost panel displayed a first-person view similar to the current edition. The rightmost panel displayed a third-person view of an avatar, match-moved to the physical viewer moving throughout the space. Both 001 and 002 integrated an online component, but neither utilized a client that provided a real-time link with the installation. Finally, neither prior edition integrated sound.



Figure 8. *Game-Space 001* installed at University Gallery, University of Florida in 2008.

4.2 Problems and Solutions

4.2.1 Technical

Technically, prior installations performed well, teaching us about issues in video tracking, ambient lighting adaptation, networking and inter-application communication, and many other issues that would have been impossible to foresee without the experience of actually implementing our ideas in this environment.

The most significant problem with 001 (see Figure 8) was the camera system. We used low-cost, analog security cameras attached to a central video processor, combining the imagery into one feed to be used for tracking. The lenses in these cameras were fixed, with little adjustment except for focus. This required extreme precision in determining a ceiling mounting location for the cameras and painstaking correction of distorted imagery via software. We were able to make it work, but beginning with 002, we were able to reduce the number of cameras required by half, and improved the imagery using better quality firewire cameras with architectural/perspective correcting lenses.



Figure 9. *Game-Space 002* installed at The Tampa Museum of Art in 2009.

Another challenge addressed in 002 (see Figure 9) related to the need to handle path finding in mapping motion from real to virtual. As an avatar follows the path of a physical viewer it will naturally approach obstructions such as walls, pedestals, and sculpture, etc. To avoid the avatar hanging on these obstacles in 001, we were forced to disable collision detection. This allowed the avatar to pass through obstructions and maintain a path that approximated the path of the viewer. Of course, this is less than ideal. If a physical viewer makes a sharp turn, the avatar will likely “cut corners” and walk through a pedestal or pass through the corner of a wall. We partially solved this problem in 002 by implementing a node-based path finding system that dynamically constructs likely paths around obstacles, using the geometric features of the simulated space. Unfortunately, this system introduced delay between the motion of the physical viewer and the motion of the virtual subject/camera. This will be addressed in 003 by conceptual changes to the work, and in improved tuning of the tracking parameters.

4.2.2 Conceptual

After two major exhibitions and significant technical improvements that fundamentally validated our mechanical approach, the primary changes for 003 are conceptual. We have identified three areas that cause concern: 1) Predominance of a narrow interpretation that the work is primarily focused on

institutional critique, 2) Confusion that the work is “about” virtuality, and 3) A lack of embodied identification with the content.

4.2.2.1 Institutional Critique

Of course, it is a simple recognition that by virtue of the name, *Game-Space*, and its location within the gallery/museum, that some form of institutional critique is present. While that is obviously an intended component of the work, it is less interesting to us than the mechanisms involved with this relationship, and the broader issues of the creation of subjectivity in mediated environments. We recognized the need to provide more conceptual openings for readings that expand an understanding of the work beyond this initial moment. Related to this, viewers tended to think we were critical of the other work in the exhibition. Some would focus narrowly on the fact that our system would allow one to track viewership or somehow “keep score.” While criticism of the other work and conversion of the space into a game is a valid strategy, again, they are ultimately diversions from our goals.

In the current iteration of *Game-Space*, our solution to the problem of an over-emphasis on institutional critique is to video-track a smaller area of the space, and focus the tracking on a particular work that is not created by another artist in the exhibition. This has the added benefit of allowing us to create a focal work that performs in unison with the *Game-Space* concept, rather than being dependent on the quality and nature of the surrounding art. *After Diboutades* improves our ability to focus the concept in ways that avoid a myopic emphasis on institutional critique. It acts as a gateway to *Game-Space*, linking the traditions of art, representation, perception, projection, subjectivity, and embodiment, in ways not possible in versions 001 and 002.

4.2.2.2 Virtuality and Embodiment

To exhibit work that uses electronic media, one must accept that an audience will often have different conceptions of technology from your own. Some viewers of the first two versions of *Game-Space* would immediately draw associations with Linden Labs, *Second Life*. For some who don’t play video games, *Second Life* has become the de facto symbol of virtual reality. Some viewers were obviously cuing on the fact that 3D imagery was being displayed and would struggle to imagine what we were “saying” about this environment and whether they needed to know something about *Second Life*. While our concern does involve virtuality, an emphasis on *Second Life* is a diversion. Simply creating a virtual representation of a physical space and calling it a game is not the point. Our goal is to find a way to encourage the viewer to look at the image and critically evaluate the work on a deeper level. Obviously people will bring associations that may be incongruent, but our job is to mediate those tendencies. In our assessment, this problem of “virtuality” seemed to also be accompanied by a subject position on behalf of the audience/viewer that was distant. Despite the fact that the images they were seeing were structured from various points-of-view, they did not identify with the content of the imagery; their experience involved little personal investment. The feel was too “virtual,” too obviously computer generated in the style of low polygon animation, vis-à-vis *Second Life*. Our use of the avatar as a symbol of the physical viewer was being lost, and some people approached the work as if they were looking into another world with little personal identification. In *Game-Space* 003, we sought to address these issues in several ways. Most importantly, we have

dispensed with the representation of an avatar. Instead, the display of the viewer in *GS-TPV003* will be comprised of video of an actual person within the physical environment. This will reinforce the idea that the work is concerned with a mixture of physical and virtual, combating the exclusively virtual emphasis or previous readings. We expect that this will encourage a sense of identity on behalf of the viewer, especially in those circumstances where they see themselves. The video will be combined with a background plate that is a photo-realistic rendering of the camera view. This will create less of a distinction between “real” and virtual, further encouraging a sense of identification and more importantly, adding conceptual complexity.

Another strategy to deal with this issue is to use video projection and separate the first and third person views into separate screens. Both LCDs and projection systems can be considered “screens,” but the LCDs used in 001/2 are more likely to foster a passive viewing experience than projective technology. Additionally, using a projector for *GS-FPV003* (the hybrid subject) allows us to vignette the image against the wall, breaking down the imagistic borders that remind us this is just a picture, again, reinforcing a sense of embodiment and identification with the content.

5. TECHNE

Game-Space utilizes a custom video tracking system composed of two Unibrain Firewire cameras feeding an Apple Mac Mini running Max/MSP/Jitter. One camera, mounted directly over *After Diboutades*, uses a perspective-correcting lens by Theia Technology. This lens allows the camera to produce images with less distortion than typical devices, thereby producing better tracking results. The second camera is used for the third-person view of *GS-TPV003*, and has a more traditional lens while allowing for the capture of high-resolution imagery. A modified version of Jen-Marc Pelletier’s *cv.jit* is used that allows us more freedom and control over the tracking parameters. Advantageously, *cv.jit* utilizes the open-source computer vision library OpenCV, which in turn allows our system exposure to its full API.

Coordinates of people navigating the environment are fed into a second Mac Mini using TCP/IP. The two Minis are attached together using a crossover Ethernet connection to minimize latency. The second Mac Mini is responsible for the production of 3D imagery. The exhibition space is modeled using Autodesk Maya, while the interactivity and motion are handled with Unity Technology’s Unity3D. A custom plugin was developed that allows for easy communication between Max/MSP/Jitter and the game engine.

After Diboutades is produced using an Object 260V rapid manufacturing machine using their semi-translucent Full Cure 720 acrylic photo-polymer. Embedded within the work is a third Mac Mini with an attached Unibrain camera with small-scale remote lens. This computer is connected to the network and continuously feeds images to the game-space.org website.

6. ACKNOWLEDGMENTS

Our thanks to the University of Florida, School of Art and Art History for their contributions towards the cost of hardware required to produce this work.

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