

Reconstructing *Brandon* (1998-1999): A Cross-disciplinary Digital Humanities Study of Shu Lea Cheang's Early Web Artwork

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Abstract

This paper explores the art history, the digital aesthetics, the technical anatomy, and the restoration of Shu Lea Cheang's early web artwork *Brandon* (1998-1999). Commissioned two decades ago by the Solomon R. Guggenheim Museum, the work is just back on view to the public after a major restoration. It seems timely to consider Cheang's artwork: a collaboration between the artist and a network of programmers, designers, authors and other contributors that offers a creative platform for remembering and engaging with histories and issues of identity from the LGBTQ+ community. In the spirit of the piece, this article is a multi-disciplinary collaboration between a curator, a media art conservator, a computer scientist, and a scholar of the digital liberal arts, which brings together these different areas of expertise to offer an innovative and multi-faceted consideration of one artwork from a digital humanities perspective.

Introduction

Commissioned by the Solomon R. Guggenheim Museum, *Brandon* (1998–99) by Shu Lea Cheang is a landmark art project that spans disciplinary boundaries. The multipart work comprises a sprawling network of components including online digital interfaces, live public programs hosted by collaborating institutions in the United States and Europe, and a multimedia installation. Realized at a moment when the internet was coming into widespread use, *Brandon* is among the most ambitious digital projects of its time and the first artwork in the Guggenheim's permanent collection to use the Web as a primary medium. As a memorial to Brandon Teena, a trans person who was raped and murdered in Nebraska in 1993, Cheang's work also represents a crucial intervention in gender studies, raising questions about rights and identity that remain urgent today. The critical questions about the relationships between gender and technology that *Brandon* raises anticipate those being asked by contemporary artists who have not previously had the opportunity to interact with the work.

Yet for many years, *Brandon* had been inaccessible to a wide public due to technological obsolescence. The Guggenheim's recent restoration of the work sparked a reevaluation of its art historical, cultural, and technological significance. *Brandon's* enduring importance stems from its highly collaborative structure, which incorporates contributions by numerous prominent scholars, artists, and programmers. Yet this sprawling form also poses unique challenges for evaluating the work. The process of restoring, studying, and presenting *Brandon* to contemporary audiences must be as multidisciplinary as the work itself, involving media conservators, computer scientists, curators, and humanities' scholars. Only by considering the work from multiple perspectives — historical, theoretical, technical, and aesthetic — can a full understanding of its importance be achieved.

A narrated screen navigation of the web artwork *Brandon* can be found at [Phillips et al. 2017].

1. www.brandon.guggenheim.org : An Art-historical Analysis

...how do we not stifle the web as an art medium...how do we not consider being in a 'museum' meaning the ultimate recognition of a 'work of art' that the work is set and done...these are the burdens of mine. To launch this project I want to be given space to experiment, to fail (fail on the part of interfacing with an unknown net public). - Shu Lea Cheang [Cheang 1998, Jan 11]

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Shu Lea Cheang's *Brandon*, "a one year narrative project in installments" launched online on June 30, 1998. One of the most ambitious projects that the new media artist and activist had realized at that point in her career, the web artwork^[1] was inspired by the story of trans man Brandon Teena. The work explores "issues of gender fusion and the techno-body in both public space and cyberspace" [Guggenheim 1998] through a meta-narrative structure defined by hyperlinks to a network of connected interfaces that begins with the splash page (Figure 1). *Brandon* is also a landmark in the history of the Solomon R. Guggenheim Museum, representing the first web-based artwork that the institution commissioned for a planned "Virtual Museum." The launch of www.brandon.guggenheim.org was linked to its display at the Guggenheim's now defunct satellite venue in New York's SoHo neighborhood. Visitors to the launch event encountered an installation that included three interactive computer workstations and live navigation of the browser windows displayed on a 14 foot high by 45 foot long video wall consisting of 75 stacked rear projection cubes (Figures 2 and 3). A simultaneous live chat in one of the artwork's interfaces linked the audience in SoHo with the artist and other *Brandon* users at the Theatrum Anatomicum at the De Waag Society for Old and New Media in Amsterdam, where Cheang was an artist in residence. "With technical grace and an unprecedentedly epic scale", reported Austin Bunn of the *Village Voice*, "*Brandon* makes a bid to become the inaugural piece in the canon of online art" [Bunn 1998].

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Cheang characterized the work as "a multi-artist/multi-author/multi-institutional collaboration" that unfolded over the course of a year with periodic content uploads" [Brandon credits 1998-1999]. *Brandon* included contributions by dozens of artists, writers and technologists (Figure 4) as well as uploads from two live events that were simulcast through the internet and featured cultural critics, theorists and academics from a wide range of fields held in both the US and Europe. The work's fundamentally collaborative nature reflects a core tenet of much web-based artwork produced in the 1990s; indeed, for Cheang it was the medium itself that made the artwork possible [Cheang 1997, Aug 11].

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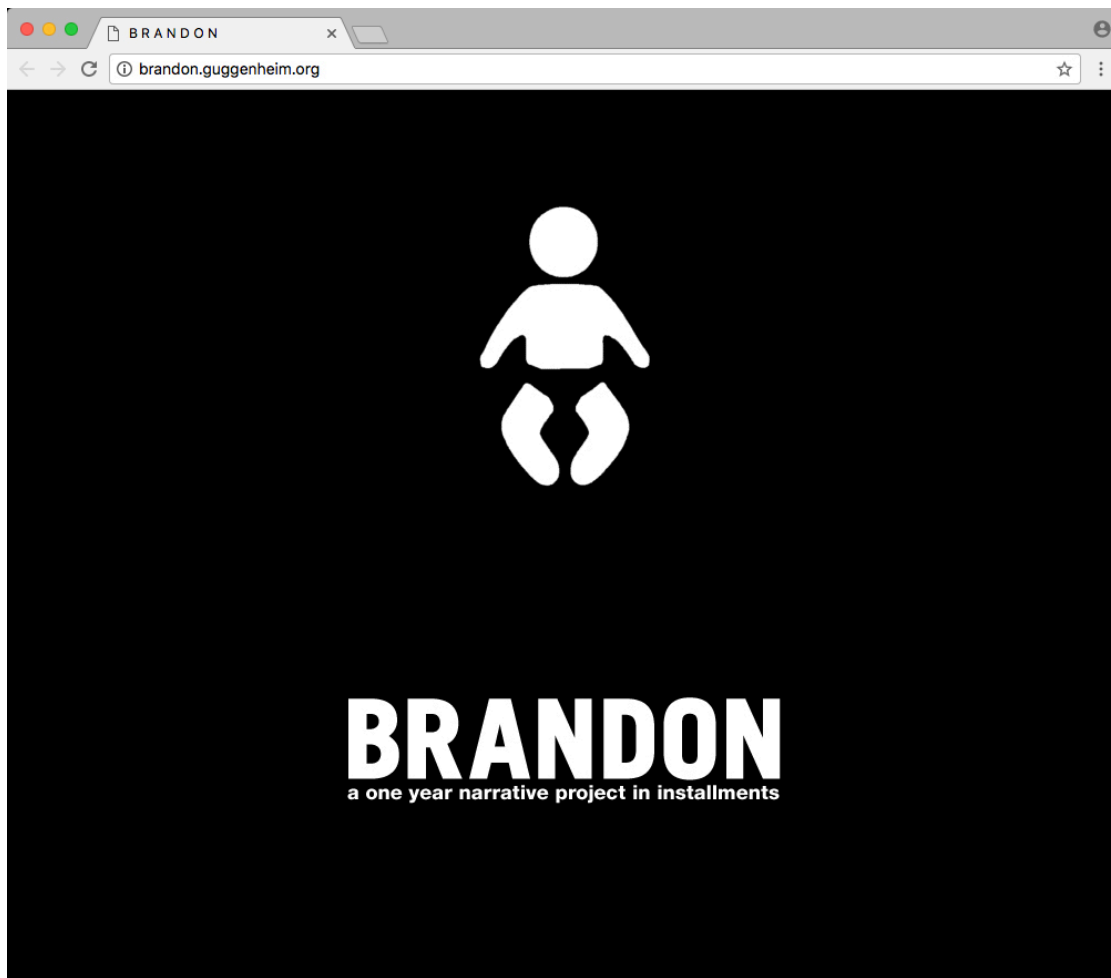


Figure 1. The splash page of Shu Lea Cheang's *Brandon* (1998-99), Interactive networked code (html, Java, Javascript and server database). Solomon R. Guggenheim Museum, New York. Commissioned by the Solomon R. Guggenheim Museum, and produced in association with the Waag Society for Old and New Media, The Institute on the Arts and Civic Dialogue at Harvard University, and The Banff Centre, with additional funding from The Bohen Foundation, The Rockefeller Foundation, the New York Foundation for the Arts, and the Mondriaan Foundation. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

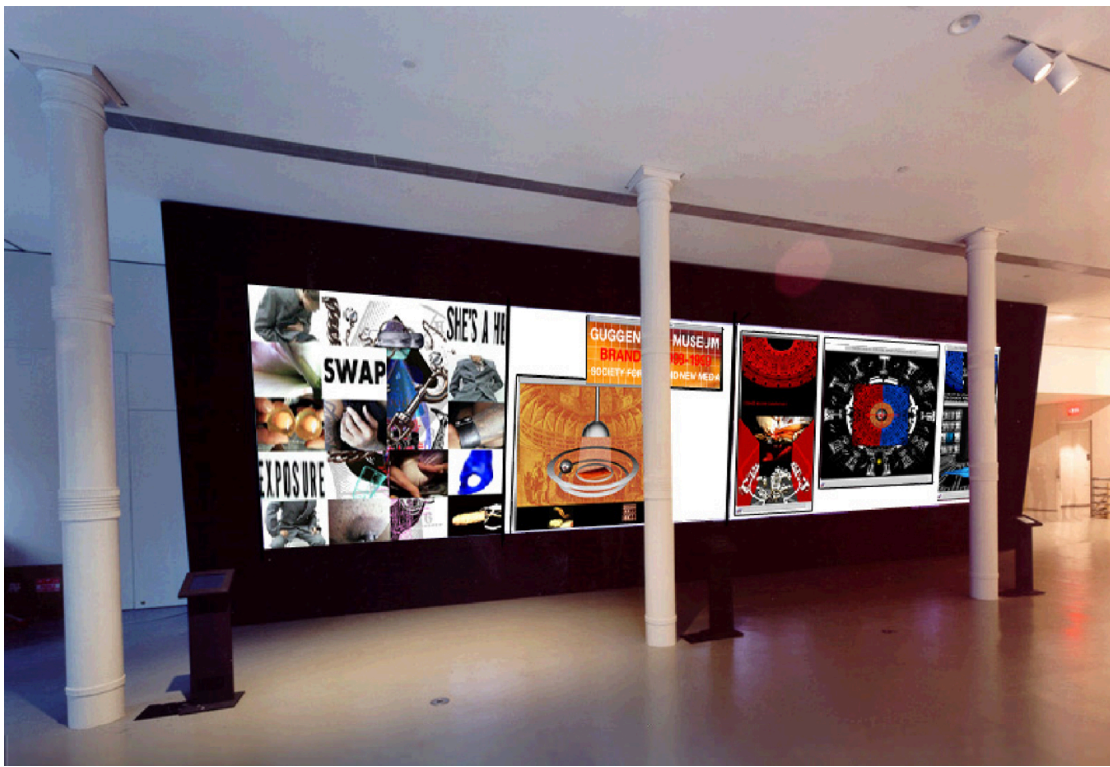


Figure 2. The video wall at the Guggenheim Museum, SoHo displaying Shu Lea Cheang's *Brandon* (1998-99). © Solomon R. Guggenheim Museum.



Figure 3. Impressions of *Brandon's* launch event at the Guggenheim Museum, SoHo on June 30, 1998. © Solomon R. Guggenheim Museum.

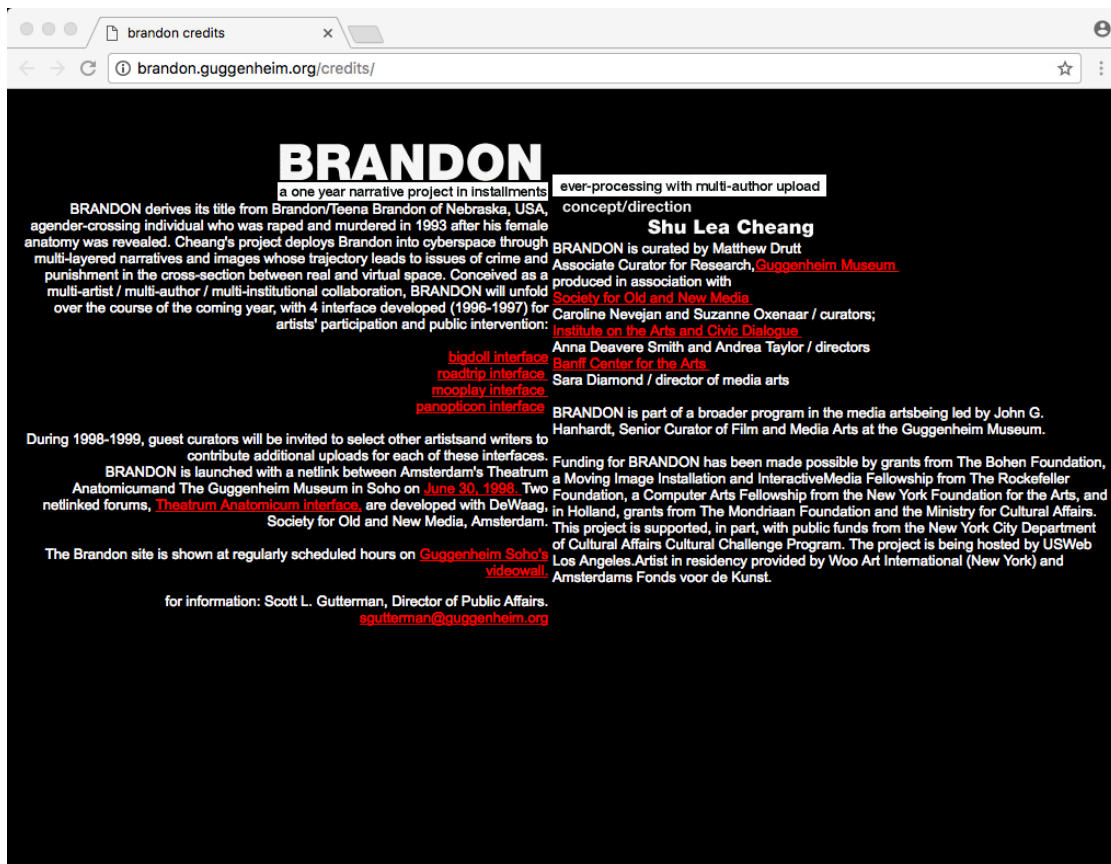


Figure 4. Cheang's collaborators are listed on *Brandon's* credit page. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

1.1 *Brandon*: the Artwork

Cheang's work memorializes Brandon Teena, a twenty-one-year-old trans man living in Nebraska who was brutally raped and murdered in 1993. Brandon Teena's story became a touchstone for bringing visibility to transgender people and their struggles in the United States. Brandon Teena was the subject of a 1998 documentary film *The Brandon Teena Story* and the award-winning 1999 feature *Boys Don't Cry*. Cheang's response to Brandon Teena's story departs from the linear narratives and psychological realism of these later films.

Instead of a biography of Brandon Teena, the artwork *Brandon* examines the structural conditions that have confronted trans people in contemporary society. The work's five different interactive web interfaces, *bigdoll*, *roadtrip*, *mooplay*, *panopticon*, and *theatrum anatomicum* (Figures 5-9), employ images and texts that meld critical histories of gender and sexuality with contemporary perspectives on American culture, emphasizing expressions of institutionalized violence. Cheang's project further suggests parallels between gender and the malleable forms of public and private identity that can be constituted online.

For the Guggenheim commission, Cheang described her intention to deploy Brandon "into cyberspace through multi-layered narratives and images whose trajectory lead to issues of crime and punishment in the cross-section between real space and virtual space" [Brandon credits 1998-1999]. The basic structure of the project belies the conceptually rigorous and at times impenetrable navigation of the website. Persistence and exploration are required to unlock each interface which often proves challenging to users, an intention of the artist: "I am testing the limits of [users'] frustration level" Cheang said in a 1998 interview [Bunn 1998].

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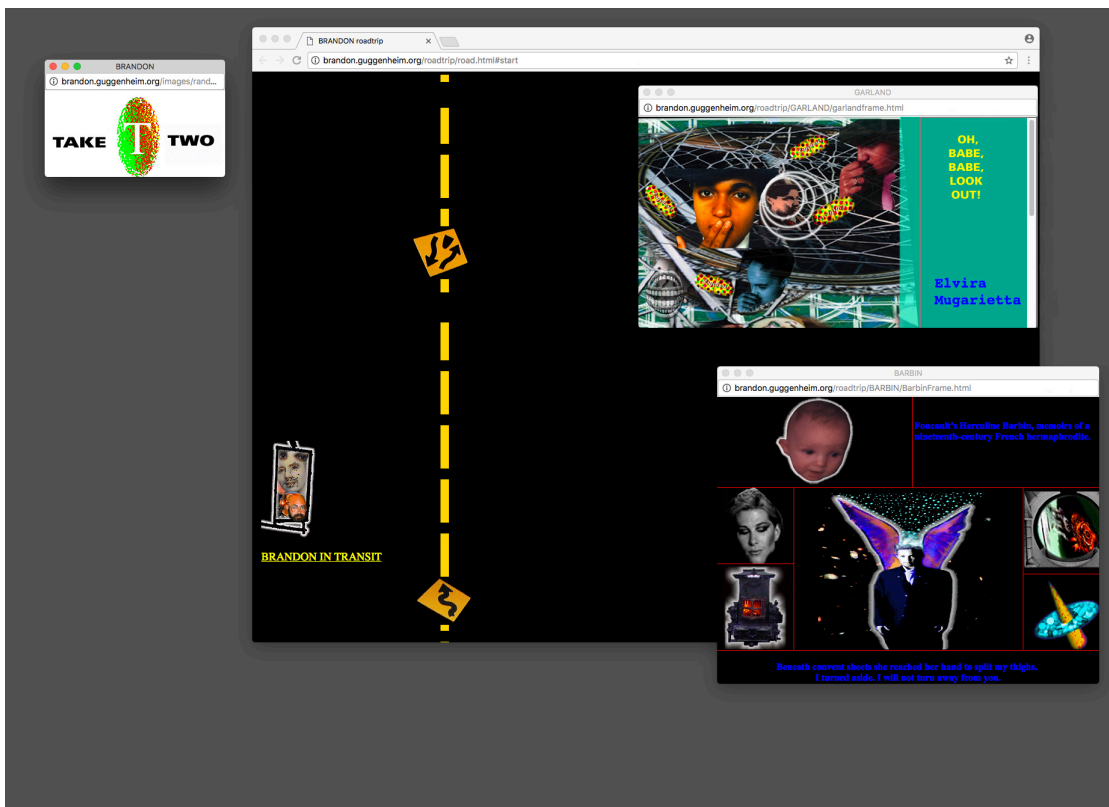


Figure 6. The *roadtrip* interface. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

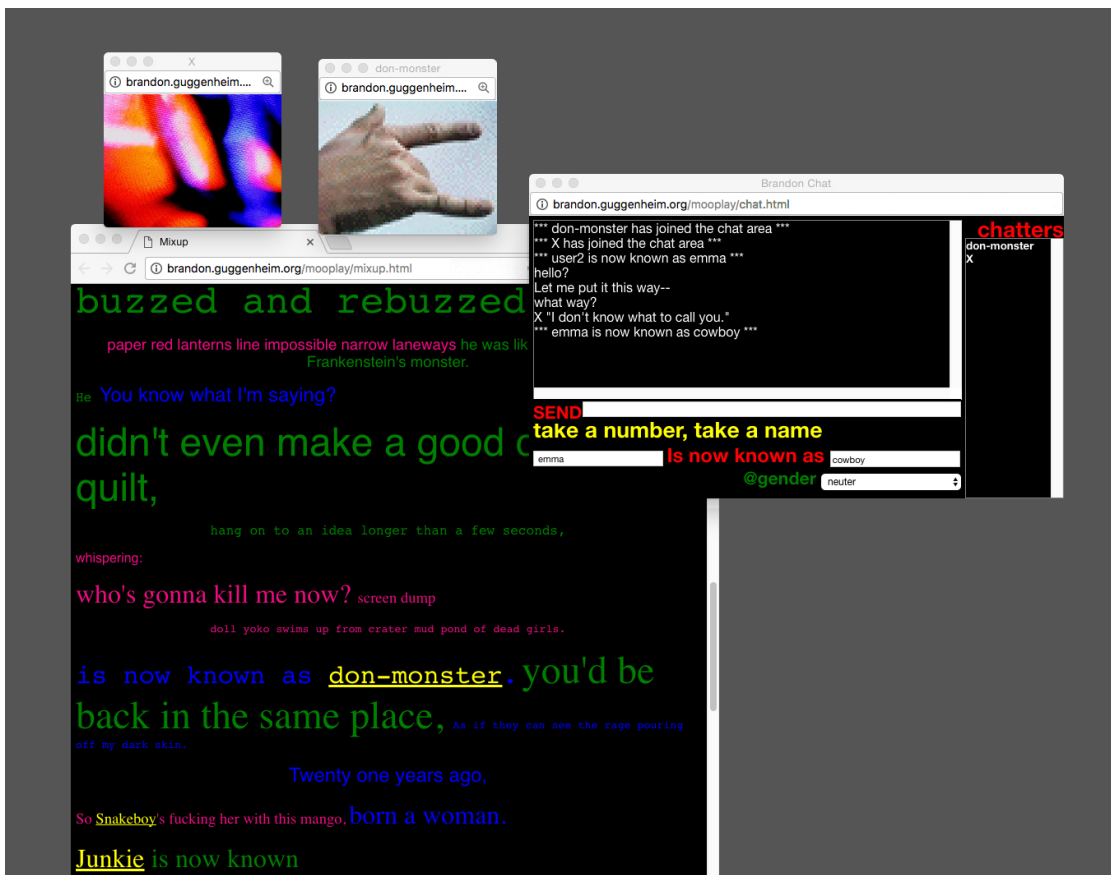


Figure 7. The *mooplay* interface. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

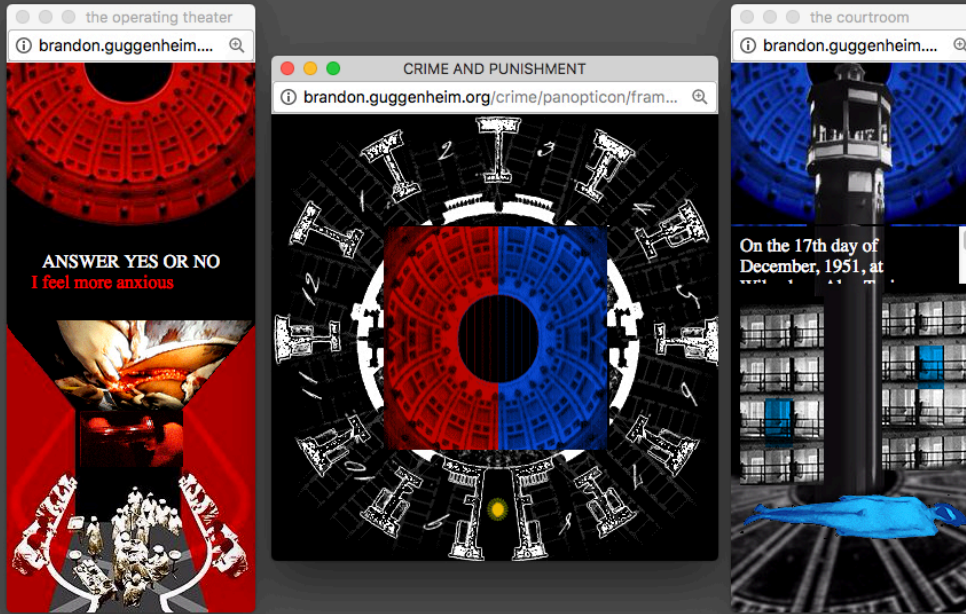


Figure 8. The *panopticon* interface. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

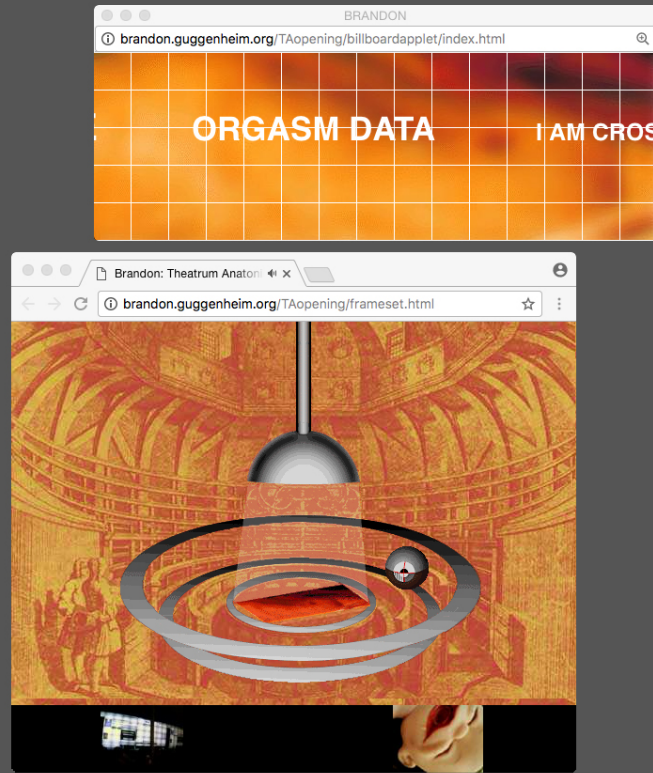


Figure 9. The *theatrum anatomicum* interface. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

Artist Jordy Jones was Cheang's primary collaborator on the *bigdoll* interface (Figure 5), which is subtitled "recombinant social body". Working with JavaScript programmer Cherise Fong, Jones developed a bank of images and texts related to gender and identity that would be displayed in random sets, with order and placement shuffled every time the page was accessed. For example, the phrase "SHE'S A HE" might appear surrounded by images of a person in a business suit and a close-up picture of a pierced nipple. Jones further invited other artists to contribute images to the archive over the course of the project's development.

The *roadtrip* interface (Figure 6) is a nonlinear text and image framework laced with hyperlinks that uses the highway as a key motif. According to Cheang, the interface was "[c]onceived to upload Brandon onto the cyberzone where he surfs across Nebraska's route 75" [Cheang 1996]. Users encounter a cascade of texts and images related to various figures with fluid gender identities: Herculine Barbin, a nineteenth-century French hermaphrodite; a Mississippi Man named James McHarris who was stripped in a courtroom to determine his gender in 1954; Venus EXtravaganza, a drag queen who was featured in the 1989 film *Paris is Burning*; and "Baby Bean", a nineteenth-century transexual. Four "episodes" describe Brandon Teena's fictional encounters with each of these figures on an extended journey. *Roadtrip* also represents the backbone of the work, including links to the other interfaces that users must find by clicking on various moving images.

The *mooplay* interface (Figure 7) draws upon the experiential qualities of the early 1990s text-based, networked systems called MOO. The interactive MOOs allow for multi-user engagement in virtual reality settings that often involved role playing through user created characters. The *mooplay* interface simulates the experience of a live MOO. It features narratives written by Pat Cadigan, Lawrence Chua, and Francesca da Rimini, which are presented together in *mixup*, a page within the interface, in scrambled forms. As with *bigdoll*, loading the site recombines the elements on the page, meaning that no two users encounter exactly the same story. At the heart of these narratives are a series of "personae",

developed by each of the contributing writers, that appears inchoate, and ever-changing. Among the ten fictitious characters whose names appear as hyperlinks in *mixup*, are “snakeboy”, “dolyoko” and “donmonster”. A JavaScript applet offers a “pseudo chat” between users and these personae, with predetermined sentences producing the effect of engaging with various identities in an online social space.

The *panopticon* interface (Figure 8), developed by Beth Stryker and Auriea Harvey, is a virtual simulation of Jeremy Bentham’s concept for an ideal prison in which inmates occupied cells arranged in a circle around a central guard tower. The web environment was inspired by Cheang’s visit to the Koepel prison in Arnhem, Netherlands — one of the prototypical examples of this form of architecture. Heavily informed by Foucault’s theoretical analysis of the Panopticon as a metaphor for social life in modernity, the interface features an array of images related to surveillance by both the government and the medical establishment. Cheang’s work surveys how powerful institutions manage “diseases of the social body”, especially those related to so-called sexual deviance and gender nonconformity [Cheang 1996]. The six “cells” and six “hospital wards” in Cheang’s Panopticon are populated by images of prisoners and patients set to undergo invasive surgeries. Each image is accompanied by a text relating to overlaps between the medical establishment and the carceral state. For example, one text relates to a 1907 eugenics law passed by the state of Indiana mandating forced sterilization for people in state custody.

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Finally, the *theatrum anatomicum* interface (Figure 9), connects the web-based components of *Brandon* to several live events. According to Cheang, the interface “resets” the dissecting table designed for an anatomical body in order to similarly study the “gendered social body” [Cheang 1996]. This virtual space hosted images and texts related to performances staged in an actual seventeenth-century operating theater in Amsterdam, which had been reconfigured as the Society for Old and New Media, De Waag, Amsterdam, where Cheang developed the *theatrum anatomicum* interface during her residency. At the time of *Brandon*’s launch, *theatrum anatomicum*, which was modeled after the physical space in De Waag, had not been fully activated, anticipating the live events later that year that would populate the interface with new content.

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1.2 Shu Lea Cheang: the Artist and her Practice

Brandon embodies interests that have been and continue to be central to Cheang’s career — both in terms of its subject matter and the collaborative working process that the artist initiated. Shu Lea Cheang was born in 1954 in Taiwan and has lived and worked in the United States as well as in Japan, the Netherlands, the United Kingdom, and France, where she currently resides. She describes herself as an artist, filmmaker, [and] networker, as she has worked in a variety of mediums: film, video, installation, and web projects.

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In the early 1980s, Cheang was part of the New York-based Paper Tiger Television collective, a group that produced public access television programs that critiqued corporate control over broadcast networks and offered an alternative source of news and a platform for experimental video production. Cheang began creating video installations for art spaces in the early 1990s. These multiscreen pieces grappled with subjects ranging from the Tiananmen Square Massacre to representations of Asian identity in the mass media [Chua 1996]. In 1995, she realized her first web-based project, *Bowling Alley* (1995–1996), for the Walker Art Center in Minneapolis. The commission linked the Walker’s galleries to a local bowling alley with a web-based video-link running on an Apple PowerBook. According to Cheang, the piece was an examination of how private and public spaces were becoming intertwined through network technology, a theme Cheang explored again in *Brandon*.

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The activist orientation of Cheang’s work, as well as her career-long commitment to utilizing “new media” — be it video, cable networks, or the web — continues in the present. Cheang’s projects address profound social disruptions while manifesting an underlying sense of humor and taste for the absurd. One of Cheang’s most complex works, *I.K.U.* (2001), initially took the form of what the artist describes as a “Japanese Sci-Fi Porn feature”. It spawned a sequel project, *U.K.I.* (2009–2014). The latter includes a “viral performance” for which a cast climbed over piles of junked keyboards and computers. Additionally, Cheang produced an online “viral game” in which users are pitted against a futuristic corporation that’s intent on reprogramming the human orgasm on a biological information network — a corporeal World Wide Web.

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1.3 *Brandon's* Live Events

In each of her previous projects, Cheang maintained a link between the physical realities of embodied experience and the virtual world. The artist described herself as a “cyber-nomad” during the period of *Brandon's* development, appearing frequently on an international circuit of festivals, conferences and biennials [Ho 2012]. She described “experimenting with boundary crossing between the actual (state/nation) and virtual (anonymous/avatars)” [Ho 2012]. The subtitle of *Brandon*, “a one year narrative project in installments” refers to a sustained enrichment of the site and the series of four live events through which the artist enacted this boundary crossing. In addition to the “netlinked” launch event on June 30, 1998, three additional programs took place “in real life”, underscoring the necessity during this early period of web-based art to maintain a physical experience of the artwork.

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On the night of August 5, 1998 at The Institute for Arts and Civic Dialogue at Harvard University, Cheang staged “A Virtual Court Test Trial for Brandon” to provide an “opportunity for the BRANDON project to interact with a theatre-going public and netizens”, with the goal of developing a virtual court system that would open a dialogue on both real and virtual crimes [Harvard 1998, 2]. The test trial (under the artistic direction of Anna Deavere Smith) invited the “net public”, as well as scholars and legal experts ranging from Lawrence Lessig to Kendall Thomas, to serve as jurors for six simulated court cases. The presentation of five of these sexual-assault cases included actual court documents, evidence, and testimony performed by five actors through a script prepared by Cheang and a team of researchers. The cases included the wrongful death suit that Brandon Teena’s mother brought against the county sheriff (Brandon v. County of Richardson), the “cyber rape” case Legba v. Mr. Bungle (see [Dibbell 1993]) and the Chanelle Pickett case (Chanelle Pickett v. William C. Palmer) about a trans woman who was murdered in Watertown, Massachusetts in 1995. The audience at the event was by invitation only but the public could watch a simulcast and log on to a live chat room on the *Brandon* website. The performance was exploratory rather than conclusive, as Cheang noted, “...in the end we’re not making any judgment calls. There will be no sentencing” [Hartigan 1998, C6].

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Like *Brandon's* launch event, the third and fourth live events were simultaneously staged inside the Theatrum Anatomicum at De Waag and at the Guggenheim’s SoHo branch, and “simulcast” with audio and video streams that connected both venues through *Brandon* (Figures 10 and 11). On September 20, 1998, the third live event, “Digi Gender, Social Body: Under the Knife, Under the Spell of Anesthesia” took place. The forum included a panel discussion in SoHo and performance in Amsterdam that sought to “relocate the 17th century public dissecting lessons...as a digital-age net spectacle...with cultural critics, genderists and biotechnologists” conducting a “virtual surgical operation on the theory and construction of technosocial bodies” [Cheang 1998, Sep 16]. The centerpiece was an activation of the installation designed by Atelier Van Lieshout (Figures 12 and 13) based on the drawings of the Theater Anatomicum by Jonas Zeuner from 1773. Recalling dissecting lessons of the seventeenth century, the installation included an operating table and suspended rings that held a revolving web camera which captured and transmitted the live event. Instead of a live surgery as Cheang had hoped to broadcast from a clinic, the main operating table held a projection screen carrying images of sexual reassignment surgery and the *Theatre Anatomicum* interface from *Brandon*. In place of medical doctors, a panel of “surgeons” including scholars of media theory and LGBTQ+ studies such as Allucquère Rosanne “Sandy” Stone and Susan Stryker, verbally operated on the concept of “digi gender”.

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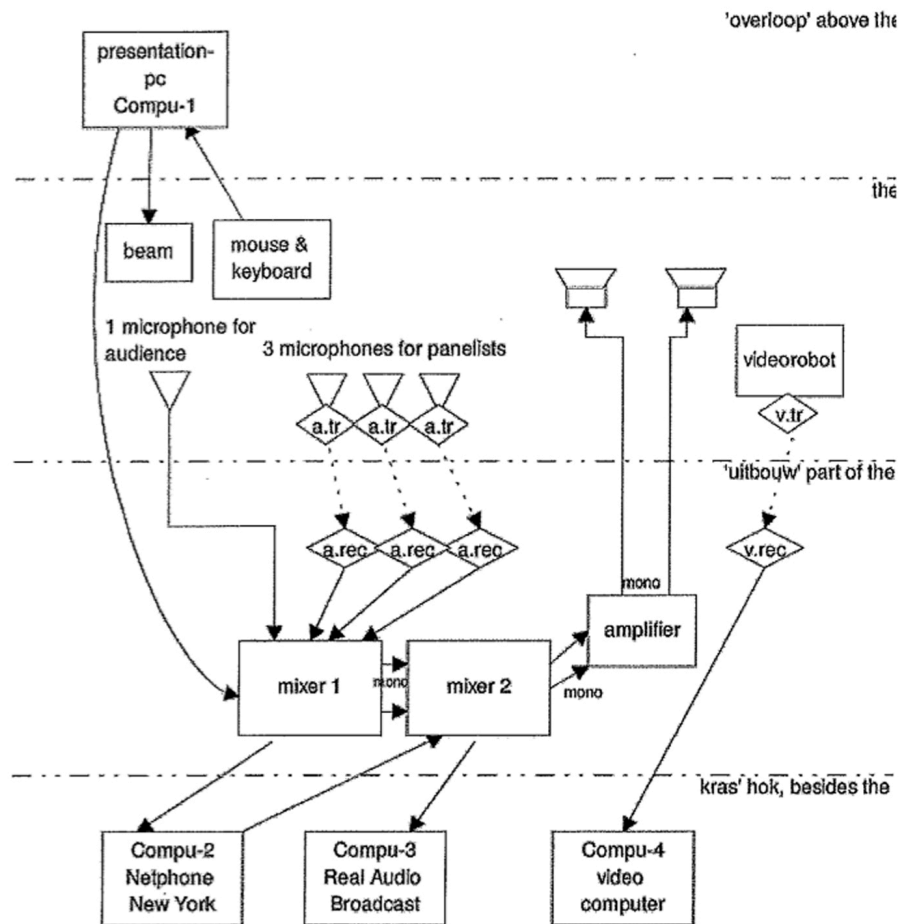
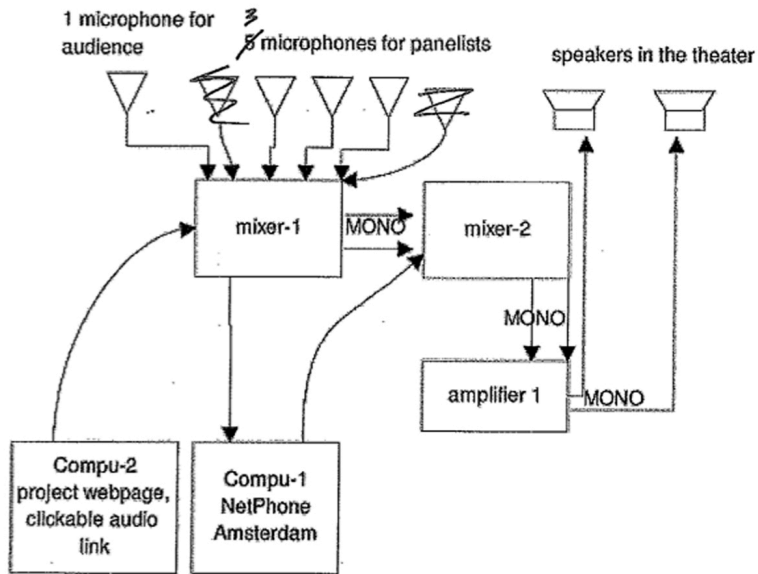


Figure 10. Technical diagram of the live audio and video connection that was established between the Guggenheim SoHo and De Waag in Amsterdam for the DigiGenderSocialBody event on September 20, 1998, here detailing the set-up at De Waag. © Solomon R. Guggenheim Museum.



timeschedule for setting this up:

sunday

11:00 (17 in GMT+1): start testing audio, together with amsterdam

13:00 (19 in GMT+1): panelists rehearsal, technical check with amsterdam

14:00 (20 in GMT+1): forum starts

Figure 11. Technical diagram of the live audio and video connection that was established between the Guggenheim SoHo and De Waag in Amsterdam for the DigiGenderSocialBody event on September 20, 1998, here detailing the set-up at Guggenheim SoHo. © Solomon R. Guggenheim Museum



Figure 12. The installation by Atelier Van Lieshout at the Theatrum Anatomicum, Society for Old and New Media, De Waag, Amsterdam featured a revolving webcam that was used to live-stream video imagery of *Brandon's* events via the interface theatrum anatomicum. Foto: Derk Jan Wooldrik © Courtesy of De Waag Society of Old and New Media.



Figure 13. Detail of installation view of Atelier Van Lieshout construction for Shu Lea Cheang's *Brandon* (1998-99) at the Theatrum Anatomicum, Society for Old and New Media, De Waag, Amsterdam.

The fourth and last live event, “a virtual courtroom where crime and punishment calls for public debate” [Cheang 1997, Dec 16], was held on November 15-20, 1999. Building on the 1998 test trial at Harvard University, the session was titled “Would the Jurors Please Stand Up? Crime and Punishment as Net Spectacle”. The event established parallels between medical institutions, the legal system, and broad social attitudes toward gender and violence. Participants could “apply” to become jurors using a “court” interface on the *Brandon* website that included case questionnaires (Figure 14). At the Amsterdam venue, laptops were mounted onto the Atelier Lieshout installation for participants to engage in the virtual court. In this final live event, as in the previous forums, Cheang continued to cross virtual and real boundaries to explore and challenge viewer’s perceptions of identity, gender and violence in an emergent online space. As she noted in an interview from the time: “If virtual worlds are used as laboratories, it’s easier to recognize the possibilities for change — both within a virtual environment, and, just maybe, in the real world as well” [Hanley 1998].

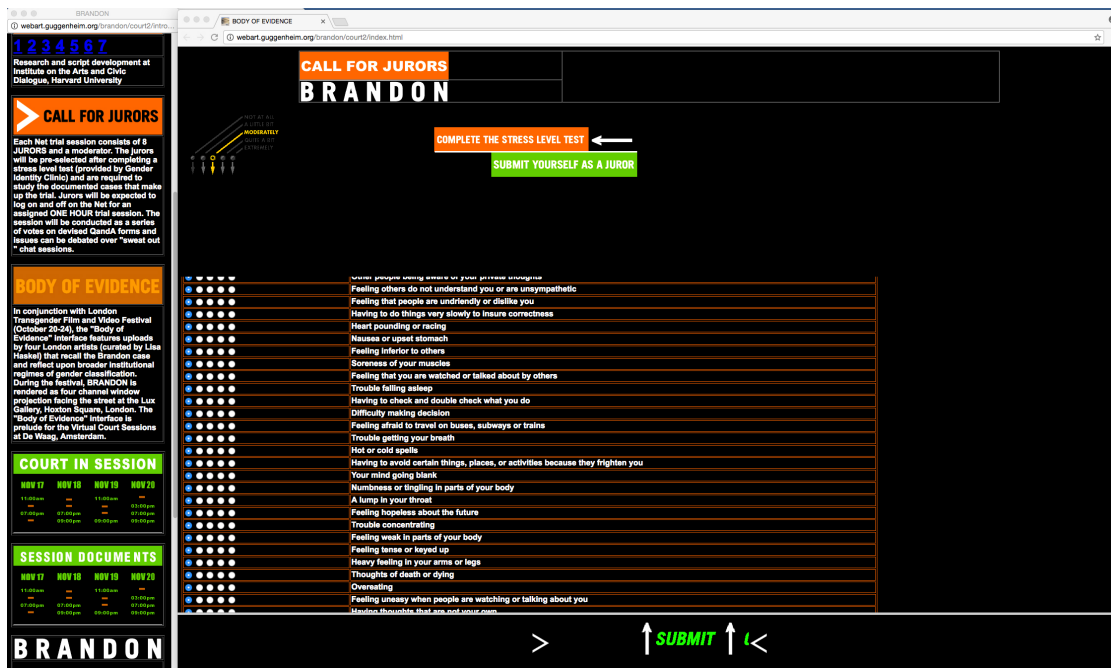


Figure 14. Screenshot of the web questionnaire for “Would the Jurors Please Stand Up? Crime and Punishment as Net Spectacle” held from November 17-20, 1999. © Shu Lea Cheang

1.4 *Brandon's* Context and Commission

Though the digital form of *Brandon* may have been a new type of acquisition for the Guggenheim, the project fits into a larger post-WWII tradition of artists experimenting with new media and technologies. The burgeoning net.art scene of the 1990s offers the most immediate context for *Brandon*. In addition to adopting networked technology, artists including jodi.org (Joan Heemskerk and Dirk Paesmans), Alexei Shulgin, and Vuk Ćosić valued dispersed modes of authorship and sought to circulate their work in venues outside of traditional art institutions. Because many key net.art projects from the time explicitly rejected museum display and required new approaches to collecting, *Brandon* represents a rare opportunity to bring institutional resources to bear on understanding and preserving a work from this pioneering period.

Cheang also joined artists such as the VNS Matrix collective (Virginia Barratt, Julianne Pierce, Josephine Starrs, and Francesca da Rimini) in utilizing the virtual space of the web to challenge fixed notions of gender and sexuality. VNS Matrix are among the first artists to use the term cyberfeminism to describe their practice. Cheang self-identified as a “closet cyberfeminist” claiming sympathies with the broad notion of female and queer access to online spaces and visibility within them while distancing herself from a “declared movement” [Galloway 1998]. It’s also important to consider Cheang in the context of artists exploring identity offline in the 1980s and 1990s (see 4.3). Cheang’s 1993 installation *Those Fluttering Objects of Desire* was included in that year’s Whitney Biennial, an exhibition that famously brought questions about race, gender and sexuality to the foreground of American art discourses.

Cheang first began working on *Brandon* in the mid-1990s and wrote a proposal by 1995 that identified it as a “web project...designed and conducted as time-based hypertext on the WWWebLand” [Cheang 1996]. Her early sketches of the interface (Figure 15), from her residency at the Banff Media Centre in Canada already demonstrate the complex direction she hoped to take the work. Cheang anticipated the potential the web could provide for artistic experimentation and technological innovation noting, “it’s been so great working with DeWaag’s design team and programmer...I earn my respect! Not every[o]ne believes artist[s] can push technology further” [Cheang 1998, Jun 27]. John G. Hanhardt, the former Guggenheim Senior Curator for Film and Media Arts, initiated the commissioning process. Hanhardt had previously worked with Cheang at the Whitney Museum of American Art, where he had been a curator in the mid-1990s. Hanhardt’s team at the Guggenheim included Matthew Drutt, Associate Curator for Research, who shepherded the commission to its realization.

The complexity of *Brandon* pushed the boundaries of the Guggenheim's exhibiting and collecting practices. The commission of the website *Brandon* required the Guggenheim to consider the web as a virtual exhibition environment that complements and expands the museum's gallery spaces. For the museum, it was its very first "move beyond the site-specific or time-specific nature of conventional exhibitions into a more complicated boundless paradigm" [Guggenheim 1998]. By the end of the one-year narrative experiment *Brandon* had expanded the Guggenheim's program, moving the institution closer to achieving what museum curators at the time had hoped for in their groundbreaking decision to commission web art: "not taking the Internet inside of a museum...[but rather] exposing the museum to the internet" [Ippolito 2017].

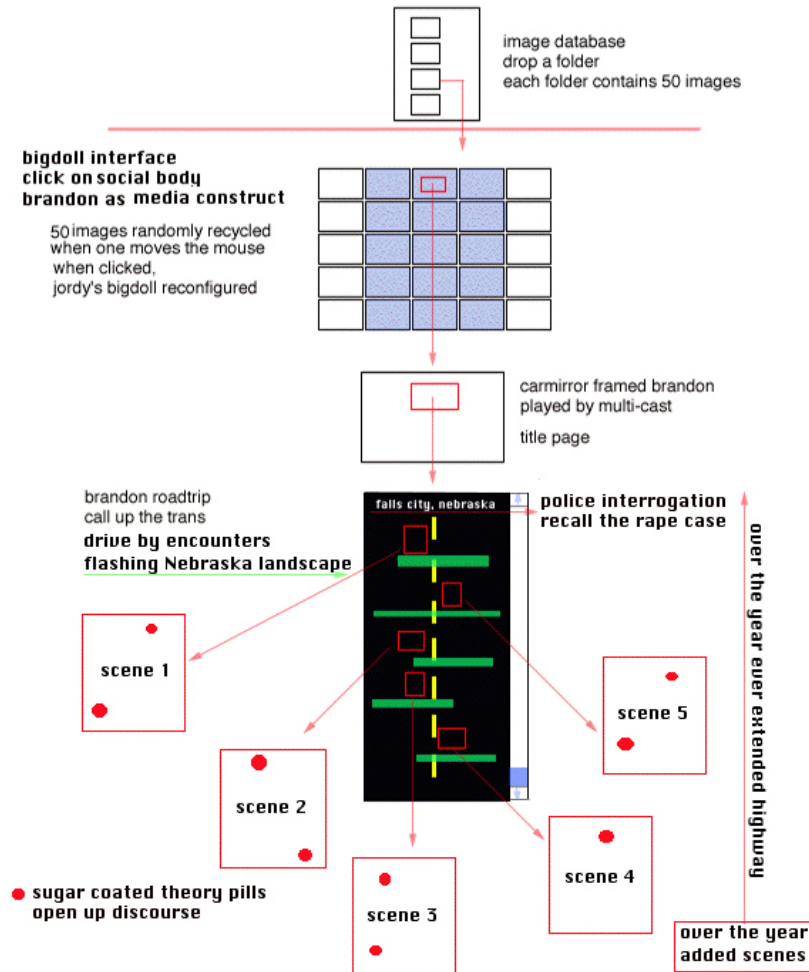


Figure 15. Shu Lea Cheang's draft of *Brandon's* interfaces during the development phase © Shu Lea Cheang.

2. *Brandon's* Collection and Preservation

From the moment of *Brandon's* commission in 1998, the web artwork was anticipated and regarded as an addition to the Guggenheim's permanent collection. In his official letter of intent to the artist, the curator Matthew Drutt assured: "...it will be the Guggenheim's intention to acquire *Brandon* for its permanent collection at the close of its presentation" [Drutt 1998, Jan 21]. The *Brandon* commission was considered an exciting milestone in the Guggenheim's larger vision to start collecting digital art: "The context for *Brandon's* development is the Guggenheim Virtual Museum [...]. It will not only be a showcase for web-based art, it will be the means through which the Guggenheim brings such works into its collections" [Drutt 1998, Jun 30]. At the time of this announcement, the Guggenheim Virtual Museum (Figure 16) was not yet existent (and it would in fact never be launched), but Drutt explained to the *New York Times* that by commissioning *Brandon* for the Virtual Museum, "[w]e've started collecting before we built the institution..." [Mirapau

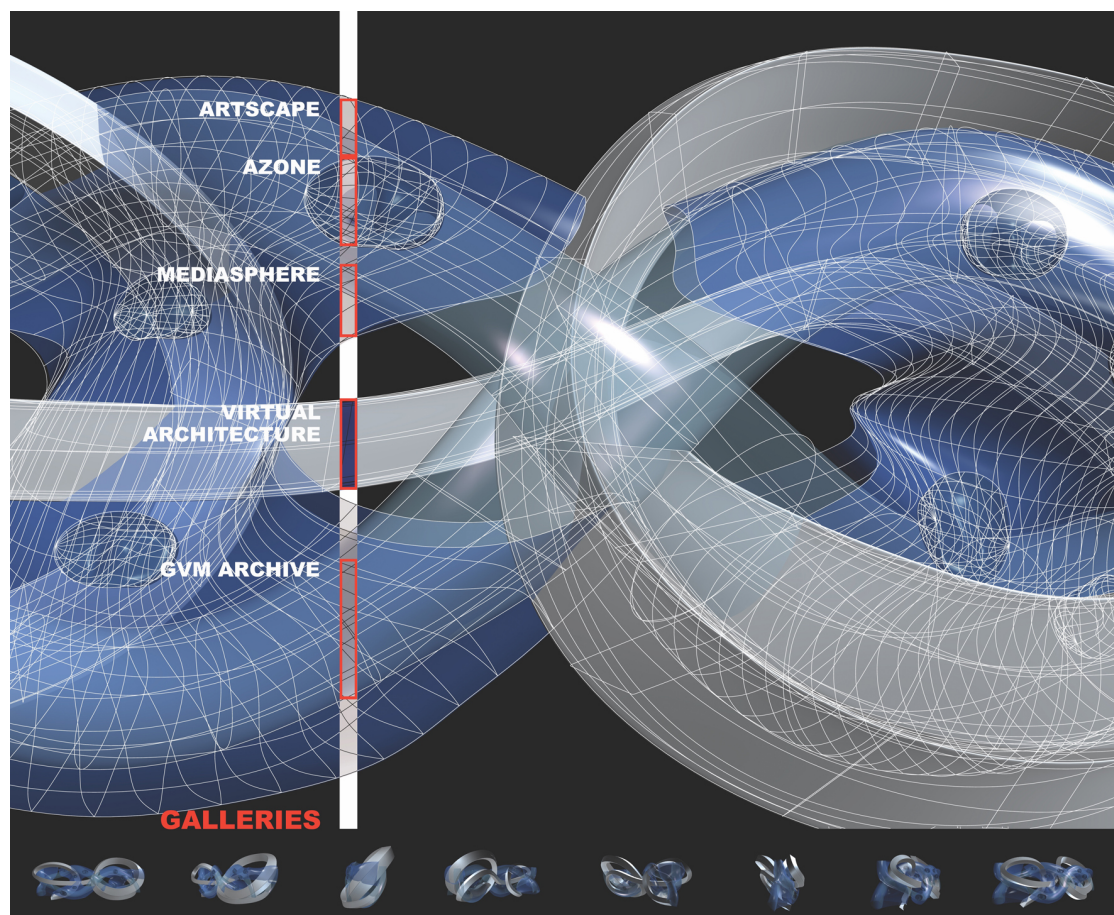


Figure 16. The Guggenheim Virtual Museum was designed by Asymptote Architecture around 1998. © Asymptote Architecture: Hani Rashid and Lise Anne Couture.

Despite these best intentions, *Brandon's* passage from commission to accessioned collection artwork was not smooth, and certainly not as immediate as anticipated: *Brandon* did not officially enter the Guggenheim collection until September 2005. This chapter illuminates *Brandon's* life — on and offline — after the completion of the “one year narrative project in installments” and examines the chronology and conditions of the website’s eventual accession, maintenance and restoration (See Figure 1). The following reconstruction of events is based on the research of archived Guggenheim staff emails and recent, unpublished interviews the authors conducted with stakeholders involved in *Brandon's* commission and accession, including Shu Lea Cheang, Matthew Drutt, John G. Hanhardt, Jon Ippolito, Caitlin Jones, Alexander Galloway, Justin Dávila and Marleen Stikker.

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Brandon's history as “the first artist’s project commissioned for the World Wide Web” [Guggenheim 1998, Jun 18], and as one of the first web artworks collected by a major museum, cannot be told without tracing the evolution of media art conservation as an emerging practice. From a standpoint of collection management and care, the Guggenheim’s curatorial vision in 1998 to not just commission and stage, but to collect *Brandon* was courageous, if not daring. At that time, the Guggenheim had no media art conservator on staff who could have examined the incoming artwork, ensured proper storage and tracking of digital components, documented the artwork’s significant conceptual and aesthetic properties, identified its functional and interactive behaviors, projected the inherent preservation risks and laid out a plan for maintenance and management of change. As a profession and practice, media art conservation barely existed at the time, within the United States or internationally. Moreover, the Guggenheim’s information technology (IT) infrastructure was not advanced enough to allow in-house web hosting and maintenance of *Brandon* on Guggenheim servers. At the time, even the Guggenheim’s own website, the development of which had been spearheaded by Matthew Drutt in 1994, had to be hosted by an external Internet Service Provider, *USWeb Los Angeles*, which later also accommodated

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2.1 What are we collecting?

Regardless of the museum's lack of IT infrastructure and media conservation staff in the 1990s, *Brandon's* specific nature and complexities would have challenged any collecting institution in taking ownership of the work, then and today.

Brandon's sprawling layout includes over 82 web pages, interactive experiences and pop-up windows based on 65,000 lines of code and 4,500 files (see 3.2), requires extraordinary time and effort to grasp, let alone to analyse and document. Shu Lea Cheang herself states that "no one (including myself) can claim to have viewed the entirety of this work" [Ho 2012]. The difficulty of defining the artwork's identity and components was further exacerbated by the collaborative, multi-author nature of the work and the fact that parts of the code were developed and temporarily hosted across several institutions, namely Banff Centre for Arts and Creativity in Canada and the De Waag Society for Old and New Media in Amsterdam. Moreover, *Brandon* was never just a website. Its constituents included a physical installation at De Waag (Figures 12 and 13) as well as the four performative and interactive public events around *Brandon* (see 1.3), which expanded and animated *Brandon* as a platform for live engagement and exchange via chat, webcam, audio broadcast and online participation and rendered the artwork, in part, a live performance. In his New York Times interview, Druitt acknowledged at the time: "It's very difficult for me to imagine what the museum is going to collect at the end of this [*Brandon* project] because a lot of it is ephemeral. Once it happens, it's over. But I think it's something we have to embrace rather than shy away from" [Mirapau 1998].

2.2 *Brandon* between 1999 and 2005: Afterlife, Off-line Dormancy and Collection Intake

Despite *Brandon's* credit page description as "ever-processing" [Brandon credits 1998-1999], no further developments or user entries took place after the project's closing event in November 1999 (see 1.3). The website remained live and hosted by *USWeb's* subcontractor *W3* until 2002. During this live period, the artist retained direct log-in access to the server for maintenance and upkeep purposes. She occasionally hired Alexander Galloway, then an editorial intern and "tech person" at Rhizome, as well as a friend of the artist, to "fix either some JavaScript stuff or some server-side stuff" in *Brandon*, "a couple of hours here and there" whenever "the site was broken or something went wrong" [Galloway and Jones 2017, 8]. Some evidence also suggests that Galloway may have been asked around 2000 to consolidate *Brandon's* code from other external sites, namely the De Waag servers [Galloway and Jones 2017, 27].

In 2002, John G. Hanhardt announced to the artist: "...we are now looking to make [*Brandon*] part of the Museum's Permanent Collection. As a first step, we want to archive the project which means we will take it offline and archive it for later acquisition" [Hanhardt 2002, May 1]. Shortly after, Galloway was commissioned by Jon Ippolito, then the Guggenheim's Assistant Curator for Media Arts, to create an archival back-up of *Brandon's* code. In his "Technical Notes for the Archiving of *Brandon*," Galloway documents: "In June 2002 the files from the *Brandon* development website were compressed into a TAR archive and burned onto this CD-Rom" [Galloway 2002, Jul 8]. Along with the CD-Rom, Galloway sent a note of concern to Ippolito: "I am a little worried to tell you to pull the plug on the website, since it is possible that in ignorance I have overlooked files that I don't know exist" [Galloway 2002, Jul 10]. Galloway urged Ippolito to "Please cross-check my work, or have Shu Lea do it, before you tell the ISP to pull the plug". Soon after, *Brandon* was deleted from the server and remained offline until its formal intake into the collection three years later, in September 2005.

The reasons behind *Brandon's* delayed accession and three-year off-line dormancy were not fully established within this research project, but contributing factors may have included the 2001 departure of *Brandon's* commissioning curator Matthew Druitt; a possible necessity to quickly remove *Brandon's* code from *USWeb* servers without the technical ability to host *Brandon* on Guggenheim servers just yet; and last but not least: a general uncertainty among museum staff how to apply accession, intake and cataloging procedures to web artworks, or media art more generally.

The momentum that triggered the artwork *Brandon's* formal acquisition into the Guggenheim collection in 2005 was created by two coinciding requests for exhibition inclusion: Rhizome's "ArtBase 101" (launched 6/23/2005) and Banff

Centre's "The Art Formerly Known as New Media" (9/17-10/23/2005). The museum's ability to successfully process and complete the acquisition this time around, however, was largely owed to the new practices and resulting institutional confidence that the Guggenheim's *Variable Media Initiative* had instilled across museum departments [Variable Media 2004] [Guggenheim2006]. Launched by Ippolito in 1999, the initiative advocated embracing and consciously managing the change inherent in time-based, variable, ephemeral, performative and technology-based works of art, and to collaborate with artists to preserve identified artwork "behaviors", rather than exclusively focusing on their (possibly ephemeral or temporary) materializations. As a result of this initiative, "Variable Media Interviews" had become part of the Guggenheim's acquisition process; "Variable Media Guidelines" had been added to legal contracts and purchase agreements; archival master formats and preservation deliverables were requested for the collection; and artists were asked to complete "Variable Media Questionnaires" to anticipate and discuss possible changes over time in their collected works.

In 2005, based on the Guggenheim's new and empowered ability to commit to complex media artworks, Hanhardt reached out to Cheang again: "At the time that this project [*Brandon*] was realized we did not have the policy in place to accept digital artwork into the collection. Thus *Brandon* was not made part of the Collection. [...] I will begin the process of proposing that this artwork be made part of the collection as netart commission" [Hanhardt 2005, Jun 1]. Three months later, on September 20, 2005, Hanhardt proposed *Brandon* for acquisition to the Guggenheim's Art & Museum Committee, which ratified the acquisition shortly after.

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The two loan requests in 2005 not only triggered *Brandon*'s formal accession, but its Guggenheim implementation and first major restoration. Variable Media Fellow Caitlin Jones worked with Cheang and Francis Hwang, then Rhizome's Director of Technology to restore the work to functionality and with Christopher Borkowski, the Guggenheim's Senior Web Administrator & Developer, on "taking Brandon home" [Cheang 2012, May 12], i.e. installing and hosting *Brandon* on Guggenheim servers for the first time. The degree of the art work's technical dysfunctionality in 2005 was significant: "...many links at the roadtrip.html" did not work in Safari, and many Java applets were not functional, including the "bodysurgery" applet, the "chat" applet for the "virtual court", the sessions and questions within the "virtual court", and big parts of the "theatrum anatomicum" interface. Hwang explained to Cheang: "The main problem is that [...] the code was written such a long time ago that any browser viewing it will have a much different version of the Java interpreter [...], which is probably the main cause of the bugs. I don't have the expertise, or knowledge of code to fix this in any reasonable amount of time" [Cheang 2005, Aug 31]. Hwang was able to restore some, but not all of *Brandon*'s issues in time for the Banff loan. He informed Jones and Cheang: "...similar problem here [in TAcourt]: Fairly advanced java problems that I can't fix in the time I got" [Cheang 2005, Sep 9]. To address all of *Brandon*'s graver issues at some point, Hwang suggested "finding and paying someone with Java expertise to update the code. [...] This will probably be expensive" [Cheang 2005, Aug 31]. Seven years later, Cheang recalls: "...yes, even with 2005 restoration, we didn't have a chance to resolve all issues due to budget reasons and surely, version of programming language, ie. certain java language may not be functioning..." [Cheang 2012, Jan 24]. Although *Brandon* was finally properly acquired, hosted in-house and restored to function, it had become clear as early as 2005 that this project was likely to continue to require high maintenance, in particular due to its use of 10 unique Java applets, which are called multiple times across *Brandon*.

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2.3 *Brandon* between 2005 and 2012: Keeping it Live

The characteristic qualities of "net.art", as described by net art critic Baumgärtel in 1999, are "connectivity, global reach, multimediality, immateriality, interactivity and equality" [Baumgärtel 1999, 15]. Today, in our networked world, the notions of immediacy and permanent accessibility have become further identifiers of life and art online. We are accustomed to uninterrupted online access which shapes our expectation of on-demand availability of online content, including net artworks such as *Brandon*. And yet, after its 2005 resurrection, *Brandon* experienced many dysfunctions over the years, due to changes and updates to both browser software and the underlying operating systems; updates to internet protocols; deprecated functions in Java and deprecated tags in HTML; as well as broken links. *Brandon*'s oscillation between on- and offline status had become a source of disappointment and frustration among scholars, educators and the art community. Pointedly, the online encyclopedia Media Art Net opens its 2005 description of *Brandon* with the comment: "The project, which is now offline again, was originally announced..." [Media Art Net 2005].

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The Guggenheim's biggest challenges in caring for *Brandon* over the years include the work's permanent display and need for monitoring and maintenance; the spontaneity of failures and consequential urgency of intervention; staff changeover in the Curatorial and IT Departments; and importantly, the general economy of attention in museum culture. At the Guggenheim (and many other institutions), examinations and treatments of artworks are typically conducted—and budgeted for — in the frame of acquisitions, exhibitions, loans or defined research projects. Allocating resources to unexpected interventions can be highly challenging in light of competing priorities and the lack of budget.

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In 2012, Cheang wrote to the Guggenheim stating that *Brandon* “has been offline and inaccessible for months” and asking for the project to be “brought back online” [Cheang 2012, Jan 24]. Luckily, Carmen Herno, then the Guggenheim's Curatorial Assistant for Collections, was able to prioritize *Brandon* immediately and work with Jack Szwergold, then the Guggenheim's Web Infrastructure Systems Administrator to “make adjustments to return the site to functional use. Jack [Szwergold] was able to fully recover the archive, and performed minor backend clean-up to the base code in order to restore the site to working order” [Herno 2012, Feb 21]. Szwergold also created a web-based and password-protected clone of *Brandon* to start fixing further issues, such as broken links. In a recorded Skype meeting on 5/29/2012, Herno and Szwergold presented the artist with a summary of issues and treatment proposals; it became clear that specialty expertise and allocated funds were needed to truly restore *Brandon*.

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2.4 *Brandon* between 2012 and Today: The CCBA Initiative, Source Code Analysis, Condition Assessment and Restoration Planning

Over the last decade, Media Conservation at the Guggenheim has evolved from project-based approaches — such as the Variable Media Initiative — to a permanent program with dedicated staff (since 2008). The implementation of this new conservation specialty enabled the museum to address the complex needs of its software- and computer-based artworks in a systematic way. In 2016, the Conservation Department launched the initiative *Conserving Computer-based Art (CCBA)* [Dover 2016] [Dover 2016a], at the core of which stands an ongoing research collaboration with New York University's Department of Computer Science. Since 2014, computer science students and faculty have been conducting source code analysis on Guggenheim collection works, enabling the museum to better comprehend and document the intended artwork behaviors, functionalities, software and hardware dependencies as well as associated preservation risks.

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As one of the CCBA case studies, *Brandon* was the subject of source code analysis and documentation over two semesters by computer science students Emma Dickson and Jillian Zhong. Based on their thorough examination of every element of the work, a complete account of errors and malfunctions was created in 2016.

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Among *Brandon*'s functional compromises, its non-displaying Java applets were considered most disruptive to the artist-intended experience of the work (Figures 17, 18, 19, 20, 21, 22). Java support was discontinued by Google Chrome in 2015 [Java 2015] and Mozilla Firefox at the end of 2016 [Mozilla 2015], rendering many critical parts of *Brandon* unviewable with contemporary browsers.

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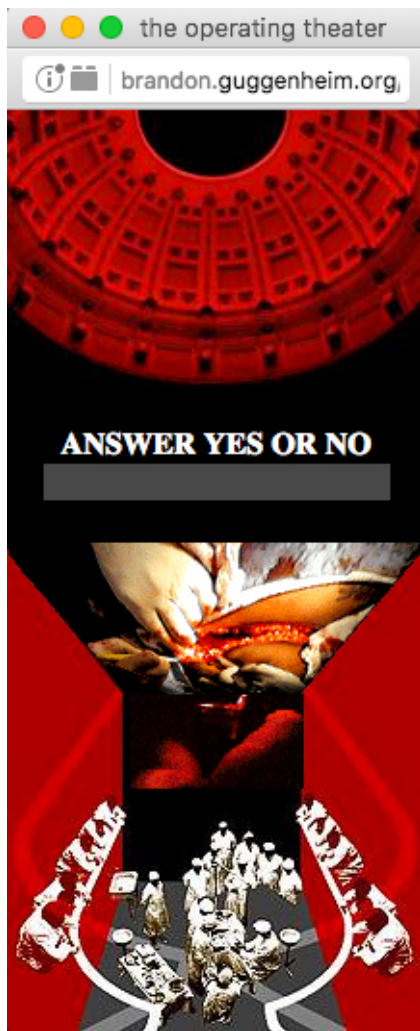


Figure 17. The Java applet *randomtext* in cell 10 of the panopticon was no longer displaying the random phrases. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

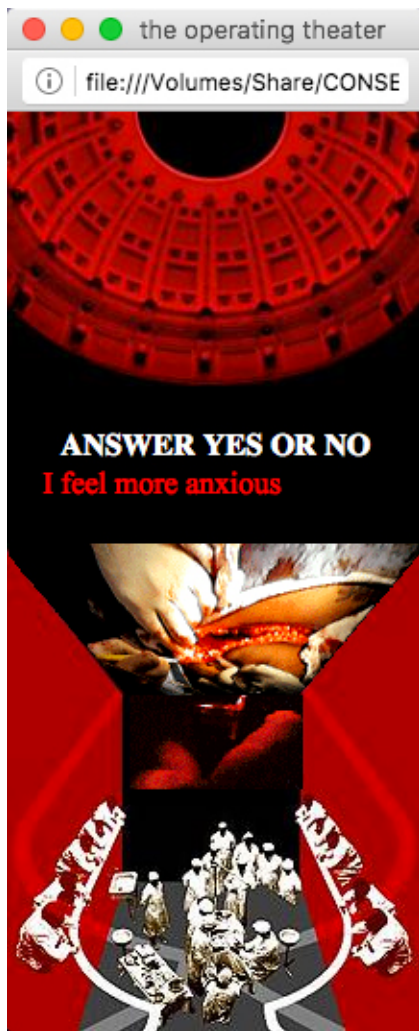


Figure 18. After the 2016/17 migration of the Java applet *randomtext* to JavaScript, the random phrases appear as in the original again. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

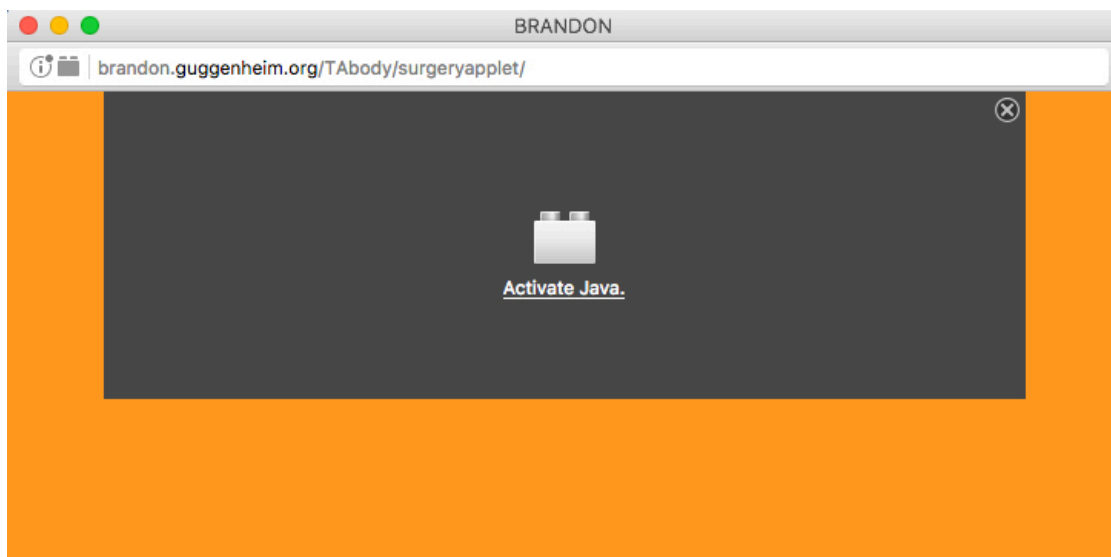


Figure 19. The Java applet *surgery* in the *theatrum anatomicum* was no longer displaying. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

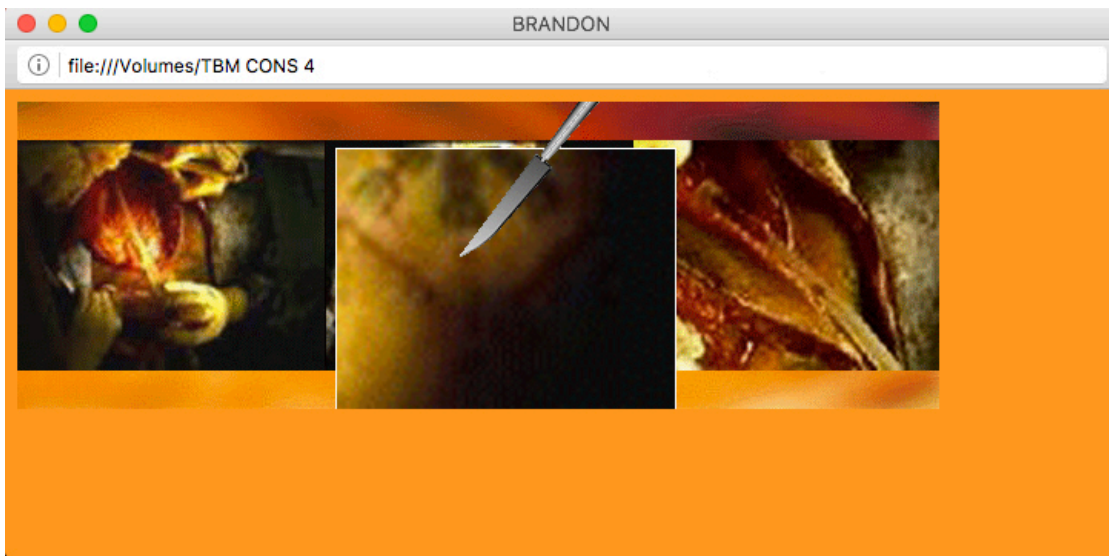


Figure 20. After the 2016/17 migration of the Java applet *surgery*, the images and magnifying function are visible again. The applet's background images were converted to an animated GIF, and the magnifying field was recreated with JavaScript. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

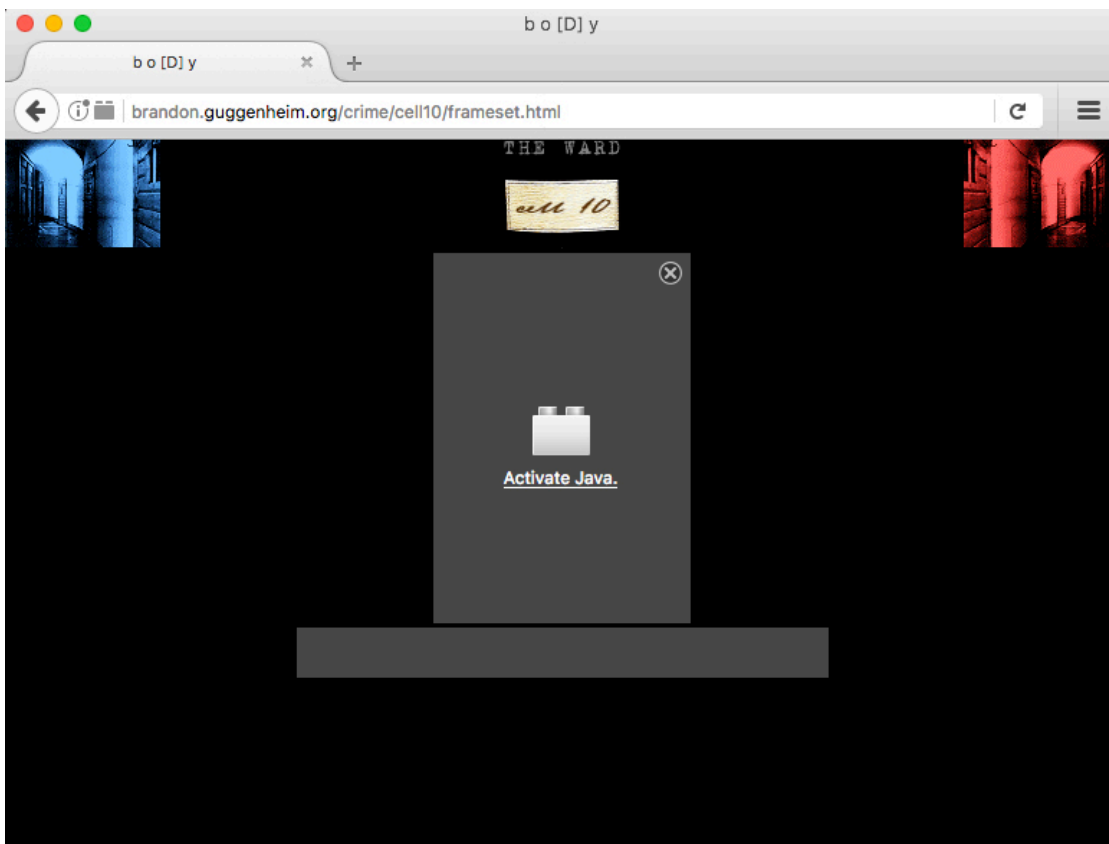


Figure 21. The Java applets *lake* and *IHeleType* in cell 10 of the panopticon were no longer displaying the blue head and animated typewriting. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.



Figure 22. After the 2016/17 migration of the Java applet *lake* to an animated GIF, and the Java applet *IHeleType* to JavaScript, the blue head and animated typewriting are visible again. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

An additional grave compromise to the work was the inoperability of *mooplay*, one of *Brandon's* five interfaces. Due to a broken script that generates hyperlinks in *mixup*, users could no longer navigate to *mooplay's* pseudo chat. Broken links were not just limited to internal dysfunctions; some external URLs have changed as well. As an example, the link to the Institute for Arts and Civic Dialogue on *Brandon's* credit page today leads to an advertisement of the domain vendor, and *TAbody's* button "LISTEN TO REALAUDIO" which should enable a download of the audio recording of the DigiGenderSocialBody event (see 1.3), calls the URL of a defunct De Waag server in vain. Embedded sounds, such as the police siren in *TAopening*, were not functioning, in this case due to missing or outdated plug-ins called by the HTML `<embed>` tag. For example, when accessed in Firefox, these sound files resulted in the display of a grey warning window "a plugin is needed to display this content" (Figure 23 and 24). All user entries in *Brandon's* virtual court section, such as the court session logs and juror submissions from the November 1999 event, were stored in a MySQL database and were no longer retrievable by *Brandon's* interface due to code deprecation.

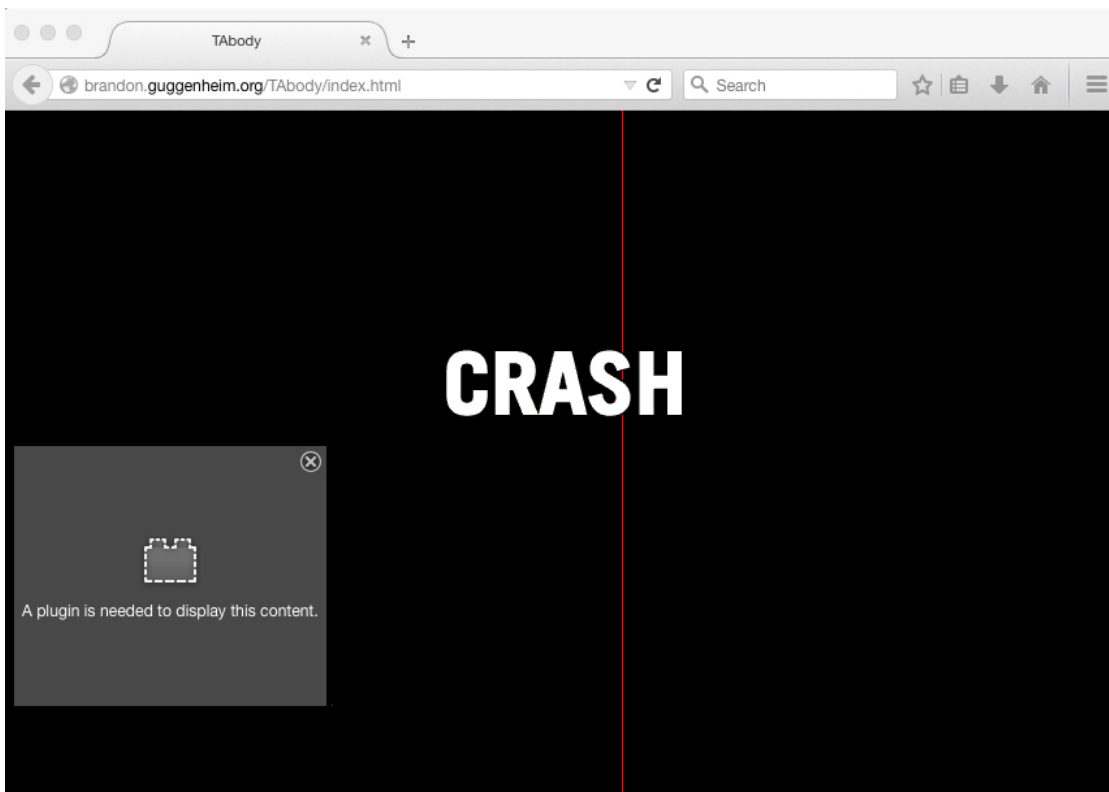


Figure 23. The sound of a police siren in *TAbody* was not functioning and instead triggered a warning that a plug-in was missing. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

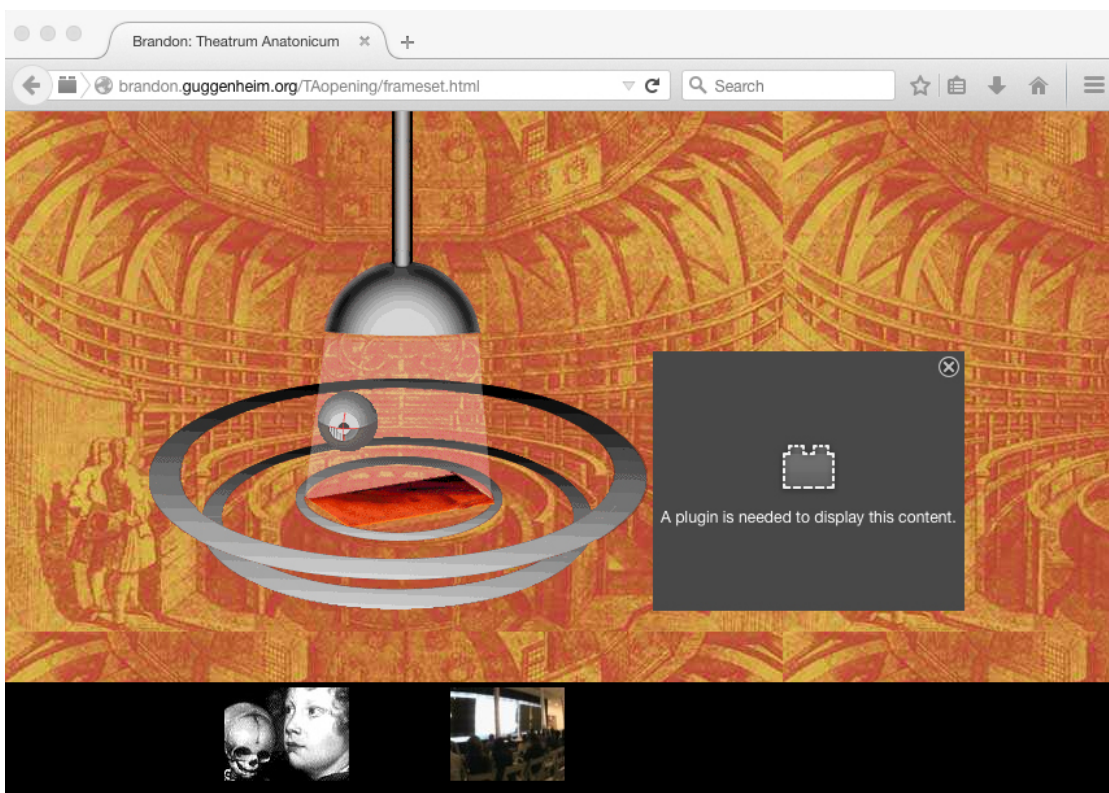


Figure 24. The entrance sound in *TAopening* was not functioning and instead triggered a warning that a plug-in was missing. Screenshot: Jonathan Farbowitz, © Solomon R. Guggenheim Museum.

The work's aesthetic compromises primarily pertained to changes in font types, sizes and colors. In *Brandon*, styling

was not done with CSS (see 3.2), but HTML font tags, which are no longer consistently supported by all browsers and will be fully deprecated in the near future. As a result, instead of following the specified parameters, contemporary browsers resort to their default settings. For example, the font types specified for large parts of *Brandon* are the old apple font “Chicago”, and alternatively “Times”. However, since today’s browsers ignore these HTML tags, their display of *Brandon* defaults to Times New Roman. The same applies to *Brandon*’s font sizes. Unable to read the old HTML tags, contemporary browsers apply their own default font size of 12pt; as a result, *Brandon*’s fonts display too small. The source code analysis also unearthed `<blink>` tags that were used to make individual words and phrases in *Brandon* blink. After the full deprecation of the `<blink>` tag, the words were still displayed, but no longer blinking.

To holistically address *Brandon*’s identified errors, the Guggenheim Conservation Department decided to launch a major, cross-disciplinary restoration project. In the Spring semester of 2016, computer science students Emma Dickson and Jillian Zhong were tasked to build a prototype to test the migration of a number of *Brandon*’s Java applets to JavaScript. These prototypes were presented to the artist on April 1, 2016 for approval, and Cheang welcomed and supported the proposed restoration strategy (Figure 25). After a period of fundraising, the restoration project was formally launched in December 2016 and completed in April 2017, in time for *Brandon*’s inclusion in Rhizome’s online exhibition “Net Art Anthology” [Rhizome 2017]. For details on the restoration, see 3.4. and [Phillips et al. 2017].

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Figure 25. Skype interview with Shu Lea Cheang on April 1, 2016. The artist welcomed the proposed restoration and approved prototype migrations of the Java applets in *Brandon*. From left to right: NYU computer science student Jillian Zhong, Guggenheim conservator Joanna Phillips and NYU’s Prof. Deena Engel. Foto: Amy Brost, © Solomon R. Guggenheim Museum.

3. A Technical Anatomy of *Brandon*

3.1. The State of the Internet and Technological Landscape at the Time of *Brandon*’s Creation

The artwork *Brandon* was written when the web was nascent. In 1997, the first year the US Census Bureau began collecting data, only 18% of households using a computer had internet access. That number doubled to 42% by 2000 [Newburger 2001, 2] and tripled by 2013 to 73% of households [Rainii and Cohn 2014]. At the time of *Brandon*’s creation, the Internet itself was exploding: while there were only 1.1 million pages on the Internet in 1997, this number

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more than doubled in 1998 [Internet Live Stats 2017]. With the advent of Google in 1998, it became more accessible and useful. Yet, people had to dial in via landline phone connections, and mobile devices with Internet access were not yet available.

The web technologies used to develop *Brandon* were standard and widely used at the time the work was composed. *Brandon* is based on a combination of programming in Java and Perl along with other web technologies to create a work that exploits textual narrative and images. The selection of technologies was not radical in nature; it was rather an innovation at that time to use web technologies to build a work of art. Other contemporary programmer-artists were building programming tools to create algorithmic art: for example, John Maeda created *Design By Numbers* in 1999, a computer program intended for artists [Maeda 1999].

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3.2. The Use of Web Technologies and Programming Languages in *Brandon*

There are approximately 65,000 lines of code in the HTML, programs and script files which were written by *Brandon*'s developers (Figure 26). These files were coded manually; they were not developed by automating the process programmatically as is often done today using PHP, Python or other modern scripting languages. The programmers working on *Brandon* used a variety of client-side web technologies including HTML to annotate or “markup” webpages for format and content along with JavaScript to make the pages more responsive to the user; Java to build web-ready displays, animations and other visual features; and digital images, among others. Perl and PHP3 were implemented on the server-side to support *Brandon*'s interactive functionality and data manipulations. A short explanation of each employed web technology follows:

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HTML (Hypertext Markup Language), which is widely used in *Brandon*, allows developers to annotate textual content in a way that distinguishes between content and structural elements by using “tags”. For example, a paragraph is surrounded by `<p> ... </p>` tags. The text that appears in the top border of a browser window of a web page is surrounded by `<title> ... </title>` tags to denote its placement.

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Notably, content formatting in *Brandon* was done within the HTML, without CSS. CSS stands for “Cascading Style Sheets” and is a current technology that allows web developers to systematically assign text formatting (e.g., bold, italics or font colors) as well as page placement (e.g., centering text and other layout aspects) within individual pages or across large websites. Although CSS was first registered in March 1998, it was not yet commonly used when *Brandon* was developed and implemented. This reflects a possible conservative approach on the part of *Brandon*'s programmers. JavaScript was written in this work within the HTML files (rather than captured in external scripts as current best-practices would promote). Framesets, which combine multiple HTML documents in a single browser window, were used throughout the work.

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Brandon uses ten unique Java applets, which were written using JDK 1.0.2 [Tauscher 1998, May 13]. The computer scientists on this research team obtained working source code for the JAVA applets by decompiling the programs to render them in a human-readable Java form.

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On the server side, Perl is a back-end programming language which was used in *Brandon* for a variety of tasks such as capturing phrases or dialogue from texts and manipulating files; some of the Perl scripts are called by Java applets. Although Perl is still in use for legacy applications at the time of this writing, PHP and Python are among the more commonly used scripting languages in current web environments for these purposes. PHP is also a server-side scripting language. The PHP3 files here are written using an early implementation of PHP and are called on to manage a variety of tasks, such as connecting to the MySQL database, which is used to capture data related to the virtual court sessions in the work. Although the amounts of data collected in this database are quite small and could more easily have been stored in text files without the overhead of running a server-side database, the developers possibly anticipated a significantly larger dataset or simply preferred coding with a database rather than from text files.

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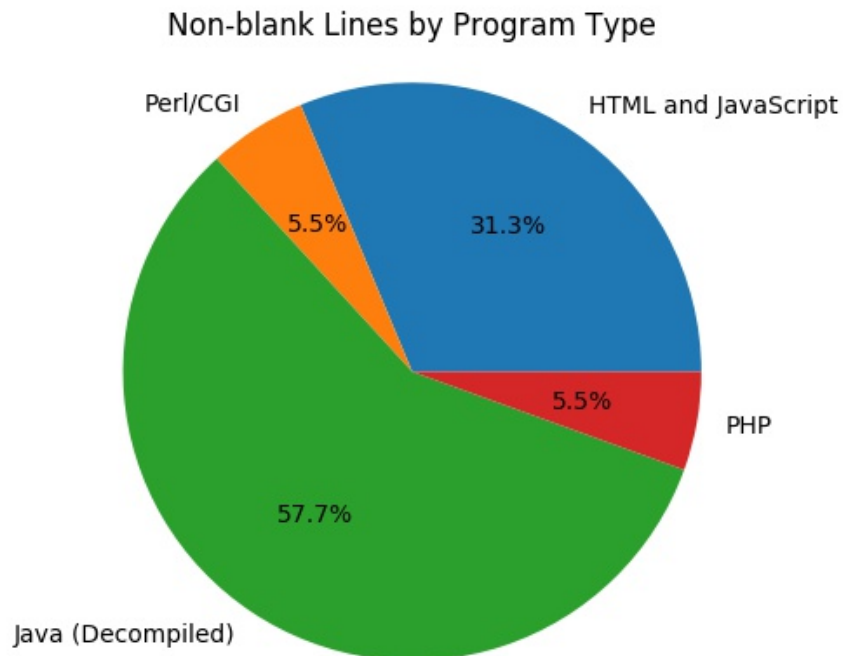


Figure 26. The lines of code in *Brandon*. Diagram: Deena Engel, © Deena Engel and Solomon R Guggenheim Museum.

3.3. A Structural Analysis of *Brandon*

Brandon is comprised of approximately 4,500 files in a complex structure of 413 directories and subdirectories [2]. There are over 30 distinct file types (Figure 27). HTML web page files comprise 13% of the total number of files. Images comprise nearly two-thirds of the files at 63%: 41% of the files are JPG images and another 22% of the files are GIF image files; there are also 13 BMP image files. In turn, 110 or 13% of the GIF image files are animated GIFs while the rest of the GIF images are still images. The CLASS and JAVA files for the Java applets comprise another 6% of the total number of files. PHP scripts and early versions of PHP files such as “PHP3” and “PHTML” files along with server-side programming scripts such as Perl and Perl/CGI scripts comprise 2% of the files. The remaining files do not appear to the viewer. Text files containing drafts, notes and prose that reveal the artist’s work as it developed comprise approximately 2% of the files. Additional files hidden from view include questionnaire log files (11%), database scripts (SQL files) and operating system level shell scripts among others.

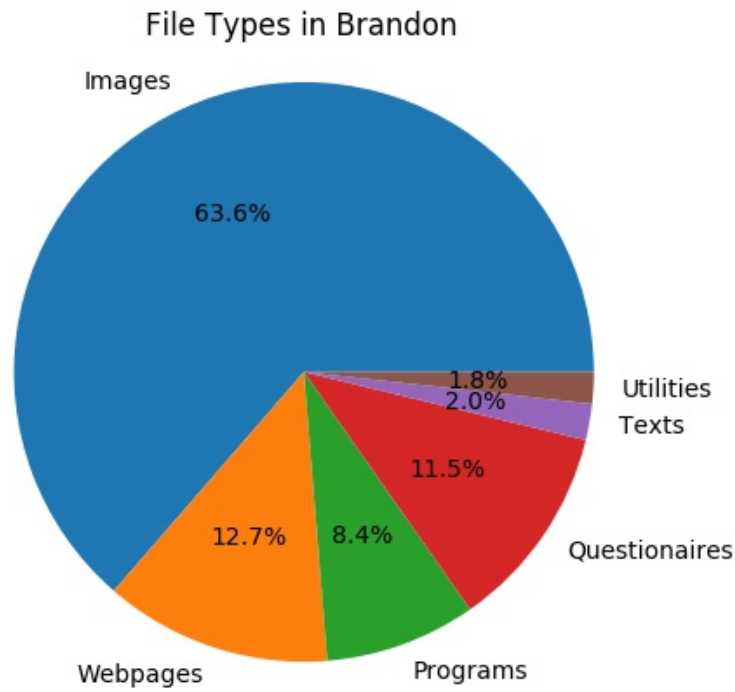


Figure 27. The file types in *Brandon*. Diagram: Deena Engel, © Deena Engel and Solomon R Guggenheim Museum

These files are organized through a complex directory tree (Figure 28) to support both the technical requirements and the content requirements for artistic goals. For example, technical requirements include the need to place Perl/CGI scripts into folders called “cgi-bin” which were typically configured on the web server to better support security. Content requirements and support for artistic development would suggest that narratives, images and other content materials be logically grouped together depending on the narrative chapter of the work in order to make the materials easier to find and manipulate, both for the artist and for the programmers. This also helped the programmers to simplify relative file paths within the code.

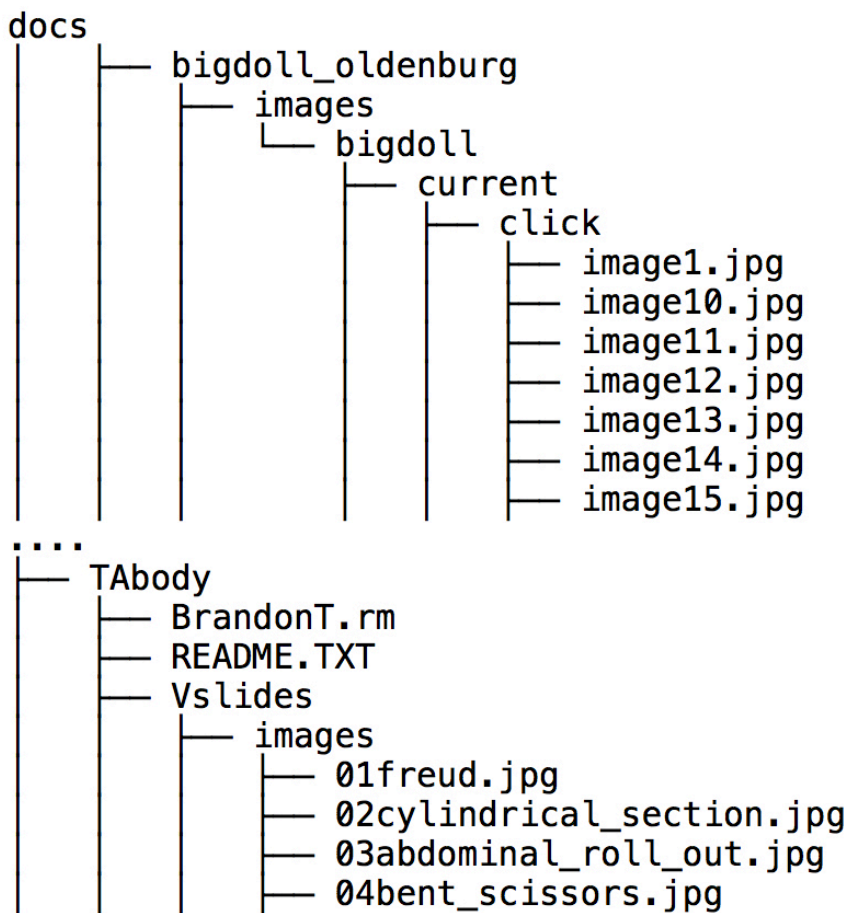


Figure 28. Excerpt of file tree for *Brandon*. Diagram: Emma Dickson, © Solomon R. Guggenheim Museum.

3.4 A Technical Description of *Brandon's* Five Interfaces

The artist collaborated with programmers and designers in each of the five interfaces of the work (*bigdoll*, *roadtrip*, *mooplay*, *panopticon* and *theatrum anatomicum*). Each of the five interfaces uses a specific selection of technologies based on the intended functionality and programmers' preferences. A further study of the technical anatomy of each narrative chapter follows.

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The *bigdoll* interface consists of an HTML file to build the web page which contains JavaScript and uses an assortment of 50 GIF images. All of the image files are named "image", plus a number from 1-50 at a size of 144 pixels wide x 108 pixels high each. The web page opens as an invisible grid of 5x5 white blocks (using an additional GIF image of a white rectangle in the same size as the other image files). Randomly selected images from the selection of 50 images appear as the user mouses over each block while JavaScript is used to process the user's mouse-overs and mouse-clicks. When the user has successfully hidden the left- and right-most columns and "uncovered" the assigned image blocks in the center three columns, JavaScript calls a function to open *roadtrip*, the next chapter in the narrative.

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Roadtrip uses an HTML file containing 14 original JavaScript functions along with 35 still GIF images and 2 animated GIF images. The *roadtrip* interface makes use of the JavaScript function "scroll" for manipulating the browser window, which creates the impression of traveling along a road. The background image that appears to move is a solid black rectangle with a single vertical yellow bar (Figure 29) that is tiled to look like the dashed lines of a typical American highway. The other images are placed in the browser window through the use of an HTML table of 30 rows (where each

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row has one, two or three columns) so that the relative positions of the images do not change with respect to one another as the window automatically scrolls. The scrolling is reversed (to go forward or back) when the top or the bottom of the table reaches the top or bottom of the browser window respectively. Some of the images open a “pop-up window” when they are clicked; some are not interactive; and others open to the other chapters.



Figure 29. The background of the *roadtrip* interface is based on this image, which is tiled to create the impression of a highway. © Shu Lea Cheang.

Mooplay is one of the two most complex interfaces of the work from a technical standpoint (along with *theatrum anatomicum*). It includes HTML and HTML pages with JavaScript along with GIF and JPG images as the other interfaces do. However, *mooplay* also includes Perl/CGI scripts and Java applets to support a chatserver and to manipulate the narrative texts in their randomized, “mixed-up” forms. Approximately one-third of the files in this section are text files which are not technically significant but hold value for the work in the logs and commentary that have been captured.

The *panopticon* is built using HTML files with GIF and JPG images. There are four Java applets which are used to manage the images and a text scroll. The HTML in this section uses complex framesets; note that nearly half of the over 200 files used for this chapter are HTML files as a result.

GIF and JPG image files make up 80% of the files in *theatrum anatomicum*. There are also a handful of BMP (bit-mapped image files) and four WAV (sound) files. From a programming standpoint, this section uses Perl scripts as well as Java applets. The Java programs and the HTML files each make up about 5% of the files. There are 13 tables of data in the MySQL database and several earlier versions of the data are also stored with the files for this chapter^[3]. The database contains data relevant to four cases and 89 jurors over 18 sessions, which took place November 15-20, 1999.

3.5 The 2016/2017 Restoration of *Brandon*

The objective of *Brandon's* major 2016/2017 restoration was to reinstate *Brandon's* intended online experience and interactivity as a living artwork, while preserving all functional behaviors and aesthetic properties of the work as defined by the original source code. A more in-depth account of the restoration can be found on the Guggenheim Blogs [Phillips et al. 2017].

The selected method to realize this goal was a combination of code migration, hyperlink replacement, database replacement, and HTML tag and frameset migration. In keeping with Conservation ethics and standards, all changes were documented through version control, treatment reporting and code annotation. The latter includes headers with project information (Figure 30) as well as detailed explanations preceding each code intervention (Figure 31, 32). No original code was deleted, only commented out and added to. In respect of *Brandon's* original code, interventive programming solutions were kept as minimal as possible and in style with the original programming. Popular alternatives to code intervention, such as embedding the work in an emulated legacy server environment and web browser software, were dismissed as a treatment option for *Brandon's* case. The “historic” appearance of the artwork in a fixed legacy browser (e.g., Netscape) would have created an illusion of authenticity that collides with the twenty-year evolution of *Brandon's* identity. *Brandon* has no conceptual dependencies on particular technologies and was always intended to be experienced by directly accessing the work through an ever-evolving variety of personal computers, environments and browser versions around the world. Discontinuing *Brandon's* 20-year history of permanent change and freezing the work at an arbitrary moment of its complex history would have deprived *Brandon* of its inherent variability and liveliness.^[4]

```
bluehead.html
1
2 <!--DOCUMENTATION
3 AUTHOR: Emma Dickson
4 DATE: 12/20/16
5 PROJECT: BRANDON, Java applet migration
6 PURPOSE: This page is called by cell 10,
7 java applet has been replaced with javascript, css and div element
8 REVISION HISTORY:
9   12/20/16: Migrated java applet to css, js and new html element
10 -->
11
12 <HTML>
13 <HEAD>
14 <!--NEW CODE START-->
```

Figure 30. The 2016/17 restoration project is identified through in-code comments at the top of the file. Screenshot: Emma Dickson, © Solomon R. Guggenheim Museum.

```
100 <!-- NEW CODE START -->
101
102 <SCRIPT>
103   // 1. Establish constants
104
105   // Keeps track of current place in the phrases being typed into the text box
106   var i = 0;
107
108   // Indicates which div is currently being written to
109   var current = 0;
110
111   // Keeps track of whether animation of the head is on or off, on being 0
112   // and off being 1.
113   var go = 0;
114
115   // The behavior of the head and the text animation changes depending on which
116   // is clicked first. This indicates whether the head was clicked first.
117   var headClick = 1;
118   var initialTextClick = false;
119   // The phrase being animated
120   var phrases = "...the body is the inscribed surface of events... $* (traced by language and dissolved by ideas).. $* Genealogy, as an analysis of descent, $*";
121
122   // 2. Text is initially placed in line 0 then currentLine is alternated
123   // between 0 and 1 according to line breaks.
124   var currentLine = document.getElementById('line0');
125
126   // 3. The interval function, the second parameter indicates speed. The
127   // function is called every 60 milliseconds.
128   var intervalID = window.setInterval(handleCharCallback, 60);
129
130   // 4. The function called by the interval function above, goes through
131   // phrases variable character by character, keeps track of position with
132   // global variable i and has special behavior for certain characters.
133
134   function handleCharCallback() {
135     // 5. In order to achieve the blinking _ look, the underscore is added to
136     // the end of each line and then removed at the beginning of the next
137     // call to handleCharCallback
```

Figure 31. Every intervention is explained and documented through code annotation. Screenshot: Emma Dickson, © Solomon R. Guggenheim Museum.

```

184
185 // JQuery methods used to stop and start the text animation
186
187 // The head and the text animation exhibit the following behavior.
188
189 // Initial animation
190
191 // The text is automatically animated when the page loads. The head
192 // is not. Clicking the text box to pause the typing will start the animation
193 // of the head. However if the head is clicked first it must be animated
194 // separately
195
196 // After the initial animation the head and the text can be animated separately
197 // through clicking on them.
198
199 // If the head is being animated and the text undergoes a change in animation,
200 // i.e stopping or starting. The head will toggle to off and on based on the
201 // changing state of the text.
202
203 // 11. on click check if the setInterval function is active, if not
204 // the text animation needs to turn on, so go is set to 0
205
206 var initialClick = false;
207 $('div.container').click(function(){
208
209   if (!intervalID) {
210     console.log('turn text on ' + " headClick " + headClick)
211
212     // the head hasnt been clicked individually but must be toggled with the text.
213     console.log("not animating head")
214
215     $('#lake-ing').lake({
216       'speed': 1,
217       'scale': 1,
218       'waves': 10,
219       'go': 0
220     });

```

Figure 32. Every intervention is explained and documented through code annotation. Screenshot: Emma Dickson, © Solomon R. Guggenheim Museum.



Figure 33. The Guggenheim's Fellow for the Conservation of Computer-based Art Jonathan Farbowitz and NYU computer science student Emma Dickson are discussing the restoration of *Brandon* in the Guggenheim Media Conservation Lab. Foto: Kris McKay, © Solomon R. Guggenheim Museum.

All Java applets that manipulate text in *Brandon* were replaced with JavaScript functions, and all Java applets that manipulate static sets of images to create animations were replaced with animated GIFs (Figures 18, 20 and 22). To restore access to the user data entered in *Brandon's* court sessions in 1999 and to prevent the (future) necessity of server-side programming to query the underlying MySQL database, all data were extracted from the database and converted into text that is accessible to the JavaScript code. This approach seemed particularly feasible, since *Brandon's* data have been static since 1999 without further additions.

To restore *mooplay*, the character names in *mixup* were reconnected with the pseudo chat (Figure 7) as well as with their sets of programmed dialogue through code migration from Perl/CGI into JavaScript (Figure 34). The inaccessible RealMedia sound file in *TAopening* was replaced with an MP3 transcode, which is now downloadable again. In keeping with *Brandon's* use of HTML for styling, CSS styling was avoided as much as possible. Thus, instead of using separate CSS pages for the correction of deprecated font tags (Figure 35), CSS styling was hard-coded into the HTML using internal styles (Figure 36). Correcting the font size tags also required a translation to a contemporary CSS font-size system (using pt) from a legacy system that used a relational scale from 1-7 (Figure 37). The deprecated <blink> tags (Figure 38) were reactivated by a new JavaScript function that identifies text between two <blink> tags and animates it to blink (Figure 39).

As a measure of preventive conservation, legacy HTML tags were also addressed in cases, where deprecation was not yet complete, but anticipated. Amongst others, this applied to the popular HTML tag <frameset>, which is widely used in *Brandon* to integrate several scrollable HTML pages into one window. To prevent these pages from near-future corruption, the framesets were replaced with borderless tables for simple page layouts, along with additional iFrames for more complex designs.

```

104
105 donmonster: [
106     "I have a, shall we say, a presence.",
107     "I'm small,",
108     "You see it tattooed on my back: Don, Don Monster.",
109     "Now I'm beyond that.",
110     "Now I'm a junkie. A theory junkie.",
111     "I became an intellectual don.",
112     "now that I'm free,",
113     "I'm still doing the crimes.",
114     "I'm just not doing the time.",
115     "Your skin gets thicker,",
116     "your hands coarser.",
117     "Your mind sharper.",
118     "Heavier.",
119     "It has a presence. A life.",
120     "reminding me of this body.",
121     "Now I can feel every muscle tremble as I inhale.",
122     "Then exhale.",
123     "solid bricks.",
124     "Damn, Monster, you look fucking good.",
125     "You got what everyone wants.",
126     "It's all good.",
127     "You know what I'm saying?",
128     "Let me put it this way—"
129 ],
130
131 hardCandy: [
132     "A gram later,",
133     "Don't ask.",
134     "he cuts the price in half.",
135     "but I'm on vacation after all.",
136     "Where's Thon?",
137     "It's my last night here.",
138     "I'm going up north. To be ordained.",
139     "Gin and tonic please.",
140     "Look, I really need to see Thon.",
141     "He doesn't answer. Just smiles.",
142     "you can't",
143     "bring yourself to look at him anymore."

```

Figure 34. The hard-coded phrases of the characters *donmonster* and *hardCandy*, which are called by *mooplay's* pseudochat. Screenshot: Emma Dickson, © Solomon R. Guggenheim Museum.

```

33
34
35 <TITLE>GARLAND</TITLE>
36
37
38 </HEAD>
39 <BODY TEXT="blue" LINK="#FFFFFF" VLINK="#FFFFFF" BGCOLOR="#000000" BACKGROUND="pix/aqua.jpg">
40
41
42 <font size=4>
43
44

```

Figure 35. The deprecated HTML font tags defined font sizes and colors within the HTML, without CSS. Screenshot: Emma Dickson, © Solomon R. Guggenheim Museum.

```

15 <!-- NEW CODE START -->
16 <style>
17   body{
18     color: blue;
19     background-color: #000000;
20     background-image: url("pix/aqua.jpg");
21   }
22   a{
23     color: #FFFFFF;
24   }
25   a:visited{
26     color: #FFFFFF;
27   }
28   p{
29     font-family: Times New Roman;
30     font-size: 14px;
31   }
32 </style>
33 <!-- NEW CODE END -->

```

Figure 36. Here, the font styling shown in Figure 35 is migrated to internal styles that can be rendered by contemporary browsers. Screenshot: Emma Dickson, © Solomon R. Guggenheim Museum.

```

<!DOCTYPE html>
<html>

<body>
<p><font size="1">This is some text!</font></p>
<p style="font-size: 8pt;">This is some text!</p>

<p><font size="2">This is some text!</font></p>
<p style="font-size: 10pt;">This is some text!</p>

<p><font size="3">This is some text!</font></p>
<p style="font-size: 12pt;">This is some text!</p>

<p><font size="4">This is some text!</font></p>
<p style="font-size: 14pt;">This is some text!</p>

<p><font size="5">This is some text!</font></p>
<p style="font-size: 18pt;">This is some text!</p>

<p><font size="6">This is some text!</font></p>
<p style="font-size: 24pt;">This is some text!</p>

<p><font size="7">This is some text!</font></p>
<p style="font-size: 36pt;">This is some text!</p>

</body>
</html>

```

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

This is some text!

Figure 37. In the left column, Brandon's legacy font sizes 1-7 are compared to contemporary font sizes defined by pt. Screenshot: Emma Dickson, © Solomon R. Guggenheim Museum.

```

13 <TD ALIGN=CENTER VALIGN=MIDDLE>
14 <FONT SIZE="3"><BLINK><B>ANSWER YES OR NO</B></BLINK></FONT>
15 <BR>
16

```

Figure 38. *Brandon* features a number of deprecated `<blink>` tags that are no longer recognized by contemporary browsers. As a result, the words are displayed without the intended blinking. Screenshot: Emma Dickson, © Solomon R. Guggenheim Museum


```

107
108 // This function blinks the text within the <blink> tag. This tag is
109 // deprecated in html 5 and no longer blinks on its own.
110 function blink() {
111   var blinks = document.getElementsByTagName('BLINK');
112   for (var i = blinks.length - 1; i >= 0; i--) {
113     var s = blinks[i];
114     s.style.visibility = (s.style.visibility === 'visible' ? 'hidden' : 'visible');
115   }
116   window.setTimeout(blink, 1000);
117 }
118 if (document.addEventListener) document.addEventListener("DOMContentLoaded", blink, false);
119 else if (window.addEventListener) window.addEventListener("load", blink, false);
120 else if (window.attachEvent) window.attachEvent("onload", blink);
121 else window.onload = blink;
122
123 </SCRIPT>
124 <!--NEW CODE END-->
125

```

Figure 39. In the 2016/17 restoration, the deprecated <blink> tags are replaced with a JavaScript function that finds all text in the code that is located between two <blink> tags and animates it to blink. Screenshot: Emma Dickson, © Solomon R. Guggenheim Museum.

4. Digital Cultures and Digital Aesthetics

If the above describes the artwork's conceptual and technical identity, its place within digital art history and the process of its restoration, then what of its digital aesthetics and its discursive fields? This article will finish with some preliminary thoughts that bring to the fore aspects of the work's original context within digital cultures of the late twentieth century while also raising questions — which will be answered not in this article but by the new audiences who will now come to the piece — about how it might be experienced within a very different digital context today.

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4.1 Digital Culture in the 1990s

Sherry Turkle's 1995 publication *Life on the Screen: Identity in the Age of the Internet* documents contexts central to the work's formation, and helps situate it retrospectively within 1990s digital cultures. This publication reflects, and reflects on, early life on the internet and offers a sense of the possibilities (as well as some of the potential problems) that emerged in the 1990s for the construction of the self online. Turkle is particularly interested in the therapeutic and liberatory potential of the expression of the self through multiple identities that the internet seemed to offer by way of its anonymity. In the third section of the book she dwells particularly on the MUD environments (Multi User Domains) that enabled online communities to set up collective online worlds such as the LambdaMOO (an online MUD community that created an early 'second-life' type environment), in which participants constructed their own characters and interacted with others. As Turkle's analysis shows, there was no sense that these characters were supposed or presumed to be mimetic representations of their creators: participants often had more than one character, either sequentially or synchronically, and their characters were often clearly fictitious, being speaking animals or otherwise humanly-impossible figures. In her chapter on "Tinysex and Gender Trouble", Turkle represents cyberfeminist perspectives, among others, and outlines several case studies that demonstrate the possibilities for expression and development of the self that stem from gender swapping in the participant's MUD character or characters (see, for example, [Turkle 1995, 220]). This digital utopianism is a key theme for Cheang's work, and will be discussed further in the next section.

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Turkle also returns repeatedly in the book to the case of the virtual rape that occurred in 1992 in LambdaMoo. This is a case in which a character called Mr. Bungle allegedly used a piece of code, referred to as a "voodoo doll", that enabled him to take over others' characters to control them and their actions. The violations perpetrated caused outrage within the community and a revisiting of the governance structures of that online world. The case was written about by Julian Dibbell in "A Rape in Cyberspace", published in *The Village Voice* [Dibbell 1993]. Dibbell's piece (and his reflection on the accountability of words and deeds) was influential for Turkle [Turkle 1995, 253], and in turn for Cheang's work. Cheang was in correspondence with Dibbell, and his work influenced the *mooplay* section of *Brandon* substantially, particularly in its central concern with sexual violence. Transcripts from the Mr. Bungle case are also quoted in *Brandon*, and the very concept of the virtual court might be seen to be inspired by the events around the Mr. Bungle case that Dibbell outlines.

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The concept of the Panopticon, which forms one of *Brandon*'s interfaces (and which Cheang researched extensively, as the work's credit notes show), is also the subject for a section of Turkle's book. In *Discipline and Punish*, Michel

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Foucault used the image of Jeremy Bentham's Panopticon prison to express his sense that all structures of social hierarchy have developed to institute the type of power Bentham envisages in the Panopticon: one in which subjects' exposure to constant potential surveillance leads to a self-censoring, self-regulating enforcement from within [Foucault 1975]. The Panopticon used surveillance as a tool of mind control. For Cheang, the Panopticon represents those medical and legal discourses that have surveilled, diagnosed, taxonomized, proscribed and regulated formations of gender and sexuality. For Turkle, however, it is the internet itself that offers a whole new dimension to the reach of the social Panopticon: "In our day, increasingly centralized databases provide a material basis for a vastly extended Panopticon that could include the Internet" [Turkle 1995, 248]. It should perhaps come as no surprise that the web was perceived as an engine of both liberation and suppression. Early writings on the web often present polarized utopic and dystopic visions, so it is perhaps fitting that in this important piece of early web art, that ambivalence around its medium is carried implicitly in the Panopticon image.

4.2 Genres and Discourses

The above contexts and discourses are all central to Cheang's art work and in many ways *Brandon* acts as a creative engagement with, and interrogation of, issues in digital cultures that were key points of reflection at its time of production. However, the work interweaves these with multiple other discursive contexts to give a richly multi-layered texture and a much broader historical reach. Within a strong theoretical framework (Lacan's theories of gender and sexuality are, for example, invoked in the artwork in addition to those of Foucault), the work creates a collage of discursive textures. The virtual trial of Mr. Bungle in the LambdaMOO online community, for example, is juxtaposed with the recent trial in the wake of Brandon Teena's death. References to online MUD communities and the discourses of science fiction and fantasy are interwoven with references to historical documents from medical and legal discourses that form the disturbingly real backbone of the work. The popular memes of the road trip provide a backdrop to the piece that is both fantasy and reality, the stuff of fiction and everyday life.

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While creative genres envelop the piece, it is striking how much of what is presented in *Brandon* is historical fact. Of course the work is based around the life and death of Brandon Teena, but what is perhaps more difficult to see at first glance is how many of the other characters in the piece are figures from history. The work is a substantial history of LGBTQ+ identities, often connected with issues of race, at the same time as it is a creative piece. Alan Turing features in the *panopticon* episode as one of the better-known parts of this narrative, but all the other characters in the *panopticon* (with the exception of two that were added in 1999 in conjunction with the Sydney Mardi Gras) were also, over the course of the team's research, discovered to be real historical figures. Historical research discovered, for example, that "Roni's Scribbles" refers to a transgender prison inmate whose blog with that title documented issues of transgender prison life.^[5] This work, then, is a creative engagement with historical facts. It is a blended work of fact and fiction.

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Embedding the documentary within envelopes of science fiction, fantasy, and other creative discourses enables documentary histories to be brought into creative worlds. Brandon Teena is taken on a road trip that includes space travel, and Cheang not only takes the central character into places geographically distant from home, but also offers a journey into a cross-historically congregated LGBTQ+ community. In this way, the piece takes on something of the idea of the online community that was created by the early MUD groups: a second life in the digital environment in which alternative communities, not available in the local geographical environment, could be sought. Of course – as Turkle's work on the MUD communities shows — the digital environment was also celebrated at this time as a space in which one could, at least ostensibly, take on whatever identity (sometimes human, sometimes not) one chose, and switch between multiple identities. Yet we now inhabit a world dominated by social media platforms in which the notion of authenticity often rests on the creation of a single, stable, identity, which must be performed under a "real", stable, name and reflect "real" experiences. Multiple accounts, multiple identities, and pseudonyms are often discouraged (a desire for "transparency" might be a motivation; the requirements of the profiling that funds the sites might also push in this direction). It will be interesting to see what new questions Cheang's work will raise for an audience at home within this very different context.

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4.3 Interactive Aesthetics

Arguably what has changed even more than these digital cultural contexts, is our experience of digital interfaces – and *Brandon* is a particularly interesting work in terms of what is required of us as viewers (or perhaps more appropriately navigators) when we come to its digital interface. The interactivity demanded by this piece is not of the nature of the full body participation that is usually the focus for scholarship around the nature of interactive digital art (see, for example, Roberto Simanowski's chapter on "Interactive Installations"; [Simanowski 2011, 120–157]). The user is not asked to engage phenomenologically with this work, but rather through a cursor. Yet it is interesting how much persistent interactivity of that kind is needed to navigate the work. As already noted, actively moving the cursor over the interface is necessary to bring up *bigdoll*, and even more so in order to find that illusive point of entry to the main *roadtrip* interface. Once in *roadtrip*, further activity is required, or at least rewarded, from the viewer. If one continuously moves the cursor over the road, images appear that you would otherwise not see. These are of motels, road signs, and other icons of the American highway. More importantly, however, the user needs to click on the already visible images by the side of the road in order to be taken through to particular episodes of the trip, and once inside each episode it is striking that most of the content demands some sort of interaction – even if that interaction is just a matter of scrolling or expanding windows to reveal the full text. It is less a sense of bodily involvement that is important here, but of becoming an active agent, and being aware of our agency. Yet this autonomy is limited within the work, which is insistent that any desire to control our exploration is deliberately curtailed and playfully frustrated in various ways. Most obviously, as one tries to navigate the work, the *roadtrip* interface moves continuously outside of our control, constantly propelling the viewer along the road, meaning we can click into episodes along the way but we can't stop, slow down, or go back to something we missed – we simply have to wait for it to come around again. It is also a nice touch that, at certain points, moving the cursor over one section brings up an icon that always appears on the opposite side of the road – thus constantly frustrating the viewer's desire to interact with it through the cursor. This kind of playfulness builds up expectations of interactivity in order to tease the viewer with them: within its microcosm the work seems to be asking us to experience self-consciously the tension between our autonomy and the limits of our autonomy. This keeps our attention as viewers or navigators of the art, and it makes us interestingly aware of being agents, but also subjects within a digital world that is outside our control.

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This interactive aesthetic is demonstrated particularly through the importance of our experience of the "random" as a core component of the artwork *Brandon*. Cheang generates the experience of randomness within the work at times as an aesthetic illusion and at times through genuine uses of randomized interaction with the work's media repository. For example, our very access to the work through the *bigdoll* interface requires us to click on a particular section of that interface that is not marked as any different from any of the other squares within that field. Our interactive exploration suddenly, and as a result of our random exploration, opens up the inner world of the work: *roadtrip*. While discovered only through random interaction, however, the point of access never changes – it is merely unmarked. The work generates such experiences of randomness in many different ways at many different points. The navigation around the *panopticon*, for example, appears random because the links from one cell to another do not take one in any obviously sequential or numerical order, yet the navigation in fact will always take you through the same apparently random loops.

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[6] Moments at which the work genuinely exploits the potential of interaction with its stored media to generate random possibilities include, for example, the chat in *mooplay*. Here the responses to user interaction are taken randomly from the texts stored within the work [Kholeif 2013, 25:01]. The pop-up windows offering "theory pills" (colourful tablet images with legends such as "take one") that appear from time to time outside of the artwork's main window are also generated randomly, offering a humorous commentary on the artwork's own (serious) engagement with discourses of both gender theory and medicine.

The aesthetics of the piece seem as engaging now as ever, even if the effect is somewhat different. What must at the time of its conception have been a much more futuristic interface now has something of the look of a piece of contemporary retro techno chic. The playful processes required of the viewer to engage with the piece (the extensive random exploration of the interface through the cursor, and the discovery of "hidden" links) might be less confounding, in some ways, to the users of web 2.0 than to those engaging with the digital interface in those relatively early days, but the act of exploration required of the viewer is still challenging. Indeed, online interfaces have become a lot more intuitive to use over the past couple of decades, resulting, arguably, in less patience with the type of navigation the artwork requires (indeed, there have already been reports of viewers thinking the piece is not functioning because they

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haven't persevered with the random interaction necessary to get beyond the initial launch screen). How might the changed context of interface design change the nature of the audience's experience of the work? And how might the contemporary context alter our experience of the connections it makes between content and form? As younger audiences come to the piece it will resonate afresh, and differently, for twenty-first-century digital natives.

Conclusion

While this essay places the artwork *Brandon*, briefly, in various digital contexts, its restoration to public view will enable a fuller consideration through the multiple lenses of media studies and a broader reconsideration of its importance in relation to a host of other contexts — especially, perhaps, to histories of gender, sexuality, and race, but also to other issues of identity, community, and digitality.^[7] While our commentary is limited to a consideration of digital contexts, our collaboration aims to contribute to an evolving methodology of digital scholarship: one in which universities work together with major partners in the culture industry, and in which project teams come together from across the disciplines. Here we build on the strengths of emerging collaborative practices such as those seen in the application of computational techniques to identify paper molds for Rembrandt's drawings [Johnson 2015]; hosting hackathons to encourage data explorations to support the study of art history such as the 2016 Museum of Modern Art *Datathon* [MoMA 2016]; as well as applying art historical approaches to digital-born art, such as using principles in technical art history to study works of software-based art [Wharton and Engel 2014]. In all cases, the cross-disciplinarity of the team requires experts to forge new approaches in this field.

We have deliberately preserved some of the differences in prose style between our different disciplinary voices in order to better reflect what it might mean to bring together such diverse fields within a multi-author team. We celebrate the play of differences around a single object rather than to trying to present a more homogeneous veneer. The same is true for content as well as style: ultimately our aim is not to construct a new, unified, thesis about Cheang's work, but rather to bring together around a single focus some of the very different kinds of scholarly concerns that can usefully interact around a digital artwork. In giving Cheang's work this kind of attention we are also, of course, asserting its significance within a history of digital culture. It is a tribute to it to say that an artwork created within a medium that has changed more rapidly than any other since its creation still feels, in various ways, relevant. It is not surprising then that the work was included in Rhizome's "Net Art Anthology": "a two-year online exhibition of the history of net art from the 1880s to the present" [Rhizome 2017]. With the restoration work achieved through the partnership of the Guggenheim with NYU, the work can continue to hold its place as a formative moment in this history.

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Notes

[1] Throughout this article we identify Shu Lea Cheang's *Brandon* as a web artwork, reflecting the artist's own differentiation between web art and net art in her practice at this time. See [Cheang 1999, Aug 4].

[2] Author Deena Engel calculated the statistics and generated the pie charts for sections 3.2-3.4 by writing a series of custom python scripts that traverse Brandon's file directories to conduct the analysis and render the charts. This analysis reflects the 2005 edition of Brandon in the Solomon R. Guggenheim Museum collection.

[3] To obtain the data for this study, a "mysqldump" was run.

[4] All code interventions were overseen by the authors Deena Engel and Joanna Phillips, executed by NYU computer science student Emma Dickson, and supported by Jonathan Farbowitz, the Guggenheim's Fellow for the Conservation of Computer-based Art (Figure 33).

[5] A substantial analysis of the historical figures featured in the piece was conducted by Emma Dickson, one of the students working on the project, supervised by author Marion Thain.

[6] This was part of the findings of an study of the narrative structure of the *panopticon* undertaken by Emma Dickson, supervised by author Marion Thain.

[7] Many pieces (in periodicals ranging from *The Guardian* to the *Wall Street Journal*) considered the work's role in relation to discourses of gender, sexuality and race soon after it first appeared, and there are signs that scholars and commentators are returning to the artwork. For example, the artist and activist group Toxic Lesbian held a public navigation event of *Brandon* on Feb. 12, 2016 at the Matadero Contemporary Art Center in Madrid; on April 13, 2017, Rhizome included *Brandon* in its Net Art Anthology [Rhizome 2017]; from Sept. 15-23, 2017, *Brandon* was presented during the International Queer Film Festival in Lisbon; and the Museum of Contemporary Art Chicago will include *Brandon* in its upcoming exhibition "I Was Raised on the Internet" (opening June 2018). At the point of this writing, the authors are also aware of current unpublished academic research into *Brandon*.

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