Dancing Media: The Contagious Movement of Posthuman Bodies (*or* Towards A Posthuman Theory of Dance)

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ABSTRACT

Dancing Media: The Contagious Movement of Posthuman Bodies

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My dissertation seeks to define a posthuman theory of dance through a historical study of the dancer as an instrument or *technology* for exploring emergent visual media, and by positioning screendance as an experimental *technique* for animating posthuman relation and thought. Commonly understood as ephemeral, dance is produced by assemblages that include bodies but are not limited to them. In this way, dance exceeds the human body. There is a central tension in the practice of dance, between the persistent presumption of the dancing body as a channel for human expression, and dance as a technicity of the body—a discipline and a practice of repeated gesture—that calls into question categories of the human. A posthuman theory of dance invites examination of such tensions and interrogates traditional notions of authenticity, ownership and commodification, as well as the bounded, individual subject who can assess the surrounding world with precise clarity, certain of where the human begins and ends.

The guiding historical question for my dissertation is: if it is possible to describe both a modern form of posthuman dance (turn of the 19th-20th century), and a more recent form of posthuman dance (turn of the 20th-21st century), are they part of the same assemblage or are they constituted differently, and if so, how? Throughout my four chapters, I explore an array of case studies from early modernism to advanced capitalism, including Loie Fuller's otherworldly stage dances; the scientific motion studies of Muybridge and Marey; Fritz Lang's dancing *maschinenmensch* (or the first on-screen dancing machine) in the 1927 film *Metropolis*; the performances of singer-dancer hologram pop star, Hatsune Miku; and American engineering firm Boston Dynamics' dancing military robots. The figure of the "dancing machine" (McCarren) is central to my project, especially given that dance has historically been used as a means of testing machines—from automata to robots to CGI images animated with MoCap—in their capacity to be lively or human-like. In each case, I am interested in how dance continues to be productive of some kind of subjectivity (or interiority, or "soul"), even in the absence of the human body, and how technique and gesture passes between bodies, both virtual and organic, dispersing agency often attributed to the human alone.

I propose that a posthuman theory of *dance* is a necessary intervention to the broad and contradictory field of posthumanism because dance returns us to questions about bodies that are often suspiciously ignored in theories of posthumanism, especially regarding race (and historically racist categories of non/inhumanity), thereby exposing many of posthumanism's biases, appropriations, dispossessions and erasures. Throughout my dissertation, I look to dance as both a concrete example and as a method of thinking through the potentials and limitations of posthumanism.

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INTRODUCTION

Animating the Kinetic Trace: From Kate Bush to Hatsune Miku

I am standing in a production suite at Concordia University's Milieux Centre, in front of a large computer screen propped up on a low desk, performing the choreography for Kate Bush's iconic song, "Wuthering Heights" (**Figure 1**). The cement floor is cold and hard underfoot—not ideal for dancing—and a white scrim behind me curves where it meets the floor, to give the appearance of a non-background: a vacuum-like space. I am wearing black tights and a leotard so that the Microsoft Xbox 360 Kinect, which is balanced precariously next to the computer monitor, can better recognize my body and read my movements.

The room fills with a deep, powerful humming sound as the heavy Alienware computer —the only one outfitted with Windows 7, which is required to run the Kinect—powers on. Black aeration flaps that resemble aquatic gills along the top of the computer flare open as the hum gets louder, funneling hot machine breath into the room. The computer is huge and heavy, and, in order to transport it to the production suite, my collaborator Michael Li and I had to heft it onto a metal dolly and steer it carefully through hallways and into elevators. The monitor displays a two-dimensional cartoon girl in a bright red kimono, standing against a grid behind which recedes a black void. Her joints and facial features are marked by dots which are tethered by neon lines to various points on the grid (**Figure 2**). Like a reverse marionette, her body—which is a product of MikuMikuDance, a freeware choreographic program[1]—is controlled from below, not above. Next to the monitor, my Mac laptop rests open on a plastic office chair. It displays a YouTube video tutorial for the choreography for Kate Bush's song "Wuthering Heights."[2] This video is paused, suspending the dancer on screen in mid-twirl. The dancer on screen is also me.

I am part of this gathering of screens and apparatuses as I begin to perform the choreography for "Wuthering Heights," glancing at the YouTube video in order to dance the sequence as accurately as possible. Acting as a mimetic interface between Bush's music video and MMD, The idea is to feed the choreography to the animated dancer in MMD, via the Kinect. The little avatar responds immediately to my dancing, but only by jerking spasmodically. She cannot mirror me (she is not naturally mimetic), and it seems as though her limbs are tied down to the grid (**See Figure 3**). Mike and I quickly realize that the Kinect works better with less light. When we turn off the spotlights in the room, my gestures are more legible to the camera. Zeynep Gunduz writes about motion capture and dance that "even the most sophisticated technologies

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lack the complexity of the human body and require certain adaptations from the dancer [to] help the computer-based system 'recognize' the dancer," such as "by accentuating extremities of the body."[3] Likewise, I find myself performing Bush's dance moves more "loudly" than is correct in order to have the Kinect read me the way I want it to. I throw my arms up into an exaggerated V, and instead of letting my limbs swing and fall with gravity, I resist in order to hold the shape of a kick one second longer. My body is being shaped, mechanized even, by the assemblage I am dancing within.

I am but one of the many "bodies" involved in this dance experiment, and I myself am more than one. Other bodies include:

- The corporeal presence of Kate Bush, who was eighteen when she wrote "Wuthering Heights," and collaborated on the choreography for the accompanying music video.[4]
- The filmic presence of Kate Bush, whose music video for I have watched repeatedly, to learn her dance.[5]
- My body in the YouTube tutorial, which has now been watched over 150,000 times.[6]
- The manipulatable digital avatar body displayed on the computer monitor against the grid in MikuMikuDance (MMD).
- The "hologrammatic" body of Hatsune Miku—the Japanese popstar who tours the world performing a live stage show.[7]
- The bodies of the fans at Miku's show, many of whom help create her choreography using MMD.
- The clunky, loud "body" of the Alienware computer.
- The sensing body of the Kinect.
- The crucial body of Michael: my technician and collaborator/MMD expert.
- The many other bodies that have inhabited and will inhabit Kate Bush's choreography, especially at the international yearly event, the "Most Wuthering Heights Day Ever," where thousands of fans come together to dance in red dresses, en masse.[8]

It was precisely in order to engage with this multi-bodied constellation that I enacted this dance translation project, bringing Bush and Miku—two influential yet disparate pop stars—to meet my own dancing body in a constellation of techniques and technologies. Even with this expanded notion of "body," my list does not encapsulate all of the agents, or active processes, that

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contribute to this assemblage.[9] In an exchange of gesture that travels across space and time via screens, code, algorithmic media, technical training and biometric data, I explored the ways in which dance movement passes between bodies, both virtual and organic, in order to disperse agency often attributed to the human body alone. By allowing my datafied gestures to dance through and *with* Miku's avatar, thereby relinquishing puppetry and mimetic realism in exchange for the machine's lively, glitchy "truth," I am exploring the porous nature of bodies—filmic, digital, and organic—in order to reveal not only dance's posthuman potential, but the extent to which dance has always been posthuman.

Miku: The Uncertain Dancing Image

In order to start exploring this project's complex, posthuman network, we might consider, in greater detail, the body of Hatsune Miku (初音 ミク), a virtual Japanese pop star with turquoise pigtails, saucer eyes, and long, spidery legs clad in black knee socks. Created by Crypton Future Media in 2007, she regularly tours the world as a 3D image, performing on stage to sold-out shows (**Figure 4 and 5**).[10] Miku is marketed as a hologram, but in reality, her body is not a laser-projected, 3D clone but a video projected onto a curved screen.[11] She is described as 5'2," 92 pounds, and sixteen years old. As a virtual star, she will never age.[12] Miku may have been invented by Crypton, but her persona is maintained through collaborative engagement by her fans, who work to "produce content with the Hatsune Miku VOCALOID or anime character … compose and upload songs, animate music videos and produce drawings" as well as "participate in dialogues … submit reviews and rate [content], and join communities such as fan sites and chat forums."[13] The content produced by these fan-collaborators—such as videos created with MMD—are regularly uploaded to websites like Nico Nico Dōga, Japan's version of YouTube, where they are disseminated to other fans and even entered into competitions to animate Miku in her live performances.[14] Early on in her life-span, these fans fell into the category of *Otaku*, or young people who have an "intense or obsessive interest" in anime and manga[15], but because of the popularity of the actor (Saki Fujita) who voices Miku, she has gained a more diverse following. Crypton presents Miku as a girl, but she is actually a product: a plug-in for a music synthesizer software called VOCALOID, made by Yamaha in 2004. Miku's voice is a digital modulation of Japanese voice actress Saki Fujita's, and just as her modular choreography is produced using MMD, her songs are composed from a VOCALOID database of

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instruments, melodies, vocal tones and lyrics. The sound of her voice is synthetic and very high in pitch, giving it an uncanny, doll-like quality. Because her identity is spread out across a web of codes, texts, images and platforms, and because she is a plastic image and an open-source, virtual cyborg, Miku is a compelling example of the posthuman dancer of our current era. Given that her movements and songs are user-generated by a large collective of fans using the choreographic program MMD, Miku can be seen as a "nonorganic embodiment of an organic subjectivity."[16] Yes, Miku is a collectively-made, digital assemblage, yet she is also a nexus of human fantasies about ownership, control, femininity and the pliable body. While she is a posthuman figuration, she also reifies many of the desires of humanism—and this is a tension I will explore throughout my dissertation, through the lens of dance. In addition, *I* am another posthuman dancer in this assemblage, especially given that my performance in the research creation project is also collaborative, mediated, networked and re-embodied.

I first learned about MikuMikuDance (MMD) through my conversations with Mike at Concordia's Technoculture Arts and Games Lab (TAG). Mike is something of an expert in MMD, having spent hours honing his skills in creating choreographies and videos using MMD as a tool. Originally created by HiguchiM (Garnek), MMD is a Japanese freeware animation program that enables users to create music videos for Hatsune Miku by maneuvering, posing and choreographing 3D models—many of them resembling Miku herself—using digital puppetry and the application of motion data. MMD users can customize backgrounds, add sound and music with the VOCALOID voice bank, and manipulate every one of the thirty or more "bones" in the figure's body in what is essentially digital puppetry. The model's facial expressions can also be altered, and her appearance and clothing are highly customizable. The program is compatible with Microsoft's Kinect and uses the Bullet physics engine to simulate the movement of the figure's hair and costume, as well as to mimic "rigid" and "soft body dynamics" and "ragdoll simulation."[17] The fan-created music videos created with MMD feature long dance sequences, captured from various angles through the use of the in-program "camera," and framed around sexually provocative dance moves and costumes. MMD's most commonly used function is its ability for fans to generate and upload choreographies and songs for Miku to perform in her live shows. Fan-made videos—generally running up to three minutes in length—usually require a week or two of editing within the MMD spreadsheet (**Figure 6**). This spreadsheet, in which each cell corresponds to the avatar's body position at a given time, organizes the dancing body within

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the logic of the grid, a technique Bernhard Siegert argues is "capable of turning humans into retrievable objects."[18] Miku's fans use the grid/spreadsheet function of MMD to choreograph the avatar and create their videos, which they often enter into the MikuMikuDance CUP, a bi-yearly competition where fans compete to win exclusive models for use in future MMD videos.

MMD is free and available for all to use, and it has been praised for its open-source, democratic approach to technology—a characteristic that also extends to MMD's namesake. Despite her feminine appearance, Miku is often defined not as a girl but as a "socially networked phenomenon" produced through "endless circulations of different modes of participation and communication" by her "ever-increasing fan base."[19] However, questions around *who* profits from Miku are rarely raised. As Miku is licensed under creative commons[20], it is possible for Crypton to benefit from the unpaid labour of her fans. She has, therefore, become an interesting case for examining the complex relationship between digital bodies, biometrics, ownership, and profit. Certainly, Miku herself does not benefit financially. Miku's fan-invented lyrics often self-consciously express discomfort and anxiety at her lack of control over her own body.[21] In one of Miku's live performances from 2015, the stage features a large scrim lit with a projection of a computer screen. The screen displays a loading icon for VOCALOID software, and Miku appears, pressing her palms to the screen, as if she is trapped within the computer. She picks up an antique hammer and begins to swing at the screen, which eventually "breaks," signified by the sound of shattering glass as Miku tumbles out of the computer onto the stage, becoming three-dimensional and in-colour as she does so. This hyperreal design by Crypton not only facilitates the image of Miku as able to move between virtual realms, in effect "worlding"[22] the stage through the use of strategic spatialized movement, but also betrays the irony of the fact that Miku (much like most celebrities will never escape life as a screened entity.

As real as she is to her fans, Miku is, first and foremost, an image. She is a digital rendering in humanoid form, referred to as a "*moe* anthropomorph" on her Wikipedia page. According to Patrick W. Galbraith, *moe* is a Japanese slang word that indicates a "response to fantasy characters," primarily based on "two dimensional images."[23] He writes that fans of anime and manga "access *moe* in what they refer to as pure fantasy (*junsui na fantajii),* or characters and relationships removed from context, emptied of depth and positioned outside reality."[24] This relationship bears a power structure weighted heavily in favour of the fan. Galbraith explains that the desire to nurture *moe* characters is extremely common among fans: "The *moe* target is

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dependent on us for security (a child, etc.) or won't betray us (a maid, etc.). Or we are raising it (like a pet) [sic]."[25] Cultural theorist Sianne Ngai's work on power dynamics helps tease out this configuration between *moe* and the fan. In Ngai's study of minor aesthetic categories, she theorizes an element of sadism that exists between the cute (oftentimes diminutive) object and its observer. Ngai explains that the excessive vulnerability of the cute object, "deeply associated with the infantile, the feminine and the unthreatening," can incite feelings of power and domination, even violence, in the one who confronts it.[26] Yes, Miku is a cute, *moe* entity, but this desire for consumption and destruction, or the aestheticization of powerlessness that Ngai describes, is different than the way Miku's fans remove her from reality, constructing her as a vessel for overdetermined fantasies about trust and stewardship. I want to suggest that because she dances (and can be danced), Miku holds a kind of kinetic agency (even if illusory) that challenges the very biometric process that governs her body: a process that represents a relation between a vulnerable, observed body, and a network of bodies involved in observing and producing.

Because her body is made of manipulatable data, Miku is both an "uncertain image" and a dream of fluidity and virtual potential.[27] Galbraith writes that "*moe* characters are fantasy forms animated by fluid desires, and as such cannot easily be divided into static categories."[28] As a fantasy, she can be anything to anyone, but in reality she is limited by (and to) her visual identity as a sexualized teenage girl. In *Girlhood and the Plastic Image* (2014), Heather Warren-Crow references female characters like Alice in Wonderland, Tinker Bell, and German theorist Siegfried Kracauer's Tiller Girls to show how their compulsively transforming bodies reflect "key attributes of digital images: malleability, transmediation and instability."[29] Warren-Crow's analysis demonstrates the influence of representational frameworks upon certain governing girlhood ideologies, namely how "nothingness and its corollaries, openness and potentiality, have become attached to girls and images in the first place."[30] Dance plays a pivotal role here, in relation to Miku, because like digital media and the figure of the (*moe*) girl, dance is also associated with malleability and the transforming body. Traditional Western definitions of dance often align with fantasies of virtuosity, superhuman weightlessness and disembodiment. In *Time and the Dancing Image* (1988), American dance historian Deborah Jowitt writes of the airy, supernatural quality prized by classical dance in the romantic era where "insubstantiality [was] close to godliness."[31] Yet the power to be ethereal (or perform ethereality) is rarely attributed to

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the *skill* of the dancer who has trained their body to do so. Dance is often seen as a quality that can be lifted off the body, meaning it can move between, and reside fleetingly in, other bodies. This associates dance, like the digital image, with immateriality. Posthuman dance, as a category that encompasses the malleable and networked dance body (both live and digital) and the fluidity of digital images, can therefore be seen as existing across the historical continuum, from modernity, to postmodernity, to advanced capitalism.[32] My dissertation aims to sort out the different articulations of posthuman dance across this continuum.

My engagement with MMD establishes a new methodology for disrupting both the immaterial associations with dance / digital bodies, *and* the sexual and economic exchanges in which MMD is normally embedded. The kind of project I have created in MMD is rare. People do not tend to use it experimentally, nor is it common to use the Kinect to mine body motion for choreography. Michael and I attempted to use MMD's built-in program for translating my motion data to the model's body, but it was stubborn and slow, so we settled on a lesser-known application called MikuMikuCapture (MMC), which Michael found after some searching. That this application was so difficult to find suggests that, generally, people are not as interested in using it. Rather, MMD users often copy-paste dance sequence data from other projects, focusing their time on costuming, sets, camera angles and fine-tuning the execution of their dancers. Generally, fans who make videos using MMD want to do well in the video contests, earn votes, and win bragging rights, but we knew that our video would never impress in these types of contests. Instead, I was interested in how, using the Kinect, Miku's body becomes mobilized by the users' own gestural input, turning her from a symbolic image, or an icon, into an indexical body, in which the human dancer leaves "a mark or trace of its physical presence," which "inscribes the sign at a specific moment of time" through the unification of the moving image of the body with its ghostly past, or, a trace of the human dancer in the code. [33] The consequences of using this mocap technology and little-to-no editing to polish the choreography are that my end result is a bit glitchy. The glitch, which Dutch artist Rosa Menkman calls an "unstable process" of "shock," is the moment where the assemblage asserts its nonhuman agency.[34] The glitches in the dance are, for me, cracks in the "window" or screen behind which Miku dances—a window that looks in on the assemblage of gender, technology and viral, monetized social media that comprise this form of dance.

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Thousands of Kates: Screen / Window / Threshold

I chose the choreography for Kate Bush's "Wuthering Heights" as my input for the MikuMiku project precisely because it has already passed through so many bodies over time and space. Written by Bush at just eighteen years of age, "Wuthering Heights" was her breakout single on her debut album, *The Kick Inside* (EMI Records),[35] which went on to top the UK charts for four weeks. It remains her most successful song. Novelist David Mitchell remembers when the song was released in January 1979. He recounts how "the following morning all the girls at my small rural primary school were dancing around the yard like twenty Kate Bushes, … trailing half-remembered lyrics and clouds of frosted breath."[36] The song's iconic status and imitability persist today, and have had a very recent resurgence thanks to the popular show, *Stranger Things*, which featured another of Bush's most popular songs (her 1985 single "Running up that Hill") on season 4, episode 4.[37] Every summer for the last five years, an international event called *The Most Wuthering Heights Day Ever* brings together thousands of international participants to re-produce the choreography of "Wuthering Heights" as a group number, in their respective cities (**Figures 6 and 7**). As the organizer of the Montreal edition of this event in 2016, I danced in the instructional video posted to YouTube, which now has over 150,000 views (**Figure 8**). Thousands of participants have learned the dance using my body as a guide, mirroring my movements with theirs, just as I learned by watching Kate Bush on my laptop screen. The ritual of acquiring body gestures by way of screen engagement is more commonplace today, where YouTube videos are often used, in the words of Thomas DeFrantz, as "video games that require participation" and where communities form around fan discourses within the comments sections of these videos.[38] Like Miku's persona, Bush's song is viewed as a kind of collaborative hub—a center for communal activity that occurs across screens and bodies. My dance translation project adds another layer to this collectivity, asking Miku and Bush to dance together, with me.

Miku and Bush are also linked, symbolically and gesturally, through choreography and their surrounding narratives. The lyrics and music video for Bush's "Wuthering Heights" tie her to discourses of nature, spectral Gothic themes, and bodies haunted by madness, and similarly, Miku has been referred to by Ken McLeod as a "holographic ghost."[39] During the choreography for the chorus of "Wuthering Heights," Bush pushes the palms of her hands against an invisible pane of glass as she sings, "Let me in at your window." Bush's lyric—a reference to Brontë's

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Gothic novel[40], in which Heathcliff begs Cathy's ghost to stay when there is no evidence she exists—gives agency to the ghost and sets up the window as a threshold between the world of the living and the world of the dead.[41] Miku coincidentally performs a similar gesture in her live show when she "breaks" into 3D space, and in a song created for her 2015 live show—a mashup of Gumi's "Echo" and Miku's "Hibikase"— when she presses her hands up against the screen of the computer, expressing her despair at being unable to break through and fully inhabit the space of the living. The screen and the window are similar in this way. The two figures are joined (**Figures 9 and 10**) when they pass through this choreographic pose, one that evokes entrapment and supplication in addition to ghostly agency. This gestural relation between two bodies which have never technically occupied the same space is, therefore, made possible through and in *my dancing body*, which is also mediated through the screen.

Glitch as Dance

After recording the motion data, Mike and I dragged the computer and equipment back upstairs and returned to the lab, where he aided in adding a background for our video and experimented with costuming.[42] Even with the approximate details in place, the video does not look the way it is "supposed to," according to the unspoken performance codes of MMD. It is glitchy and abject and lacks the polished aesthetic of other MMD videos achieved through long hours of editing. In popular MMD videos, the dancers approximate agency by moving to the rhythm of the song with measured and contained fluidity. In the video for "Echo" (**Figure 11**), for example, the camera begins on the ground, in an up-skirt shot, "filming" three dancers as their hips sway seductively. The program's physics engines ensure that their long hair and short skirts also swing to the beat. The camera often tilts or zooms quickly. It appears to have limitless mobility within the space of the screen, unencumbered by the laws of gravity or the restrictions of technical equipment. The effect is dizzying and hypnotic. It mimics the music video dance moves, which often feel stilted and lacking in weight (perhaps, unsurprisingly, since they are orchestrated by digital bodies). My video, on the other hand, is not heavily edited nor does it feature a lot of camera choreography. My dancer looks as though she has lost control of her body and is just realizing this. The dance moves through her like a river. It pushes and pulls her body and her sickled ankles drag behind. Witnessing this spectacle, I did not have the urge to manipulate her into pretty positions. Instead, I turned towards my own dancing body. I wondered

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about my own level of control over my limbs, my gestures. After all, dance is about toeing the line between doing and being done, between moving and being moved along the current.

In considering a posthuman aesthetics of dance, I feel the "unruly edges" of my dancer are crucial to her liveliness and potential for relation. Her resistance to perfection, along with her failure to perform mimesis, allows me to interrogate notions of technological progress, or "the general historical trend of progress in communication technology toward ever-greater definition and therefore greater verisimilitude."[43] This idea, that new media should become more and more like reality over time, and where "reality" is so often equated with sharpness, clarity, or high-definition, can be detected in the heavily edited and virtuosic music videos fans create using MMD. However, as communications scholar Jonathan Sterne writes, "definition is not the same thing as correspondence to reality or fidelity,"[38] and the equation of verisimilitude with technological *progress* is especially troubling when it plays out upon the sexualized female form, perpetuating a representational framework that feels decidedly *regressive*.

As my avatar fails to achieve mimesis, and fails to become successfully sexy, she repels the predominantly male gaze of MMD fans as well as the practice of biometrics that holds within it a desire for "progress" or improvement by virtue of aggregated knowledge and power over the body. And yet her own gaze is powerful and unwavering. One feature of MMD's software is that the model's eyes are always trained on the viewer. Even when you turn her body away with your cursor, Miku's gaze remains fixed. As uncanny as this gaze may be, it also provides an intimate space of recognition that acts as a counterpoint to the practice of surveillance biometrics which use visual identification to categorize, classify and "pin a multivalent subject to a dataset."[44] Because Miku's pupils track front, they facilitate a strange power shift whereby the subject under surveillance gazes back, her pool-like eyes locked in the direction of the user. This breaking of the fourth wall returns us to Kate Bush's plea to "let me in through your window." Philosopher Emanuel Levinas writes about the power of being confronted with a living presence, which he terms "the face." "In front of the face," he writes, "I always demand more of myself."[45] Dancing for the Kinect is a kind of face-to-face encounter in the mode of Levinas in that it presents an Other who "faces me," and in so doing, "puts *me* in question and obliges me" (emphasis mine).[46] In this process, I see the fragile body of my avatar, straining to reproduce my movement, and I question my *own* gestural output.

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The vulnerability of my avatar's precarious digital body becomes exaggerated in my dance translation. Although it is praised for being a digital space for the artistic expression of participatory culture, MMD is also very much a system of power over the body that works on both the level of the image and that of the spreadsheet. Bernhard Siegert writes that the invention of the grid combines the representation of human bodies with operations of "governance."[47] Between the "sixteenth and eighteenth century," Siegert explains, "grid-shaped control becomes the universal practice that constitutes the basis of modern disciplinary societies."[48] In MMD, the grid serves a diagrammatic and choreographic function, as well as enacts a delineation of space where there is none. Hatsune Miku's avatar stands on the grid against the vacuum of digital space, waiting to be danced. The grid marks all coordinate potentialities for her body positions and gestures; it delineates the possibility of her movement. But Miku's glitches in my project reveal themselves as a series of cracks in the seamless ideology of control that MMD proposes. These glitches could be seen as "proof" of a form of "hysteria" that plays to the historical narrative of the unruly female body, which is always in need of control. In his work on Miku, Daniel Black sees the translation of a female body into the digital form as a biopolitical process in which "biology [is] lost," and the "availability for manipulation and modification, appropriation and control" is gained.[42] However, the avatar's glitches also reveal the unknown or surprising mechanisms of the interface that manifest through *failed* operations.

The Expressive Simulacra

Miku also embodies the tension between biometrics as an authenticating measure—that pulls real data, sound, and gestures from the body—and the inauthenticity of her hologram: a simulacrum that reveals the artificial quality of all pop performance. In a 2012 article, CBS journalist Bailey Johnson referred to Miku as "The World's Fakest Pop Star."[49] In their analysis of fan responses to Bailey's article, however, Lukman Aroean and Philip Sugai point out that Johnson's reading of Miku is tone-deaf to the cultural differences at play. "In Shinto [culture]," they explain, "everything and anything in the universe, both animate and inanimate, even the artificial material, has its own 'soul' or 'spirit' ... "[50] My project engages with this Shinto idea directly, drawing from historical links between dance as proof of "soul," a quality located within the privacy of the body and expressed through movement, to think about the different kinds of "soul-effects" that might emerge from a "fake" body engaged in digital choreographies.

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My dancing avatar is propelled by biometrics mined from my human body, mapped onto gestures programmed into MMD, and therefore my bodily labour is transformed into data coordinates, opening up new possibilities for what constitutes a "body" when it comes out the other end of the interface. The addition of the Kinect allows for emergent, unexpected behaviour. As tempting as it is to imagine data as a field of play without limits, when I use my own biometric data to animate Miku's avatar, I have no wish to remake the world of MMD into a utopian space. Nor do I intend to treat my embodied gesture as a means of *authenticating* Miku in some Benjaminian sense. Rather, in dancing in front of, within, and alongside Miku, I wish to expose the violence that exists—not just in the image-body of the avatar, but in the spreadsheet itself.[51] This is a gestural violence that is enacted on the image of her body when she resists the prescription of her programming. My dancer, with her insectile movements and bewildered, doe-eyed expression, seems uncanny unless she performs a hyper-sexualized dance with precise execution. To allow her to flounder, is also to allow her to *express*, not from some exceptional inner soul, but—literally—to allow her limbs to be moved by my motion in this work of screendance. In her janky gestures, she carries traces of other bodies, of other relations and power dynamics which neither of us can control (**Figure 12**).

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Towards a Posthuman Theory of Dance

I begin my dissertation with this project because it allows me to introduce much of what I want to say about *posthuman dance*, including all of the contradictions embedded within the term. My dissertation seeks to define a posthuman theory of dance twofold: through a historical study of the dancer as a *technology* or instrument for exploring emergent visual media, and by positioning screendance (or dance on screen) as an experimental technique for animating posthuman relation and thought. These two approaches are complementary in their attachment to the screen—an apparatus that can both mediatize and materialize dance, in a sense, making it repeatable or transferrable between bodies, both human and non-. This dissertation explores the relationship between dance and screens, and the way that dance often ends up on screen in unexpected ways. Commonly understood as ephemeral, and in need of pinning down, dance exceeds the "body" in that it is produced by assemblages that include bodies but are not limited to them; other agents in the assemblage also contribute to the production of dance. André Lepecki asks, "if movement-as-the-imperceptible is what leads the dancing body into becoming

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an endless series of formal dissolutions, how can one account for that which endures in dance?"[52] Dance, as both a kind of labour and the *product* of that labour, often endures in disembodied forms and processes.

Throughout history, dance has relied on "media" or technologies like the stage, costuming and lighting, but it has been used to enliven and experiment with visual media such as film, animation and virtual reality technologies, often at the time of their emergence. These media have likewise been used to stretch the perceived limits of the dancing body. In recording and rendering the incorporeal element, or *trace*, of the dancing body visible (and imbuing that trace with agency), these media also perform as active agents. In this way, dance imbues nonhuman forms and processes with agency. However, in contrast with studies of screendance that configure the camera as merely a leeching force or an apparatus of capture, or which understand dance and media as primarily symbiotic, my project replaces this dyad with an assemblage model that accounts for the ways in which heterogenous factors such as specific types of media, choreographers, costuming, corporate marketing efforts, physical space, technique, and the exploited labour of gendered and racialized bodies contribute to a posthuman theory of dance. Spanning the early film era to the present day, my study engages with primarily North American and European dance on film (or screendance), to gather knowledge about the boundaries of human bodies in their various mediated forms. Throughout these case studies, I recognize dance itself as always-already posthuman. Dance is posthuman, I argue, because it is a technicity of the body—a discipline and a standardization that calls into question categories of the human—and because dance (as practice, performance and cultural technique) is always imbricated in a network of agents: "embedded, embodied and yet flowing in a web of relations with human and non-human others."[53] Screendance draws our attention to the already-posthuman qualities of dance while further enhancing dance's posthumanism.

Dance is also posthuman because of its associations with human life/liveliness, including authentic emotion and interior subjectivity—and the ways in which it asks us to question the qualities we presume to be intrinsically human. Many of today's narratives about posthuman technological developments such as Artificial Intelligence and algorithmic machine learning are hyper-focused on the simulation, not of the human body, but of the human mind.[54] Cybernetics in general has been plagued by a binary logic informed by Cartesian dualism in which mental processes (whose output is language or conversation) take precedence over (or are explicitly

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extracted from) bodily ones (gesture, movement, etc.). Dance is a practice in which such dualism cannot exist, and in fact reveals the impossibility of such dualism in any human activity. The performance of technique and choreography—even free improvisation or casual social dancing—requires the full imbrication of mental and embodied facilities. The undertheorized notion of *dance*, rather than language processing, as proof of a non-human or machine's ability to perform life or "humanness" informs several of my case studies, from the 18th century dancing clockwork automata of the Enlightenment created by Jacques de Vaucanson, to rotoscoped animated films of the 1930s that infused their characters with life by tracing dancer's movements frame by frame, to the recent promotional videos for Boston Dynamics' dancing military-industrial robots. Media and animation scholar Deborah Levitt's argument that "our conceptions of 'life' at any given moment are deeply informed by the medialogical stratum" prompts me to think about how dance (as tied to conceptions of "life") is also informed by various media.[55]

Dancing the Human

The terms "dance" and "posthuman" both resist definition. I sometimes use dance as a large, indefinite genre in my dissertation (much like "painting" or "theatre") in order to demonstrate the common generalizations about the practice, as well as the co-option of the concept of dance as a philosophical symbol for movement (of thought). Choreographer Merce Cunningham and dance writer Lincoln Kirstein define dance as a "spiritual activity in physical form."[56] And Susan Sontag writes that due to popular descriptors for dance like grace and elevation, "no art lends itself so aptly as dance does to metaphors borrowed from spiritual life," thus tying dance to some "larger rhetoric about human possibility."[57] Dance has traditionally been associated with the category of the human, as evidenced by statements like that of eighteenth-century choreographer Jean-Georges Noverre, who writes that the "dancer's technique [has come] to express the highest things of the soul"[58] and Judith Hanna, who, in her widely cited 1987 book *To Dance is Human*, writes, "To dance is human, and humanity almost universally expresses itself in dance. Dance interweaves with other aspects of human life, such as communication and learning, belief systems, social relations and political dynamics, loving and fighting, and urbanization and change… dance [asserts] the essence of humanity."[59]

Because it is so enmeshed with the notion of the human, dance has also historically been used as a means of testing machines—from automata to robots to CGI images animated with

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Mo-Cap—proving their capacity to appear human-like. The juxtaposition here, between body and machine, where the dancing body is understood as a channel to the inner soul, and the machine is understood as lacking a soul, is productive of a new relationship between dance and soul, interiority and authenticity. Susan Leigh Foster points out that advertisements and marketing endeavours often rely on this very association between dance and authenticity, explaining that "dance is acquiring a new array of values within the global marketplace where it can function as a potent signifier for an authentic home, vitality, belonging or transcendence of the ordinary."[60] Dancing bodies have been instrumental in the development of emergent media technologies, from photography and film to interactive and digital choreographic tools. These technologies, which often replicate a body into a series of externalized images, interfere with the mythic link between the dancer's singular corporeality and their unique "soul."

The Problem of Ownership

A posthuman theory of dance calls into question not only traditional notions of authenticity, ownership and commodification, but of the bounded, individual body who can assess the surrounding world with precise clarity, certain of where the human begins and ends. If posthumanism considers both body and subject as inextricably networked, permeable to and malleable by the surrounding world, then posthuman dance attends to this relationship. Because dance always exceeds the dancer, leaking out and trailing behind bodies and across spaces (and other bodies), it challenges the humanist belief that we are "autonomous beings who are unambiguously separated from our tools, or even our earthly surround."[61] One way to define dance might be to ask: What's part of the dancing body? What isn't? Many of the case studies featured in my dissertation can be categorized as "screendance" (broadly defined). As a subject of study, screendance can illuminate other fields and areas of cultural practice. The study of screendance is the study of bodies, their boundaries and relations. It is also the study of screens, spectacle, networks and a variety of cultural techniques related to the body. These examples come from cinema, social media, digital animation interfaces, virtual reality and other screen-based platforms, and so my analysis draws on film and media theory. Because my dissertation is driven by an interest in bodies and space—the ways in which performing bodies engage and interact with actual and virtual spaces and embody ideas associated with metaphorical, or imagined spaces, and how this contributes to constructions of subjectivity, for example—it also

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introduces questions about ownership, dispossession and materiality. Who owns dance? What of the dance belongs to the dancer? Dance, as Susan Leigh Foster writes, is "both the same as and separate from the person who is dancing, and thus any given dance performance cannot conceal all of the labour that goes into its performance. Nor can it entirely obscure the labour that went into composing the dance and teaching the dancer how to dance. These prior acts of exchange generate traces whose residue is evident in every moment of dancing…."[62]

Dance's relationship to ownership is also historically precarious in large part because live dance is ephemeral. Marcia Siegel describes it as a "perpetual vanishing point"[63] and Andre Lepecki writes that it is because of this immaterial quality that dance represents an opportunity to "create artworks away from regimes of commodification and fetishization of tangible objects," making it an "incalculable return without profit."[64] Indeed, dance in some way escaped the mass marketing effects on artistic production of the industrial revolution, precisely because it does not lend itself to any reproduction. Of course, this strong tie between dance and ephemerality changes when we consider dance on film, or screendance: the genre in which all of my dissertation's case studies can be placed. Walter Benjamin's argument that technological reproducibility causes the art object (or dance performance/dancer) to lose their traditional "aura" reflects the impacts of screendance on the field of dance, given that the dancer's "aura" is captured, edited, recorporealized and reproduced on screen, and especially given that Benjamin avers that the most "powerful agent" in this process is "film."[65] In his seminal text, "The Work of Art in the Age of Mechanical Reproduction," he writes that "the presence of the original is the prerequisite to the concept of authenticity."[66] However, for Benjamin this is not a tragedy so much as a democratizing force, which, "in permitting the reproduction to meet the beholder or listener in his own particular situation, […] reactivates the object reproduced," thus "shattering tradition" and renewing humankind.[67] Screendance serves as an example that furthers Benjamin's argument that reproducibility can free the work of art from tradition and ritual, aligning with a critical posthuman ethos that wants to free the human from traditional, Enlightenment-era notions of subjectivity. As such, his essay is important to my understanding of screendance as a posthuman practice.

Posthumanism and Cultural Techniques

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Emerging in the second half of the 20th century along with poststructuralism and postmodernism, posthumanism is a broad, interdisciplinary field of theory that breaks with the foundational values and assumptions of modern Western thought and attempts to decenter the humanist subject along with "assumptions of universally-applicable aesthetics and universally valid epistemology."[68] This antihermeneutic approach is characteristic especially of French and German posthumanism, stemming from Derrida, Foucault and Lacan, and bearing a notable difference from American posthumanism, which is grounded in cybernetics. Bernhard Siegert and Geoffrey Winthrop-Young note, however, that "In both cases [German and American], the 'post' implies a sense of 'always already,' an ontological entanglement of human and nonhuman" so that the guiding question becomes not "*How did we become posthuman*? But rather, *How was the human always already historically mixed with the nonhuman*?"[69] Likewise, I argue that dance has always been posthuman.

This dissertation does not consider posthumanism as primarily positive or negative, but rather seeks to tease out the nuanced complexities of the term, using dance as both a concrete example, and as a method of thinking through the potentials and limitations of the posthuman approach. Like Siegert and Winthrop-Young, Rosi Braidotti remarks on the difference between European and American posthumanisms, mapping the former onto "the critique of the humanist ideal of 'Man' as the allegedly universal measure of all things" and defining the latter, which she also terms "post-anthropocentrism," as a practice that "criticizes species hierarchy and human exceptionalism."[70] Braidotti locates a feminist politics of critical posthumanism somewhere in between the North American and European approaches. She writes that "to define the posthuman era as the Anthropocene is not to do it justice: we need to factor in the combination of fast technological advances on the one hand and the exacerbation of economic and social inequalities on the other."[71] This dissertation likewise sees the technological, social and philosophical as inextricably linked, without drawing too stark a line between the German and American approaches.

For example, Siegert and Winthrop-Young argue that "what (still) separates the theory of cultural techniques from those of the posthumanities […] is that the former focuses on empirical historical objects while the latter prefers philosophical idealizations."[72] While I share Siegert and Winthrop-Young's critiques of posthumanism, I am skeptical of this opposition, which seems to also suggest a gendered reading whereby male German media theorists are connected to

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"empirical historical objects" and female American posthuman theorists (Haraway, Hayles, Barad, etc.) are associated with the sentimental or flighty "philosophical idealizations." Juxtaposed here are materiality and cartography (to use Braidotti's term) or the "grid" (to use Siegert's) on the one hand, with embodied perception and imagination, on the other. Rather than pick a side in this binary opposition, my dissertation takes up *dance* as a fitting interrogator of this dual tension. Like Braidotti's definition of posthuman subjectivity, which is "not restricted to bound individuals, but is rather a co-operative transspecies effort that takes place transversally, in-between nature/technology; male/female; black/white; local/global; present/past—in assemblages that flow across and displace the binaries," dance too can travel between bodies in flows and assemblages, complicating the notion of the body as a bound entity.[73] To refer to Donna Haraway's seminal posthuman figuration from her "Cyborg Manifesto," dancers are cyborg-like in that they are "boundary rider[s]" who takes pleasure in hybridity.[74] This hybridity also exposes a tension at the core of posthuman dance, between fantasies of a boundless flow that rejects stasis, and the dancer's body as an isolatable visual object with a history of fetishization and commodification; between dance as movement for movement's sake, and choreography as a method of standardizing bodies and making them machinic.

Siegert and Winthrop-Young's work on cultural techniques is important to my understanding of dance, not as an ephemeral, expressive escape from the weighted materiality of the body, but as a set of culture-technical and media-technological practices that *produce* bodies and subjects. In the words of Cornelia Vismann, "the operation itself produces the subject."[75] Pierre Bourdieu's theory of *habitus* and Ben Spatz's work on "embodied technique as knowledge" (2015) also informs my argument about posthuman dance as a *technicity* of the body that should be taken seriously, not as an instrument for enhancement, but as a kind of knowing. Dance technique does not necessarily perfect or improve the dancing body; cinema and media studies scholar Rizvana Bradley's work on amateur dance technique and the "gestural failure" suggests that body techniques need not be "simply ephemeral and fleeting" but can be "disruptive," as well as act "as an access point for everyday desire and as a point of transfer for the cultural exchange of knowledge."[76] John Martin's definition of metakinesis, of the "inherent contagion of bodily movement, which makes the onlooker feel sympathetically in his own

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musculature," crucially draws the dance/screendance audience into the constellation, demonstrating how they too can be affected by the technique of the dancer.[77]

Dancing with Screens

We might view the historical development of cinema as the concurrent development of screendance. This is because many of the first live action films featured dancers (Méliès; Edison). Because early film technologies anchored the camera to a tripod, Douglas Rosenberg explains that "it was the dancer who supplied motion to the frame, thereby amplifying the camera's ability to comprehend movement".[78] However, the risk in framing screendance alongside cinema, as Noel Carroll argues, is that it "blocks the prospects, conceptually and sometimes practically, of an innovative engagement on the part of makers of dance images with new technologies."[79] Carroll explains that traditionally, for something to be considered cine- or screen-dance, it would have to exploit the unique features of cinema, understood in contrast to the possibilities and limitations of theatre.[80] My definition of screendance is expanded to include any kind of "moving-image" dance on "screen," where screen could refer to the television, cinema, computer screens, the screen of one's personal device or tablet, and the "holographic" screen on stage.

But posthuman dance is not just about proximity to the screen. Beyond the fact that they are examples from films, many of the dancers in my case studies are also presented as posthuman in terms of their classification as robot, cyborg or automata-like characters. Their origin stories include technological components such as electricity, transmogrification by mechanical processes, AI development, Mo-Cap animation technology, robotics and algorithmic movement. Even Miku's creators, Crypton Media, use her digital body as a key player in the narrative and marketing of her presence. In this way, the posthuman dancers I feature in my dissertation can tell us something, not only about screendance or the mediated body, but about the *narratives* that construct the relationship between technology and the human. Thus, imagination is as important to my theory of posthuman dance as concrete technological development.

Locating Posthuman Dance: A Media-Historical Approach

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The guiding historical question for my dissertation is: if it is possible to describe both a modern form of posthuman dance (turn of the 19th-20th century), and a more recent form of posthuman dance (turn of the 20th-21st century), are they part of the same assemblage or are they constituted differently, and if so, how? I see a posthuman impulse—namely, a de-hierarchizing of the human as primary agent in the dance assemblage, the contingent incorporation of other objects as actors, and an increased emphasis on relationality—in all the dance works taken up in my dissertation, regardless of their date of origin. These posthuman ethics can be mapped onto both modernist subjects and postmodernist ones, for example, in part because the modernist subject is already no longer conceived of as the sovereign being, in full control of itself and the surrounding world, and because the development of cinema plays a large role in this distribution of performative agency. However, to define a posthuman theory of dance from a media-historical perspective, I examine the various shifts in dance-as-cultural technique that occur between modernity/modernism, postmodernism and our current era of "advanced capitalism" (Braidotti).

The historical period covered in this dissertation begins at the year 1892, when American dancer Loïe Fuller presented her "Serpentine Dance" to Parisian audiences. Although Fuller's persona—as well as her insistence upon being recognized as the true inventor of the Serpentine—aligns with both the Romantic poet and the Modern genius figure, it is precisely the plurality of bodies and subjects associated with her dance (both in terms of Fuller's imitators and in terms of the various non-human agents involved in her performances) that make Fuller a posthuman dancer. In contrast with Fuller's bids for ownership, several other examples explored in this dissertation point out a modernist shift from representations of the exceptional, singular individual body to representations of the mass or swarm of bodies, including Busby Berkeley's large group choreographies shot from above, and the choreography of labour on the assembly line under Taylorism. This modern shift away from the singular body also extends to the rising cultural technique of dance notation, in particular Labanotation (1920s), which tended to abstract the dancer's body into disembodied shapes and lines.

Benjamin's "Work of Art" essay, which was published in 1935, mainly focuses on modernist-era technologies of photography and film as they relate to reproducibility, but his argument can extend to technologies from postmodernism and advanced capitalism as well, albeit with a slight shift of terms. One postmodern technology that is pivotal to a posthuman theory of dance is motion capture, or mo-cap (which gained popularity after its implementation in video

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game design in the late 1980s), in which a dancer's body is outfitted with sensors at precisely-measured spots on their joints and extremities, so that their movement can be plotted as spatial coordinates by a series of strategically placed cameras. Once the cameras have recorded the dancer's movement, that data can be mapped onto a stick figure or avatar, which can then be animated further to enhance realism. Like the older (modernist) animation technique of rotoscoping, mo-cap is often used to preserve the lively gesture of the human body, or the feeling of *essence* (as produced by techniques), which is hard to achieve with animation alone. Critiques of motion capture, a process that converts dance movement into numerical patterns, have often juxtaposed data with embodiment, arguing that the dance loses something *living* in the translation. If the dancing body is an interface for the human soul, then the notion of biometric intervention seems particularly invasive in that it seeks to turn not just the body but the *soul* into a string of numbers. Skeptical as I am about "authentic origins," especially as rooted in the body, I reject the notion that technological mediation corrupts the "soul" of dance. In fact, what technological mediation reveals to us is that soul has always been produced, via techniques. Therefore, the mechanical reproduction of the "soul" in screendance is a catalyst to enhanced relation between the potential production of "bodies" and "souls," not restricted to the anthropocentric realm.

Technologies such as mo-cap hold within them various power dynamics that contribute to a posthuman theory of dance, specifically, in this case, a tension between manipulation and relationality that can be traced back to an earlier historical phenomenon—the popular scientific human motion studies carried out by English photographer Eadweard Muybridge and French physiologist Étienne-Jules Marey in the late nineteenth century. Muybridge and Marey devised photographic apparatuses to observe the mechanics of the body in motion, often using dancers as models. Because the material image of the moving body, in these cases, could be "reified and remobilized as a *res extensa*" it meant that "movement was no longer located in the lived-in object … but in the machine devised … to project the image."[81] This notion of observation and extraction, wherein bodies are mined for resources and studied like discrete objects from afar, is tied to precisely the kind of Enlightenment-era values that theories of critical posthumanism interrogate, yet Muybridge and Marey's motion studies, and tools like mo-cap, also bear posthuman qualities and potentials.

In extending Benjamin's modernist argument about the technological reproduction of aura to the capability of mo-cap to technologically reproduce, and redistribute, the dancer's

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"soul," I aim to establish a posthuman theory of dance that takes its roots in modernism and intensifies in the era of advanced capitalism. Whereas Benjamin's essay takes up the traditional modern questions about authenticity and originality, these issues are not of interest in my study of posthuman dance. Instead of asking questions about inner essence, I will take up Foucauldian discourse analysis to ask, of my objects of study: what are their modes of existence? Where have they been used, how can they circulate and who uses them? What are the potential subjectivities that emerge from these objects? The "mechanical reproduction of soul" is exponentially increased in screendance, where the dancing body (as extension of the lived body) is extended further through the mediological trace.

In *Discourse Networks 1800/1900,* Friedrich Kittler argues that the introduction of electromechanical media such as the typewriter in modernism (the epoch he calls 1900), as well as attendant qualities such as data storage, inscription and transmission, already represents a fragmentation of the cultural techniques and subjects of Romanticism (the period he calls 1800) such as handwritten poetry, the solitary Romanic poet and the value of hermeneutics.[82] Following Kittler, I locate modernity's relative beginnings not with the first industrial revolution, which aligns with the growth of industry such as coal, iron and railroads, but with the second industrial revolution (circa 1870-1914), alongside the expansion of electricity and steel and the introduction of the typewriter, gramophone and film media. Kittler sets his discourse network of 1800, characterized by hermeneutics, "natural" language and the solitary figure of the Romantic poet, against that of 1900 (beginning with the second industrial revolution), a period he associates with inscription, data storage and transmission.

One concept that Kittler tracks across these epochs in relation to speaking and writing is that of the "soul." Kittler argues that post-1900, the "isolated routines of readings, listening and speaking become automatic and impersonal, […] [r]ather than being rooted together in one voice from the inmost soul," as they were in "epoch 1800."[83] Kittler focuses on handwriting in particular, not as an external trace of the inner individual, but as an expression of training.[84] What if dance is not so much a spontaneous eruption of feeling, but an expression of training—an already modular language that can be acquired and implemented? A dancer's embodied gesture, just like a writer's penmanship, displays quirks that communicate their individuality/inner feeling by way of their learned technique/habitus. However, unlike handwriting, which is displayed on the page, at a distance from the hand that produced it, dance

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"feeling" or technique is legible *on the body itself*. In his work on the typewriter, Friedrich Kittler argues that it is this particular machine that initiates the transition from early modern subject to posthuman subject, largely because of the shift in inscriptive media technology – unlike writing produced with a pen or pencil, the typewriter's output no longer bears the organic trace of the hand. In a reversed formulation, digital screendance often uses mo-cap as an inscriptive media, not to preserve an exceptional trace, but to extrapolate a general aesthetics of realistic liveliness in dance. In other words, an individual may be identified by their penmanship but not by their (posthuman) typewritten letter, and this is also true for the trajectory of the dancer who, performing live on stage, is linked to their own, unique body, but who becomes anonymous when their individual dance movement generates a faceless energetic force in the digital realm.

It is in large part this legible affect that makes the spectacle of the dancing body so attractive to new media practitioners. The dancing body spectacularizes media. The link between spectacle and media is a notion already taken up by scholars of modernism such as Vanessa Schwartz and Ben Singer, but my dissertation draws a posthuman thread between early modern experiments with the spectacle of dance, intensifying in advanced capitalism. In digital screendance, dance often acts as both a signifier of the spectacular energy of authentic emotion, and as a mode of body erasure in which agency (and contingent emotion) gets distributed between the dancing form and the media that produce/support it. Across instances of screendance from modernism, postmodernism and advanced capitalism, "life" can be seen as contingent upon mediation. Anna Munster, professor at the National Institute for Experimental Arts, writes that we must "radically question the birth of digital culture as one that has been shaped largely via a binary logic, […an] outdated cartography has previously forced us to either celebrate or denigrate the Cartesian mind, the disembodied gaze and the transcendence of dematerialized information as salient features of digital aesthetics."[85] She asks: "What if we were to produce instead a different genealogy of digital engagements with the machine, one that gave us the room to take body, sensation, movement and conditions such as place and duration into account?" Following Munster, I see posthuman dance as an opportunity to look to digital media as modes of relation and conceiving new modes of "life" — tools that return us to bodies, shared gesture and sensation as legitimate places of new knowledge production.

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Rather than juxtapose the modern era, which fostered an artistic interest in abstraction and dehumanization, with the postmodern era, often characterized by disembodiment, dematerialization and fragmentation (Jameson), my dissertation proposes that both of these periods present technological progress as at least somewhat synonymous with progression beyond the gendered and racialized body. Whereas modernism leaves a "genius" in place, fully in control of the fragmented work of art,[86] and whereas modernist and postmodernist artists were actively engaged in creating technological work that was "neutral" and "pure" (code for white), art created in advanced capitalism is more opaque about where ownership and agency lie, and about its processes of erasure. Yet these tendencies are still present in today's screedance works, and we should be attentive to such strategies, especially given the way racialized bodies are tracked, put under surveillance, policed and marked "impure" today more pervasively than ever before.

Against the "Post"

In locating a posthuman theory of dance within history, it becomes apparent that the "post" of posthumanism is not only misleading, given my ability to read case studies across a forty year span as "posthuman," but also somewhat incorrect, in terms of what the philosophical approach intends to communicate. Jamaican cultural theorist Sylvia Wynter has consistently called into question whether the "post"—in poststructuralism, postmodernity, postcolonial—is a useful conceptual frame, and in effect avoids it "in order to understand, instead, how particular epistemologies are unthinkable and/or unarticulated within hegemonic Western categories of knowledge and philosophy of knowing" (106). In writing based on an interview with Wynter, David Scott writes:

> "The story of humanism (whether as a philosophical doctrine or as a worldly orientation) is often told as a kind of European coming-of-age story. On this account, humanism marks a certain stage in Europe's consciousness of itself—that stage at which it leaves behind it the cramped intolerances of the damp and enclosed middle Ages and enters, finally, into the rational spaciousness and secular luminosity of the Modern. As such, it forms a central, even defining, chapter in Europe's liberal autobiography. But that coming-of-age story has another aspect or dimension that is often relegated to a footnote, namely the connection between humanism and

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> dehumanization. For this Renaissance moment of the birth of humanism […] is simultaneously the moment of initiation of Europe's colonial project. Humanism and colonialism inhabit the same cognitive-political universe as inasmuch as Europe's discovery of its Self is simultaneous with its discovery of its Others.[87]

Scott's account reveals that humanism's associations with dehumanization forecasts the colonial dehumanization and oppression that persists to today. These still very present if not intensified issues might prevent us from declaring we have moved past anything, as implied by the "post." Jinthana Haritaworn suggests that instead of posthumanism, we might start with "anti-colonial accounts of the world that have a long history of resisting both human and nonhuman erasure" such as Indigenous sovereignty, which has the "potential to tackle anthropocentrism and dehumanization simultaneously, as relational rather than competing or analogous paradigms."[88] Zakiyyah Iman Jackson comments on critical posthumanism's tendency to ignore these concerns, writing, "the resounding silence in the posthumanist, object-oriented, and new materialist literatures with respect to race is remarkable, persisting even despite the reach of antiblackness into the nonhuman—as blackness conditions and constitutes the very nonhuman disruption and/or displacement they invite."[89]

Like many theorists who avoid the term posthuman (and many do avoid it!), Wynter never uses the word. However, her work can certainly be understood as participating in the conversation of critical posthumanism, at least in that it can be seen as inaugurating a "return to the human" in response to certain forms of posthumanism, as can the work of Fred Moten, Anne Anlin Cheng and Thomas DeFrantz. It is not a coincidence that these scholars of colour are all reticent to use the term "posthuman," regardless of the overlap in their research with proudly "posthuman" thinkers like Braidotti, Haraway, Hayles and Ferrando (all white women). I think it is no coincidence, either, that writers like Moten, Cheng and DeFrantz all frequently use *dance* in their work, whereas none of the classically posthuman thinkers do. It surprises me, given critical posthumanism's obsession with embodiment, that the thinkers associated with the school of thought gravitate much more towards literary analysis than they do analysis of dance as posthuman.[90] One aim of my dissertation is to demonstrate how a posthuman theory of dance can actively challenge posthumanism—as a philosophical approach that has been historically dominated by white voices, and perhaps because of this, not very attentive to the politics of race.

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In my dissertation, I am particularly interested in examining case studies where the dance labour of racialized bodies is exploited for commercial gain—where the dance is removed from the dancer in order to enliven or "authenticate" various nonhuman or abstract forms. In bringing posthumanism and dance together, I hope to demonstrate that dance—in all its messy embodiments—can help us better understand the stakes and shortcomings of critical posthumanism.

Chapter Summaries:

My **first chapter** tracks the *contagion* of Loïe Fuller's popular "Serpentine Dance"—a piece performed by Fuller as well as countless imitators in late 19th century France and America—across various bodies and screens.[91] Fuller herself was never filmed, in large part because she was so paranoid about having her dance stolen, but a search for the "Serpentine" on YouTube today turns up numerous videos that claim (erroneously) to feature Fuller. In contrast with Benjamin's critique of mechanical reproducibility and the multiplying force of film, the Serpentine does not "substitute a plurality of copies for a unique existence"[92] but positions plurality as a condition unique and authentic to its ontology. In other words, its *aura is plurality*. In an analysis of Fuller's failed attempts to own the Serpentine through patents and lawsuits, YouTube as an archive of "probability," and the complex relationship between Fuller and the figure of the Modern genius, I argue that Fuller presents some of the key quandaries associated with posthuman dance.

Chapter two examines *mechanization* and dance through the figure of the dancing robot, cyborg or automaton. Olympia, the dancing automaton from E.T.A. Hoffmann's 1817 German-Romantic fiction, "The Sandman;" Maria, the first on-screen robot from Fritz Lang's German-Expressionist film, *Metropolis* (1927); Kyoko, the dancing cyborg from Alex Garland's *Ex Machina* (2014); and Lil Miquela, a present-day Instagram influencer who is also a digital image, and who sings and dances, animated by motion capture technology. Throughout these examples, I maintain that dance is not only a cultural technique in its own right—and one that can mechanize and standardize the human bodies that practice it through repetition of body techniques, but that it also serves to prove life-like or humanness in these machines. If dance is a cultural technique of the soul, then the dancer's "soul" is formulated not as a pre-existing essence

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that diminishes via replication, but rather as a quality that can itself be manufactured, simulated or engineered, through the technique and technology of dance.

Chapter three explores weaponization, standardization and *disembodiment* as features of posthuman dance, drawing on examples from the scientific human motion studies of Eadweard Muybridge and Etienne-Jules Marey at the turn of the century, Taylorism and the choreographed labour of the assembly line, and the spectacle of American Engineering firm Boston Dynamics' dancing military robots. This chapter presents militarization as a feature of synchronized group dance and is attentive to the role of the camera in the procedures that govern and organize bodies in space, both in terms of entertainment/spectacle, and in terms of work. The thermographic camera used to film the NFB screendance *ORA*—another of my case studies in this chapter—offers a posthuman alternative to the film camera because it senses through heat or hapticity, rather than through vision. Yet *ORA* also presents a posthuman fantasy world in which dancing bodies are without gender or race, thus introducing the stakes of my final chapter, which interrogates posthumanism's common exclusion of discussions about and considerations of race.

Chapter four looks at the relation between posthuman dance's tendency towards abstraction, extraction and erasure, as seen through the medium of animation. Douglas Rosenberg's theory of "recorporealization" or the re-configuring of the organic body, through the powers of editing techniques and projection, into a different or changed entity on film, results is an "impossible body, unencumbered by gravity, technique, time or death."[93] These fantasies, of a dancing body that cannot die, often depend on the extracted labour of dancers of colour, and the editing or animation process that follows in effect erases their bodily presence and participation in the final product. Beginning with a historical overview of the history of abstraction and dance notation (especially Labanotation), I follow this phenomenon through several case studies including Max Fleisher's rotoscoped animations of American jazz bandleader Cab Calloway, *Happy Feet's* star animated penguin Mumble (whose motion was provided by American tap dancer Savion Glover), Bill T. Jones' 1999 digital dance work *Ghostcatching*, and the video for Major Lazer's "Light it Up," all of which call up questions about essentialism, indexicality and the "grain" of the body in relation to dance and race. Using Roland Barthes' "Grain of the Voice" as intertext, I argue that the "grain" of the Black dancing body has tangible capital, even in its presumed contrast with the precarious elasticity of the de-racialized technological embodiment—the "an-ontology" of the animated form.

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My conclusion revisits the research questions posed in my introduction and considers the role of current viral dance video content in the appropriation of Black dance labour on the screen-based social media platform TikTok. This example returns us to questions about ownership, dance, contagion and the concept of the posthuman, and embeds these questions within the complex network of advanced capitalism.

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Unruly Edges: Accepting Uncertainty

Throughout my dissertation, I am interested in the affordances and drawbacks of a posthuman approach to studying dance. What can dance reveal about the issues and discourses posthumanism commonly ignores, particularly around racialized and gendered bodies? How can thinking dance through the posthuman draw various objects and performances across history together in relation? How can an attempt to articulate a posthuman theory of dance in fact reveal the shortcomings of both definitions, or of definitions in general? How might a posthuman theory of dance help to articulate or critique notions of progress, as they relate to emergent technologies? Anthropologist Anna Tsing, for example, opposes the forward trajectory of posthumanism, implied by its etymological "post." She also objects to teleological courses of action that are guided by progress as an ultimate goal. Similarly, the project I began describing at the start of this introduction—my dance translation between Kate Bush and Hatsune Miku, in MMD—resists verisimilitude as a signifier of progress in order to "put unpredictable encounters at the center of things."[94] If we can destabilize our understanding of human success as an idea innately tied to progress, Tsing suggests, we might be able to both "live inside" this "regime of the human" and "still exceed it."[95] According to Tsing, the first step in de-hierarchizing progress as *the* ultimate goal is to understand that many things—the economy, the environment, our emotions—can be unpredictable and out of our immediate control. The second step is to realize how a lack of control offers potential for forms of self-aware political engagement, or an ethics of radical openness. Embracing precarious feelings facilitates an opening up, or a "condition of being vulnerable to others."[96]

"Dancer of the Future": Towards a Posthuman "Soul"

In a 1903 lecture delivered in Berlin, Isadora Duncan posited that "the dancer of the future will be one whose body and soul have grown so harmoniously together that the natural

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language of that soul will have become the movement of the body."[97] Hatsune Miku, whose name means "the first sound of the future," is also a dancer of the future, albeit in a different sense than Duncan implied. The "natural language" of Miku's "soul" is comprised of coordinates on a spreadsheet, and the movement of her body is fully orchestrated. In choosing to animate Miku's avatar with my own biometric data, and in producing a dancer whose outward appearance is at odds with her movement quality, I wish to push against the notion of essence, especially as it relates to the femme-presenting body. I also want to propose the relation among multiple bodies—specifically in the example of contagious movement—as an alternative to hierarchies of control, of which MMD is only one example. Miku has been praised as a hub of collaborative creativity, and while it may be true that her fans form a unique collective, Miku herself remains the object (or, the puppet) of that collective's manipulation.

To return to the provocation in my introduction pertaining to digital choreographies and how they shift relationships between dance and "soul," I appeal to a theory of posthumanism which continues to de-center the Eurocentric notion of the singular and exceptional soul. Whereas a postmodern theory of dance would likely do away with the notion of a soul altogether, a posthuman theory of dance asks: what if the "soul" was not unique, exceptional, isolatable, or discoverable, but rather, an-ontological, shifting, multiple, and relational: not the core of the individual, but the engine of relation. The dancing avatar in my project is doubly posthuman: her digital body is moved by code—making her posthuman in a literal sense of the term, implying a shift away from privileging hierarchies of organic bodies and "natural" origins—but she also holds within her an assemblage of relation, a genealogy of many other dancing bodies (including her own) that move in response to one another. In carrying the trace of both my organic body and Kate Bush's screen body in tandem with the glitch response of her interface, Miku's avatar enacts a de-hierarchized mode of collectivity, conjured through dance.[98] This MMD project is an attempt at a posthuman work—both in terms of form and content. It not only informs my writing with embodied research-creation, but facilitates some of the driving questions behind my dissertation: How does understanding screendance as posthuman not only elucidate its collective, relational qualities but also its relationship to exploitation and commodification in advanced capitalism? How does the *spectacle* of dance on screen also propel processes of erasure? How do we still rely on dance, today, as a productive force of life/human-ness, in our technological assemblages?

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Chapter 1: *La* Loïe and the Multiple Body of the Serpentine Dance

"…all the magic of Merlin, the sorcery of light, colour, flowing form…She transformed herself into a thousand colourful images before the eyes of her audience. Unbelievable. Not to be repeated or described." – *Isadora Duncan describes the Serpentine Dance.*

Refusing Singularity

In 1892 American dancer Loïe Fuller captivated audiences at the Folies Bergère in Paris, where she performed her legendary "Serpentine Dance" to a packed house. At a time when theatres were just beginning to convert gas to electricity, Fuller's experiments with fabric and coloured lights stunned audiences and transformed her body into what the *London Standard*, in 1900, called a "kaleidoscopic vision," distributing agency away from the human dancer and onto a web of nonhuman actors, thereby staging a posthuman dance.[99] According to the posters advertising the show, Fuller's costume was made of 500 yards of heavy white silk, which she manipulated invisibly by hooked bamboo canes from within, in spirals and loops.[100] Fuller used embodied technique to disappear into a fluid spectacle of abstract and semiotic forms (described as a flame, butterfly, flower or even a uterus), but her bodily labour was just one component of this posthuman dance assemblage. Nearly a century before Donna Haraway declared that she would "rather be a cyborg than a goddess," Fuller constructed a cyborg dance-body comprised of the emergent technology of electric light projected onto the ever-moving screen of her costume.[101] By turning *herself* into an animated screen, Fuller predicted the rapid changes of modernity in *fin de siècle* North America and Europe, including future cinema viewing practices, and expanded the notion of what constitutes a dancing body in a very posthuman manner.[102] However, because Fuller herself was never filmed dancing the Serpentine, and because the videos that exist of the dance today are mainly performed by imitators whose names are sometimes hard to ascertain, the Serpentine Dance is also posthuman in a more layered sense: as a fascinating assemblage of various dancing bodies and screens, technological and organic agents that collaborate to resist notions of origin and ownership.

Dance and film scholars (McCarren 2003; Garelick 2007; Gunning 2003) often credit Fuller as the inventor of the Serpentine, and her name has become tightly fastened to this "signature" dance, both in academic and popular discourse.[103] However, the origins of the Serpentine Dance are a bit more unclear, even from Fuller's own account of arriving in Paris for

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the first time to discover an "imitator," Maybelle Stewart, performing her choreography.[104] "Imagine my astonishment," she writes in her autobiography, "when, in getting out of the carriage in front of the *Folies*, I found myself face to face with a 'serpentine dancer' reproduced in violent tones on some huge placards. This dancer was not Loïe Fuller."[105] Upon watching her "rival" and "robber," dance on stage, Fuller was relieved to discover that Stewart's version of the Serpentine paled greatly in comparison to her own: "My imitator was so ordinary," Fuller writes, "that, sure of my own superiority, I no longer dreaded her."[106] Surely Fuller includes this anecdote in her autobiography to secure her position as innovator—and thereby most skilled performer— of the Serpentine Dance. Yet her anxious bid for ownership over the dance did not prevent Fuller from agreeing—since the publicity for Stewart's Serpentine Dance had already been circulated—to replace Stewart and dance under her name for the first two nights of the show."[107] This often-overlooked historical assemblage, in which the circulation of posters and print media, along with the tangle of electricity, costuming and props onstage, work together to efface Fuller's identity as an original and singular creator, interrogates the mythology of Loïe Fuller as "the" Serpentine Dancer. It is precisely in this gap, between the Serpentine as an illusion of disembodiment and Fuller's wish to tie the dance to her unique and singular body, that I locate the tensions of the posthuman. Following Francesca Ferrando's statement that "posthumanism has internalized the hybrid as its point of departure (that is, an origin which has no origin)," I begin my exploration of a posthuman theory of dance by examining the slippery origins of the Serpentine.[108] Posthuman in its own right, not least of all because it presents the performative, dance-like qualities of nonhuman materials, the Serpentine Dance exists as a contagious phenomenon that elides origins and refuses to reside in any one, singular body. This is especially visible in the proliferation of "Serpentine" videos cla uploaded to the streaming platform YouTube: these videos feature a variety of different dancers—contemporaries of Fuller such as Crissie Sheridan, Annabelle Whitford-Moore and Maybelle Stuart—with obviously different body shapes, faces and costuming, who perform the choreography in slight variations. Over half of these videos credit Loïe Fuller as the performer, even though it is clear she is not the dancer in the work. I argue that this phenomenon—of the Serpentine as contagious phenomenon and of the constant return to Fuller as origin of the piece—presents Fuller as an author of a set of cultural techniques that can be taken up by other bodies over time.

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Many scholars and historians have written about Fuller's masterful transformation of her body using electricity and light, acknowledging her as an early intermedia dance artist who undoubtedly fits within a framework of the posthuman (See Merwin 1998, Coffman 2002, Gunning 2003, Westby 2017, Karpenko 2019). In my reading of Fuller as posthuman, I expand the focus to include the "multiple bodies," both human and non-, of the Serpentine Dance. Futurist F.T. Marinetti's term for Fuller and the ideal dancer of Futurism was "the body multiplied," with the past-tense verb signifying the replication of human power, or the centrality of the human body to the operation of the sentence. I flip Marinetti's formulation, instead using the term "multiple body" or bodies, so that the adjective "multiple" *fundamentally contests the body as singular*. For me, this approach serves to locate the posthuman qualities of Fuller's dance not only in its technological hybridity but in its departure from the individual isolatable subject (manipulating the silks at the helm of the dance) in favour of an assemblage model of subjectivity. The Serpentine redistributes agency from Fuller the "genius creator" to the many other material and ideological components that construct the dance: yards upon yards of silk, electricity, the poems of Stephane Mallarmé, academic discourses of feminism and technology, Fuller's autobiography, chemical element radium, the unidentifiable Serpentine dancer on advertisements for the show, Marie Curie, YouTube algorithms, the movie camera, Maybelle Stewart, Crissie Sheridan, etc. etc.

Mechanical Reproduction and the Problem of Ownership

In hindsight, the assemblage that comprises the Serpentine is clearly multi-faceted. Even at the time of its creation, Fuller's deep wish to be seen as the inventor of the piece betrays her awareness of the Serpentine's evasion of ownership. During her first tour of the dance in New York in February of 1892, prior to her Paris show, she was dismayed at the fact that even as critics praised the Serpentine, her "name was nowhere mentioned," remarking, "They had stolen my dance."[109] Consider Fuller's description of the Serpentine Dance as both her creation and as a "great discovery," from her 1908 autobiography titled *Quinze ans de ma vie* (translated to English in 1913):

> Golden reflections played in the folds of the sparkling silk, and in this light my body was vaguely revealed in shadowy contour. This was a moment of intense emotion. Unconsciously I realised that I was in the presence of a great discovery, one which was destined to open the path which I have since followed. Gently, almost religiously, I set

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> the silk in motion, and I saw that I had obtained undulations of a character heretofore unknown. I had created a new dance.[110]

Fuller frames this experience as religious, emotional and predestined, demonstrating both her sizeable ego and the common understanding of dance as a conduit for spiritual experience and authentic emotion. Fuller's description here is an impassioned bid in her ongoing fight for ownership of the Serpentine Dance. Throughout her autobiography, she employs proprietary language to lay claim to the dance and all elements of her stage show. Of her "chemically composed colours, heretofore unknown," which she used to tint her stage lights, Fuller writes: "I stand before them like a miner who has discovered a vein of gold."[111] Here she presents herself as a labourer whose discovery, like "gold," has tangible monetary effects for her as an artist. Fuller later filed patents for her costumes and set designs (**See Figures 13, 14 and 15**) in an effort to protect her "discovery," but nevertheless, the Serpentine kept slipping away from her. I argue that Fuller was preoccupied with the originality of her work because there was something characteristically evasive about the Serpentine Dance—most likely due to a combination of emerging modernist values, the relationship between the Serpentine and early cinema, the rise of what Walter Benjamin named techniques of "mechanical reproduction," and the fact that it was danced by a woman—that made it antithetical to the notion of ownership. Perhaps ironically, these are also the qualities that make the Serpentine "posthuman," in the sense that the posthuman is also post-author or -owner.

Live dance, as an ephemeral practice, already resists ownership. Because dance "leaves no object behind after its performance," its ephemeral nature is also its "afterlife," in that it "haunts every second of the present with its potential return."[112] Anthea Kraut, who has written extensively about dance and copyright, argues that copyright historically allowed choreographers to "position themselves as possessive individuals and rights-bearing subjects rather than as commodities and objects of exchange."[113] Likewise, Fuller filed her patents as a safeguard against the ephemerality of the Serpentine, as a means of ascertaining control over the profits of the dance, and to protest the "loss of control over her bodily labour" that turned her from a genius inventor and a subject with agency, to a powerless, reproducible object.[114] To that end, however, the patents were unsuccessful or perhaps even counter-productive in their instructive nature: they rendered the Serpentine *reproducible* as a cultural technique.[115] Kraut points out that

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the written description Fuller "recorded and submitted for copyright registration" actually "reads like instructions for re-creating the solo dance."[116] And indeed, between the years of 1895 and 1905, there was a sudden influx of "Serpentine" dancers in Europe, prompting Fuller to believe her choreography was being copied by performers like Ameta, Chrissie Sheridan, Annabelle, Ruth St. Denis, Émilienne d'Alençon, Lina Esbrard and the "flame dancer" Papinta (who some have suggested as another possible inventor of the Serpentine and Fire dances to which Fuller laid claim).[117]

The historical record is also complicated by the emergence of film at the turn of the century. While Fuller reportedly refused to be filmed, many other dancers performed the Serpentine for the new medium of cinema, inscribing their bodies within the filmic archive. The case of the Serpentine dance is therefore a textbook example of Walter Benjamin's argument in his widely cited 1936 essay "The Work of Art in the Age of Mechanical Reproduction," where he argues that with the rise of technologies of mass production–particularly film and photographic technologies which can unmoor images from their unique spatial and temporal locations (the "fabric of tradition")—the art object loses its "aura" or authentic character.[118] As Benjamin writes: "The presence of the original is the prerequisite to the concept of authenticity," an authenticity which, when copied, becomes more and more difficult to verify, and marked by an "aura" that dissolves as copies of the original are made. The most "powerful agent" of such reproducibility, Benjamin argues, is the film.[119] Similarly, while the descriptions of Fuller's Serpentine by those who saw it performed live evoke an undeniable sense of aura, the capture and distribution of that dance on film stretch that aura away from the singular body, encompassing many different (oftentimes unnamed) dancers. This paradox, between the individual human creator and the dispersed, more-than-human collective, played out on the screen of the dancer's technologized body, and on the cinematic screens where the Serpentine dance films were projected, makes Loïe Fuller a critical example of the tensions at play in a posthuman theory of dance.

Upon viewing Fuller's Serpentine performed live, American modern dancer Isadora Duncan described the piece as follows: "Before our very eyes she turned to many-coloured shining orchids, to a wavering, flowing sea-flower, and at length to a spiral-like lily, all the magic of Merlin, the sorcery of light, colour, flowing form…She transformed herself into a

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thousand colourful images before the eyes of her audience. Unbelievable. Not to be repeated or described."[120] Duncan specifies that the dance should not be repeated, but if the essence—the aura, even—of the Serpentine is its disorienting, abstract and many-bodied aesthetic, this aura remains even as the dance moves further from Fuller's "originary" body, and is mediated by the technology of film across screens and other bodies. No matter who is operating the veils, or how the dance is viewed, the Serpentine's "aura" resides in the spectacle of it: its ability to affect a viewer, moving them into instability and wonder. In his essay, Walter Benjamin defines the "authenticity" of an art object as "the essence of all that is transmissible from its beginning, ranging from its substantive duration to its testimony to the history which it has experienced."[121] This definition depends on a traditional understanding of narrative arc as well as a clear sense of beginning and end. Alternatively, the "authentic" body of the Serpentine—cumulating over the course of its experiential history—is, by default, multiple. Framed within Benjamin's observations about mechanical reproducibility and the multiplying force of film, the Serpentine does not only "substitute a plurality of copies for a unique existence," but positions plurality as a condition unique and authentic to its ontology. In other words, *its aura is and always has been plurality.*[122]

Fuller as Romantic/Modern "Genius"

By reading the Serpentine through Benjamin, several modernist qualities emerge that compete with my designation of the dance as posthuman. Fuller's patents, for example, speak to the Serpentine as a new and original idea. The societal obsession with newness is especially acute within Fuller's early-modern context at the turn of the century, just after the invention of the electric motor and prior to the "birth" of cinema. Michel Foucault attributes the obsession with newness to discourses of "Tradition," broadly speaking, which "enable us to isolate the new against a background of permanence, […]to transfer its merit to originality, to genius, to the decisions proper to individuals" and "pursue without discontinuity the endless search for the origin."[123] Fuller's fight for ownership is therefore also a fight for tradition, which she flouts in almost every other way—as a woman who was also a scientist, for example, using new electric tools on stage and abstracting her body into a series of nonhuman images rather than adhering to traditional balletic or narrative choreographies. Notably, tradition here is linked inextricably to the masculine, and in particular the male figure of the genius. In her work on Gertrude Stein,

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Barbara Will writes that "genius is a term that "authorizes, in the Romantic or modernist sense: a term rooted in an essentializing logic and in a conception of the self as intentional and autonomous."[124] The figure of the genius, which according to philosophers like Hegel, Kant and Schopenhauer is "always male," is also the very figure which posthumanism reacts against.[125] The Serpentine Dance is posthuman distinctly because it distributes agency away from Fuller as genius-creator, but it is only because Fuller is a *woman* that this pivot can happen as resolutely as it does. If Fuller can be considered posthuman in part because her "signature" dance evades ownership and origins, this reveals the gendered biases of posthumanism.

Throughout her life, Fuller participated and innovated in fields that were generally closed to women. In her interview with Liz Heinecke, whose recent book *Radiant* offers a parallel biography of Fuller and her close friend Marie Curie, Jennifer Ouellette writes that Fuller "was something of a self-taught chemist, eventually patenting the use of various chemical compounds and salts to create color gel and luminescent lighting."[126] Heinecke and others have credited Fuller as the first performer to employ the power of luminescent chemical salts for stage lighting, devising magic lanterns fitted with translucent, colourful gel lenses to project a playful dance of colours onto her moving costume from multiple angles. As such, Fuller is frequently framed as a creative genius, a magician, and a mad scientist all at once; Fuller embodies both the Romantic artist who "did not want to be shackled to the de-humanising and […] increasingly industrialised world" because she understood the human "individual" as the "heart of the creative process" *and* the scientist who discovers and harnesses animacies in the world around her.[127] At the same time, As Lara Karpenko notes, there is also an impulse to attribute the spectacular inventiveness of Fuller's performance to the electricity, or the male operators of the lights, thereby suggesting the "masculine authorship" of Fuller's works.[128]

Fuller's view of herself as an exceptional individual in the sense of both inventor and creator is at odds with the prevailing argument about why her dance was so powerful, and indeed why the Serpentine might be called "posthuman": it obscured and abstracted her body, making her an "unstable signifier" and evacuating the individual from the dance.[129] This incompatibility, however, is not present in the work of modernist "geniuses" such as William Burroughs, James Joyce or Marcel Duchamp, who are often praised for their invention of similar abstract work. In *A Thousand Plateaus*, Deleuze and Guattari explain that such artists—always male—are congratulated for their ability to "shatter the linear unity of the [world]," the very linear unity

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which they are also credited with inventing, and thereby present a more accurate portrayal of reality, one not bound by mimetic realism.[130] It is telling that when Fuller attempts to shatter the linear unity of the world—an impulse that is in itself posthuman—she is denied genius status. This is doubly due to her being a woman and a dancer. The dancer's body is simultaneously subjective instrument and art object; when that body is female it is much more easily viewed as one in a series of copies or successions, a trend that intensifies in modernism.[131] There were therefore higher stakes for women in the modernist bid for genius.

I acknowledge this as a paradox intrinsic to posthumanism proper and one which is inevitably gendered: Fuller relinquishes genius and ownership in large part because she is a woman. In claiming Fuller as a posthuman dancer, I therefore not only risk participating in the discourse that denies her ownership of the dance, but presenting this impossibility of Fuller's ascent to "genius creator" as positive. She does not get to be seen as she really wanted – as the "essential, autonomous authorial subject creating absolutely new and original works of art" (a figure thoroughly compatible with Romantic-era humanist ideals) —and instead is co-opted as a proponent of postmodernist (as well as feminist-posthumanist) artmaking that is "open-ended, processural, collaborative and resistant to any final symbolic or authorial containments."[132] This tension, between Fuller's self-perception and the way her work has been interpreted, illustrates what Roland Barthes calls the "death of the author," a de-hierarchizing of human agency that has a particular impact on the traditional values attached to dance, namely "creativity and genius, eternal value and mystery."[133] In Western classical dance, of course, the individual dancer has never been prioritized as a genius the way the poet, novelist or visual artist has. In fact, all claims to authorship where dance is concerned are already fraught by the citational nature of gesture itself. In this way, dance is exemplary of Barthes' definition of a "text" as "a tissue of quotations drawn from the innumerable centres of culture" where the writer, or in this case, dancer "can only imitate a gesture that is always anterior, never original."[134] In Barthes' original quote, he uses the word "gesture" to refer to the impulse of the writer. When viewed through the lens of dance however, the impossibility of original gesture, where gesture is not metaphorical but literal, and embodied, takes on a more potent resonance. The human body in motion is never original, but rather always passing through citation. Gestures, repeated unconsciously, become echoes that live briefly in a multitude of bodies. Such is the case with Fuller's Serpentine Dance.

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Fuller as Cyborg

It might seem odd to begin my exploration of posthuman dance with Fuller, who was at the peak of her popularity at the end of the 19th century, long before the term "posthuman," cybertheory or digital media came about. But my strategy in beginning with Fuller is in part to show that posthumanism does not emerge with computer technologies or postmodernism and cyberfeminism in the 1990s. Rather, by defining Fuller as posthuman, we can begin to see that the nebulous category of posthumanism encompasses ideas and anxieties—about dissolving boundaries of the body and subsequent lack of control over our subjecthood, for example— that were already circulating at the end of the Victorian era and the dawn of industrialism. In his work on the "Modernity Thesis," Ben Singer writes of modernity as a "barrage of stimuli"—an apt descriptor for the Serpentine Dance itself—and explains that exposure to the dangers of new technologies such as the electric cable car introduced a fear of disembodiment (or dismemberment) in the masses.[135] Following Benjamin's definition of modernity as a series of shocks, [136] Singer links such fears to the "escalation of sensationalism in popular amusement," and the "thrill" of amusement parks, vaudeville and the "rise of cinema."[137] Fuller, whose performances emerged out of vaudeville, created work inspired in part by these cultural anxieties, staging the impacts of technology on the body in her performances, and prompting Jacques Rancière to remark on her "hyper-mediatic" body as an "exemplary graphic emblem of the age of electricity."[138] At the turn of the century, Fuller was already experimenting with dance as an interface for technology, presenting an imbrication of thematic content and form that displayed both modernist posthuman qualities.

It was Fuller's use of technologies of light, in particular, that contributed to the spectacle of her stage show as a precursor to cinema. By turning *herself* into an animated screen, she blended biology and filmic media, conjuring the figure most synonymous with posthuman thought, and which philosopher of posthumanism Francesca Ferrando calls "the historical and herstorical [sic] passage between the human and the posthuman": the cyborg.[139] Although it is most closely associated with Donna Haraway's postmodern cyborg, which emerges as a figuration of cyberfeminism with her "Cyborg Manifesto" (1985), and which she describes as a "hybrid of machine and organism," a "condensed image of both imagination and material reality" who takes "pleasure in the confusion of boundaries,"[140] the idea of the cyborg can be tracked back historically to encompass modernist examples as well. Such examples include

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German dadaist artist Hannah Hoch's experiments in photomontage (1919-30), Hans Bellmer's surrealist dolls (1932-36) and the work of Mexican painter Frida Kahlo, whose self-portraits (1930-44) depict her body as hybrid and porous, yet also grounded in the lived experience of chronic pain. Pre-modern examples of the cyborg might include Olympia, the mechanical dancer in E. T. A. Hoffman's "The Sandman," and Julien Offray de La Mettrie's exploration of humans as "automatons" in his materialist philosophy, *L'Homme Machine* (1747). If the cyborg is, as Bruce Grenville writes, a "sign of a collective anxiety around the ubiquitous presence of the machine," then Fuller's cinematic stage performance could certainly be interpreted as cyborg-like in the sense that its popularity was in part symptomatic of a collective unease about the disembodying force of film.[141]

Effacing the Human

Fuller's cyborg-like nature is not her only link to posthumanism. Fuller's choreography (including and beyond the Serpentine) was also posthuman in that it often distributed agency away from the singular human dancer. Her work was often described using spectral terms such as "ethereal, [and] delicious,"[142] and she was called a "magic blossoming," a "whirlwind of light and veils…vanishing and disappearing like a pale mist"[143] and a "lovely apparition."[144] Reviewers in Paris and New York constantly referred to her in ephemeral rather than material, human terms, so that Fuller was not even a body in motion but rather, motion itself. Of Fuller's "Phosphorescent Dance," for example, which incorporated dots of phosphoresence painted on her silks, critic Julius Meier-Graefe notes that "it is tiny brilliant points that dance, it is a dance of lights glittering like stars […] they merge…crisscrossing, [displaying] not an iota of human movement."[145] In her 2017 doctoral dissertation on dance and interactive technology, Concordia University PhD graduate Margaret Westby writes that the "entangled agencies" that surrounded Fuller in a "magical spectacle of technology and movement" in combination with her "technical prowess in the male-dominated field of technology" allowed her to shift "typical notions of gendered subjectivity."[146] This "prowess" is demonstrated in her technical knowledge—Fuller's stage lighting was developed out of meticulous scientific experiments with radium and luminescent salts[147]—and from the physical strength required to manipulate her large, heavy swathes of silk, ironically revealing the immense level of bodily effort required to orchestrate the *appearance* of disembodiment. By contrast, those writing about Fuller's performance often

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describe her as lacking a body, and as Ted Merwin notes, "critics of Fuller found her so disembodied in performance that they denied that she was a dancer at all."[148] Jacques Rancière similarly transfers Fuller's agency in the dance almost completely to her costume, effectively reducing her to a technician: "Loïe Fuller does not trace figures with her feet. She remains static. She dances with her dress, which she unfolds and refolds, making herself a fountain, a flame or a butterfly."[149] These descriptions of Fuller's agency (or lack thereof) are in part facilitated by dance as a practice that already blurs the division between the body as subject and object, insofar as dance is always *both* process and product of the moving body.

It is worth focusing on this disjuncture, between the labour of Fuller's performance, and the effect of her disembodiment, in order to better clarify the stakes of a posthuman theory of dance. Rather than merely extend her human agency to the silks, Fuller danced *with* the many elements of her stage performance – most notably her costume and the coloured lights projected upon her – thereby facilitating the performative potential of these various inhuman elements and enacting a non-anthropocentric spectacle in both content and form. Rather than instrumentalize these elements, Fuller accompanied them on stage. In this sense, the Serpentine Dance predicts not only the play of electric light on a cinematic screen, but film's ability to transform corporeal materiality into a flickering image. Like the cyborg, who is never fully in or out of control of its presence, Fuller's audience was undecided about whether she wielded electric technology like a powerful wand, executing her dance with intention and control—some critics call her a "goddess of light"[150] and a "magician"[151]—or whether Fuller was ultimately effaced by the mediatic assemblage of her performance, subsumed into her technological surround. Somewhere between the "depersonalized ballerina" and the modern dancer, who "soars without apparent effort," Fuller *made material dance.*[152] Historian and journalist Rhonda Garelick remarks on Fuller's "capacity to merge with the realm of the nonhuman or the supernatural" like the cyborg—who Haraway positions as a "boundary rider"—a fluid figure somehow both intrinsically female and also capable of transcending oppressive categories of gender and race.[153] The feminist potential of the cyborg is located in her gendered body, a machinic-organic hybrid that "skips the step of original unity" and acts as a figuration for something Haraway calls "worlding": a convergence of forces (including the human) that come together to produce identities and relations.[154]

Rhonda Garelick names Fuller the "real 'Future Eve,'" referencing the automaton in Auguste Villiers de l'Isle-Adam's 1886 Symbolist science fiction novel *L'Eve Future.*[155] I find it

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strange that Garelick aligns Fuller not with "Thomas Edison," the ironically-named scientist-inventor character in the novel, but with Edison's creation, a technological construction of the "ideal" woman. In Garelick's portrayal, Fuller becomes pure object: a gendered technological spectacle. This is problematic because cyborg women are always relegated to the realm of the object, thereby reinforcing the Pygmalion binary structure of male genius creator and his female creation. Instead, I see Fuller as a precursor to Haraway's *figuration* of the cyborg in the sense that her performances introduce the concept of non-human and more-than-human agency, distributing dance power across what Stephane Mallarmé called the "fearsome bath of materials" in which she performed, while also staging an interface between technology and the body, evoking the feminist potential of the cyborg as a body which is not singular, organic or sovereign. The first theorists of posthumanism (Haraway 1991, Braidotti 1994, Halberstam 1995, Hayles 1997) were also feminist theorists of techno-embodiment and digital mediation. In the introduction to *A Feminist Companion to the Posthumanities* (2018), editors Cecilia Åsberg and Rosi Braidotti define an ethics of posthumanism not as a fantasy of body transcendence, but as an awareness of the "recalcitrant and connected nature of nature, of bodies and of embodied selfhoods as more than a bounded, cerebral affair of willpower and intention."[156] However, if posthuman embodiment, like Haraway's description of feminist embodiment, is "not about fixed location in a reified body, feminine or otherwise," but about "nodes in fields," distributed and always already in "significant prosthesis," then it follows that posthuman embodiment, in its diffuseness, is also a kind of dispersal or even partial erasure.[157] We should pay close attention to these processes of erasure as both empowering (in their ability to distribute agency) and simultaneously at odds with a feminist politics of specific or "situated" embodiment (also Haraway). Fuller's position as a celebrated dancer can therefore be read productively against *and* alongside her kaleidoscopic dance aesthetic, which enacted a dematerialization of her tangible female body.

Woman as Spectacle and Obstacle

Despite her obvious success in various male-dominated fields, Fuller was unable to fuller escape gendered projections and assumptions about her work. Ted Merwin, for example, writes that Fuller used technology to "wed" her organic, womanly body with the masculine force of electricity on stage, thus "marrying" dance (female) and science (male).[158] Here, Fuller's use of

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electricity is framed as a foray into a men's world, reinforcing a Cartesian binary that delegates the dancing body as feminine, and the scientific mind as male. While many scholars have interpreted Fuller's work through feminism, it is worth noting also that claims for Fuller as a distinctly feminist artist are largely speculative (and generalizing), drawing from Fuller's stereotypically masculine expertise where electricity and science were concerned, and from her lesbian identity.[159] There is a temptation, in historical writing, to equate women working in scientific fields with feminist politics. I do not mean to suggest that Fuller cannot stand as a powerful representation of women's engagement with male-dominated areas. However, I find it curious that in the writings about Fuller's performance, her body is often configured as an impediment to freedom, so that on the one hand she is called a feminist and on the other she is applauded for making her female body disappear. This is because feminist analyses of Fuller's work often cite her transformative potential—the *erasure* of her fixed female form—as a means of liberation from the increased commodification of women's bodies in the industrial age. Ironically, her metamorphosis into a dehumanized spectacle, much like the "vanishing woman" in stage magician acts, hinges on the "commodified visibility" of the very thing it is erasing: the female body.[160]

The fact is that Fuller's gender was a draw for audiences, as demonstrated by the posters for her shows which misleadingly feature drawings of a sexualized and scantily clad dancer (**Figures 16 and 17**). These posters often rendered Fuller so unrecognizable that it was unclear whether they depicted her or one of the many other Serpentine dancers. This ambiguous portrayal of the Serpentine dancer's body speaks to the interchangeable nature of the dancer in the dance, as well as a homogenous view of women in general. At times, the posters erroneously implied that the performer would be dancing nude beneath her costume, when in reality the audience of the piece would experience a kind of reverse striptease in which the dancer's body became increasingly covered up and obscured. Given that Fuller came to exemplify such an array of abstract and philosophical conceptions, and that she is often described in inhuman, even immaterial, terms, it is easy to forget that she was also just a woman, dancing in front of an audience. Many of Fuller's fans were surprised by the shape and size of her body when they saw her offstage, in normal lighting, and there she was: a "rather plain-looking girl from Illinois."[161] There was a contrast between the "highly eroticized body" portrayed on Fuller's publicity posters, not to mention the otherworldly butterflies and orchids she evoked on stage, and her

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mundane organic body, which critics have described using various derogatory terms like "pudgy," "stocky," "heavy," "shapeless" and "unglamorous."[162] The misogyny of these descriptions—to Jean Cocteau, for example, Fuller was merely a "fat, ugly American woman with glasses" who managed to [create] the phantom of an era"[163]— demonstrates abstract disembodiment as an aesthetic that relies on the perceived neutrality of white masculinity; any type of body that is not white and male risks becoming an *obstacle* to "purity" of form. Yet Garelick writes that "Fuller made a career out of staging her own immateriality, dissolving into light projections on fabric."[164] Fuller demonstrates what I see as a key tension in posthuman dance, between the obstacle of her situated body, the fantasy image of the female body as plastic or dissolving (in service of what Susan Bordo calls the postmodern "dream of everywhere"), and the labouring body of the dancer as a material reality with the capacity to touch, affect and relate (218).[165] The Serpentine Dance, which dematerializes the female body within a swathe of media, introduces a critique of transcendence as a crucial point of interest for posthuman dance.

Symbolism: "Not a Girl Dancing"

Fuller's work is often associated with Symbolism, the late-nineteenth century European arts movement which rejected realism in favour of spirituality, imagination and dreams, to better represent anxieties about the influx of new technologies at the time. Fuller's work was thought to be Symbolist because of its ability to blur the lines between illusion and reality—an effect described by famous Symbolist poet Stéphane Mallarmé as "the dizziness of soul made visible by an artifice."[166] Fuller's gender, or rather, her ability to transcend her gender, was also key to her role as the Symbolist's muse. In "Ballets" (1886), Mallarmé writes:

> "the ballerina is *not a girl dancing* … she is *not a girl*, but rather a metaphor which symbolizes some elemental aspect of earthly form: sword, cup, flower, etc., and that *she does not dance* but rather, with miraculous lunges and abbreviations, writing with her body, she suggests things which the written work could express only in several paragraphs of dialogue or descriptive prose. Her poem is written without the writer's tools."[167]

In his aesthetic abstraction of the dancer, Mallarmé demonstrates that in his view, the dancer's body is also prosthetic/subservient to the imagery she is capable of evoking. As Amy Kortiz writes, "[t]he dancer's agency has at best a precarious place in [Mallarmé's] formulation, since she is text, writing implement and meaning all at once, while at the same time not being a subject, who could write."[168] If according to Mallarmé, Fuller's "poem" is "written without the

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writer's tools," it once again refuses her the status of writer/author and the attendant qualities associated with such a subject position: autonomy, power, and freedom. Once again, she doesn't get to be the Modernist genius, at the helm of this de-authorization; instead her agency (as author, dancer and woman) is a casualty of this modernist-posthuman effect.

Dematerialization

Many of the descriptions of Fuller's ethereal incorporeality call attention to the gendered quality of such associations. Because the Serpentine took place at a nexus of technology, dance and the feminine body, it highlighted disembodiment as a feature of all three. In *Girlhood and the Plastic Image*, Heather Warren-Crow argues that the female imperative to embody plasticity can be linked to several key attributes of digital images: "malleability, transmediation and instability."[169] Like Warren-Crow's observation, that "girlishness had a digital nature even before the digital," I argue that certain (particularly Western) practices of *dance* incarnate ideas of body-transcendence even before digital media presented the free flow of dematerialized information as a salient feature of its medium.[170] Traditional definitions of dance often align with fantasies of disembodiment. In *Time and the Dancing Image* (1988), American dance historian Deborah Jowitt writes of the weightless, supernatural quality prized by classical dance in the romantic era where "insubstantiality [was] close to godliness."[171] Dancers were praised not so much for their physical prowess as for their ability to look and move in an angelic fashion. Jowitt remarks that the female dancer in particular was a creature of paradox in that she was seen as both a poetic image and a "panting perspiring body."[172] The frequent use of the word "freedom" in descriptions of dance's aim is striking, and also points to the sexist impulse to wish away the abject corporeality of the (often) female dancer. Susanne Langer argues that "the most important [force], from the balletic standpoint, is … the sense of freedom from gravity"[173] as does Paul Valéry, who writes that in dance, the body seems to have "broken free from its usual states of balance. It seems to be trying to outwit—I should say outrace—its own weight, at every moment evading its pull, not to say its sanction."[174]

Rhonda Garelick points out, however, that while traditional forms of balletic dance used technique as a means of transcending the body, and "while as a nation, early-twentieth-century America may have been associated with mechanicity and science," modern dance wanted the exact opposite: to free the body from the constraints of ballet technique, triumphing "personal

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feeling" over "soulless mechanicity."[175] Garelick argues that Fuller's "refusal" of her body, and "preference for mechanics" makes her an outlier in the context of American modern dance, which often "portrayed the human body moving in accordance with natural forces, allowing gravity, breath and the dancer's own physical weight to play a visible role onstage."[176] The description of Fuller as disembodied, therefore, puts her at odds with modern dance as a practice of hyper-embodiment, or affective output rooted in the body.

On the other hand, whereas ballet is often associated with a series of technical poses and body positions, the Serpentine dance, which has been praised for its flow and rejection of stasis, aligns with Modern dance's obsession with fluidity and transformation. Deleuzian media scholar Stamatia Portanova writes that Loïe Fuller's performance of the Serpentine highlights "the nature of movement as an infinitely decomposable continuity, […] one in which the form has not fully determined its own difference, its "presence and precision," from the continuities of matter."[177] In other words, the Serpentine illustrates "a continuous process of formation, rather than a form" and there is something about dance, in particular, that aligns productively with flow as an ideal of process philosophy.[178] But it is not enough to assume that flow is unequivocally good and stasis is bad. Instead of falling into this binary value judgement, Fuller reveals the complexity and contradictions of posthuman dance.

Futurism: The Multiple Body of the Serpentine Dance

Dancing at the turn of the century, just prior to the "birth of the cinema, the physical culture movement (which introduced a fascination with "anthropometry," or the measuring of the body), and the suffragette movement," Fuller straddled two seemingly opposite aesthetics—that of Symbolism, which saw her as an ethereal abstraction, a body dissolved into dream-like natural imagery, and that of Futurism, which understood her body as technologized, measurable, multiple and machinic. Her ability to harness such motion meant that Fuller found another fan in the Italian poet, art theorist and founder of the Futurist movement, Filippo Tommaso Marinetti (1876-1944). Marinetti, who was an enthusiast of speed and motorized vehicles, was also one of the first affiliates of the Italian Fascist Party and co-writer of the Fascist Manifesto. In his essay "The Futurist Dance," first published July 8, 1917, Marinetti praises Fuller for embracing the "purity" of the abstract, in contrast with famous modern dancer Isadora Duncan, whose performances Marinetti saw as laden with sentimental expression and femininity. In Marinetti's

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writing about the "new human-mechanical life" that preoccupied the minds of many during the World War, dance becomes the tool with which to explore instruments of destruction. Marinetti's translator, Elizabeth Delza, notes that "instead of achieving a human-mechanical fusion, he succeeds in idealizing the machine, or at least in substituting functions of the machine for human functions," thereby "submerg[ing] the human instead of freeing him by mechanical means to achieve 'the body multiplied.'"[179]

Marinetti uses the term "the body multiplied" in the Futurist Manifesto to signify dispersal of identity as a powerful tool accessed by the sovereign subject, as in the dancer who, by imitating the motor, for example, takes on the power of that mechanical body. Marinetti's use of the term aligns with the early articulation of posthumanism, by 20th century science fiction authors and cyberneticists like Norbert Weiner, "that a great new epoch could be reached with the arrival of consciousness computers, cyborgs, robots and other variations of post-human beings which could finally separate mind from matter" giving way to a "positivist utopia with minimal labour."[180] Marshall McLuhan's early work, in particular his statement in *Understanding Media* (1964), that "all technologies are extensions of our physical and nervous systems to increase power and speed" expresses a similar formulation, where technological progress serves to improve human life.[181] These theories situate non-human or technological objects as augmentations of the individual or singular human body, thereby re-centering power and agency at the site of the human. I purposefully reverse the syntax of Marinetti's phrase, changing "the body multiplied" to "the multiple body." By acknowledging the multiple bodies of Fuller's performance, and not just its disembodied aesthetics, I want to move toward screendance scholar Alanna Thain's notion of technological abstraction, not as an extractive, disembodying or augmentative force, but as "an in-between that is of the body itself, what [Brian] Massumi has called the 'incorporeal dimension of the body.'"[182] This incorporeal dimension is descriptive of the lingering or predictive qualities of dance, which vibrate at the perceived edges of dancing forms, thus extending the dance assemblage beyond the singular body. This phenomenon, of the incorporeal and yet multiply-bodied dance, can be drawn out or revealed/realized by film media.

Film as Multiplying Agent

The slippery aura of enchantment that Fuller's Serpentine bestowed upon her audiences is evident in the accounts of many viewers, journalists and poets who attempted to write about

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Fuller's show, but it seems that to see Fuller dance was to witness a unique and extraordinary event, one that was always in excess of any kind of archival impulse. Isadora Duncan's assessment, that Fuller's performance could not be "repeated or described," not only characterizes the Serpentine Dance as resistant to a historical repository, thereby enhancing the holy aura that seemed to hover about the performance, but also reads as predictive, given the constant repetition of the Serpentine dance by other bodies, both on stage and on film, for Edison and the Lumiere Brothers several years later. It is not surprising that this particular choreography would be so popular for early pioneers of film, given that there was something uniquely *filmic* about the Serpentine Dance. Dancing just prior to the birth of cinema, Fuller's silk costume acted like a screen that caught projected light and re-doubled the spectacle of her dancing body.[183]

Jody Sperling—dance historian, dancer, and renowned re-constructor of Fuller's choreography—notes the specific quality of Fuller's stage dance which made her like a precursor to the cinematic screen: rather than using shin lights, which spill past the dancer's body to illuminate the whole stage, Fuller used a series of follow spot lights, each operated by a human technician, who would "follow" her body with the light, ensuring it stayed within the parameters of her silk costume. In this way, the "screen" of her body contained the light, lit-up against a black background. Sperling also notes that Fuller was one of the first dancers to turn off the lights on the audience during the performance, in a prediction of cinema, directing their collective vision at her own body/screen. Fuller travelled with a crew of technicians who "danced" with her as they operated the lights. Similarly, renowned film theorist Tom Gunning announced in a conference presentation in 2000 that Loïe Fuller "invented the cinema." Felicia McCarren agrees that "the smooth transition between movements" of Fuller's dance presented "motion rather than pose" and therefore introduced the fluid seriality, or the "appearance of uninterrupted motion […] that early cinema addressed."[184] However, it is unclear whether Fuller herself was ever actually captured on film performing the dance.[185] She was famously wary of the camera's intervention into the ephemerality of live dance performance, remarking in her memoir, "[s]o unliving a thing is [dance] that it exists only in itself and can no more be copied than wind and storm are copied in the camera."[186] Nevertheless, the Serpentine Dance *was* filmed, and many of these films exist on the Internet today.

While a few of them can be found through the Library of Congress and several other archives, the most abundant repository for them is YouTube. Given Fuller's anxieties about

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choreographic reproduction and loss of ownership (as illustrated through her patents and lawsuits), it seems a cruel irony that the Serpentine videos should end up on a networked digital media platform like YouTube, where content is uploaded and circulated endlessly and without official verification. Yet, Fuller is the name most commonly associated with the dance, regardless of the fact that none of the dancers in the videos are her. For example, the search term "Loïe Fuller Serpentine Dance" entered into YouTube brings up a number of different videos, all of which credit Fuller as performer, and none of which actually feature Fuller herself (**see Figures 18 and 19**). Thomas Edison's 1897 un-tinted film version of the Serpentine Dance (viewable on the Library of Congress) is the recording that is most often credited with Fuller's name on YouTube, but in fact the film features dancer Crissie Sheridan, who quite resembles Fuller in her strong stature, stern face and grounded gestures, as well as her manipulation of the silks to fully obscure her body. Other search results include Edison's 1895 "Annabelle Serpentine Dance," featuring Annabelle Whitford-Moore and "Annabelle Dances and Dances" featuring both Annabelle and Sheridan. Anabelle's style of dance is more airy and sprite-like than Sheridan's, and the rods she uses to propel her silk veil are much shorter. By moving these instruments in an S-shape under the veil, however, she achieves an approximation of the Serpentine dance that Fuller and Sheridan perform. In these videos her body is clearly visible, her legs extending below the costume and her bare arms reaching out to grasp the rods. Fuller, by comparison, rarely revealed her limbs or body from beneath her costume. Costumed in a corseted burlesque dress with fairy wings and a headdress, Annabelle smiles coyly as she performs, engaging with the camera. Alice Guy's version of the Serpentine Dance, (1902) features dancer Lina Esbrard, who is taller than Sheridan, and less slender than Anabelle. She also smiles at the camera. Like Sheridan, she reveals more of her legs as she twirls and appears to be wearing pointe shoes, although she never rises to her toes. She ends her dance by separating herself from the Serpentine "persona," dropping her rods and costume, and taking a bow, blowing kisses to the camera. In another video directed by Alice Guy-Blaché, a dancer named Mme. Bob Walter performs the Serpentine with recognizable technical skills; her *relevés, tendus* and back arches clearly visible from behind the swirling fabric.

It is common, in viewing these videos, to catch glimpses of an ankle, a thigh, or the dancer's smiling face. This visibility of the body contrasts with written accounts of Fuller's performance, where her "hidden body," as described by Felicia McCarren for example, is

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completely eclipsed by her costume, "giving itself over to the representation of something beyond it."[187] Many of the Serpentine films are hand-tinted, a common practice in the silent film era to simulate the experience of watching the dancers move through beams of coloured lights on stage and again a kind of mechanical reproduction or an attempt to copy an effect that gives way to innovation. The first hand-tinted films were dance films[188] and Edison's *Annabelle Serpentine Dance* is credited as the first hand-tinted movie.[189] I find it interesting, given that the early Serpentine films fall into Tom Gunning's "cinema of attractions," that YouTube has also been qualified as a repository of the same. Teresa Rizzo writes that, like Gunning's cinema of attractions, a "large amount of material found on YouTube is not about telling stories or developing narratives" and are "decontextualised and recontextualised by users for the purpose of attraction," soliciting "our attention through novelty and curiosity."[190] Some of the uploads have been overlaid with contemporary music, like this one, which features a song by the Icelandic band Sigur Ros as soundtrack, and also erroneously lists the dancer as Loïe Fuller. This Serpentine film from Pathé is directed by Spanish cinematographer Segundo de Chomon and released in 1902. The dancer performs on a stage with a hand-drawn set behind her and has the steely facial expression Fuller was known for. The video is again hand-tinted, and the dancer is in pointe shoes. The use of a fade out gives the appearance that the dancer is evaporating off the screen. The IMDB entry for the film claims that the dancer is Loïe Fuller, and her name appears in the opening credits, but from my research it is unclear whether the dancer is actually her.

The names of the Serpentine dancers are not always appended to the videos posted on YouTube; sometimes they are buried within the credits of the video, other times they are not credited at all, speaking to a general erasure of not only the labour of dancers, but women's labour more generally. Wendy Haslem expands on this type of historical erasure, noting that the Edison film "Annabelle Dances and Dances (1894-97), which features several other unnamed dancers in addition to Annabelle Whitford Moore, and was hand-tinted by the "unnamed wife of an Edison employee" illustrates the "larger agenda of history to gloss over the impact of individual women."[191] In contrast with the often unacknowledged identities of these dancers however, Loïe Fuller's name appears in almost all search results for the Serpentine Dance on YouTube, if not in the video description, then in the comments beneath the video itself. The comments underneath these videos run the gamut from wonder (*Nono le vieux crabe* writes, "She was an extraordinary artist!") to critique of the dancer's appearance (*ytcarol*: "her little face is all

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grimace and frown—how lovely would a smile be…"), but the most common occurrence in the comments section is a dispute about who the dancer in these videos actually is. For example, the comments under this video (**Fig. 18**) titled "Loïe Fuller (1905) [silent short film]", posted on December 27, 2014 by YouTube user *Social Deception*, and boasting almost 240,000 views read as such:

> *Catherine Lowther*: "This is not Loïe Fuller. There are no extant films of her dancing. The Lumière Brothers hired someone else, now unknown, to perform the dance: she seems to ahve [sic] been a thorn in Fuller's side thereafter."
>
> *Mike Jarvis*: "MOMA links to this and says it is her, is there definite evidence either way?"
>
> *Leslie Stevens*: "I believe she was never filmed. This is just a follower copycat."[192]

I cite these comments to illustrate the slippery nature of Fuller's persona that also occurs in non-academic discourse today. Rather than offer us verified, peer-reviewed information, these comments, written casually and by individuals who do not announce themselves as historians or dance scholars, speak to a discourse surrounding the Serpentine Dance that is exterior to the institutions of recognized history-making and which also highlights the dance's non-linear, posthuman quality. These commenters, who enact a conversation that straddles material-digital space and time (some comments were left years apart), are active agents in constructing Fuller's mythology. The uncertainty (and interactivity) in the comments also demonstrates a similarity in the reception of the Serpentine at the turn of the century and today: the Serpentine has always been posthuman insofar as it has always shocked and mystified the viewer, whether viewed on stage, in the original filmic form, or on one's own laptop screen, using YouTube. Early cinema—like YouTube—fostered a participatory, ritualistic culture, demonstrating Serpentine as a posthuman text that stretches across my historical continuum, from early modernism to advanced capitalism.

"Falling into Lostness": YouTube as "Probability Archive"

The use of YouTube as a research depository or even archive is a relatively new academic practice, with few "rules" where methodology is concerned. Nevertheless, the popular video sharing site is also a rich depository of cultural documents, affects and discourses. Burgess et al. argue that because YouTube is "a spearhead of participatory culture" it allows us "not only

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to hear the privileged voices of industry or of the government, or the expert's or professional's view or opinion" but also, "entirely new constellations are possible."[193] This is important because, as Historian Michel-Rolph Trouillot writes, "We cannot exclude in advance any of the actors who participate in the production of history or any of the sites where that production may occur."[194] YouTube is certainly one such actor in that it offers a novel lens through which to view an assemblage like the *Serpentine Dance,* highlighting the nuanced discourses of origins and ownership that attach themselves to the dance, producing new historical narratives in the process. Cultural studies scholar John Hartley describes YouTube as a "probability archive" wherein the "status or even existence of individual objects is uncertain. They may be real or unreal, true or false, fact or fiction, original or copy."[195] Because the "*productivity"* of YouTube as archive is not regulated or managed, "knowledge is uploaded, archived, organized, debated, and deleted by myriad users, not by minority expertise."[196] He writes:

> You never know what you'll find or not find, and the archive changes constantly. A probability archive is random, complex, uncertain, indeterminate, and evolving as to its contents at any given moment. But it contains *much* more information than a regular archive can manage.[197]

The relationship between dance and the archive has always been fraught. Screendance scholar Douglas Rosenberg suggests, as many others have, that dance uses film and photography "as a hedge against cultural erasure and the vagaries of memory," but the unreliable archive of YouTube does not work to produce truth or historical fact so much as it just *works to produce,* making productivity an end goal in itself. In other words, it does not really matter whether the dancer in the Serpentine videos actually *is* Loïe Fuller, because in fact the repetitive attribution of her name to the dance, even in disputes happening in the comments section, re-inscribe her in the digital archive—unreliable or not—as the *original author* of the dance.

Dana Mills writes about the Serpentine Dance as an "inscription," attributing Loïe Fuller with a sense of creative genius and influence while also appealing to the indexical quality of the written word: "…Fuller wrote her message on the bodies of her spectators and fellow dancers; even if she had not copyrighted her movements, her dance would never be lost, as it opened up an endless series of responses."[198] She sees Fuller as the starting point for an infinite chain of dancers in her image. Following Mallarme's description of Fuller's dance as a "kind of corporeal writing," Mills understands her "inscription" as a "series of acts of writing by one moving body

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on another that puts into motion an endless conversation of interventions stretching infinitely into the future."[199] Mills' language here alerts me to the importance of distinguishing between a linear progression (or lineage) already evoked by the act of writing, and the haphazard web of Fuller's influence. The videos on YouTube are not linear. They show up in my feed without a traditional historical sequencing, and are prompted to play algorithmically, based on views. "Over four hundred hours of video content are uploaded to YouTube every minute," writes Arnesh Koul. "YouTube analyzes viewer behavior on videos watched, click through rates, average time spent, engagement – likes, dislikes, comments – and explicit feedback submissions among hundreds of data points."[200] YouTube's algorithmic behaviour is well-suited as a viewing platform for the Serpentine dance, which seems to be powered by a more-than-human drive, as if the endless motion of the silks transfers to the auto-play setting on YouTube, prompting Crissie Sheridan's body to blend with Annabelle's and Lina Esbrard's and the many other dancers who twirl across the screen of my laptop. On the one hand, this phenomenon illustrates the common erasure of actual dancing bodies throughout history but on the other, it reveals the posthuman quality of dance, whereby gesture is always in excess of any one body, initiating collectivity while negating ownership.

Content and form are here mutually influential in that the circulation of the Serpentine Dance on YouTube, an unreliable archive which is constantly in flux, matches the posthuman aesthetics of the dance, which presents an "unreliable body" in nonstop movement. The experience of watching the Serpentine Dance, like its muddied origin story, is resistant to notions of progress or linearity, even historicity. Unlike narrative ballet, which relies upon the symbolic movement from past to future, or traditional modern dance, which calls upon a series of gestures that begin and end, the perpetual motion of the Serpentine embodies the shock of modernity *and* the immersive experience of the digital-era present. How fitting that a dance emblematic of the birth of cinema (an event crucial to the modern age), should end up circulating in the unstable archive of YouTube. This algorithmic chain of anachronistic videos is a good home for the Serpentine Dance because of the film's uncertain author-function but also because, long out of copyright, the film can also be monetized and exploited with little fear of reprisal.

Posthuman Resistance to Singularity

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Rosi Braidotti's definition of posthuman subjectivity, which is "not restricted to bound individuals, but is rather a co-operative […] effort that takes place transversally," can apply not only to the practice of dance, where gesture flows between networks of bodies, complicating the notion of the human subject as a bound entity, but to Fuller's Serpentine Dance in particular.[201] The virality of the Serpentine Dance exhibits a posthuman agency of its own, travelling between dancing bodies in a kind of contagion, evading ownership and eclipsing any origin that Fuller attempted to claim (both via her patents and in her 1908 autobiography). In examining the repository of "Serpentine Dance" videos posted to YouTube today—many of which mistakenly list Fuller as performer—I argue that the posthuman quality of Fuller's dance is precisely that it was *both hers and not hers*, bringing multiple bodies (human and non-) into relation across time and space.

Whereas the *singular* body of the dancer as a mimetic tool used to extract the power of other forms returns us to the idea of the sovereign self at the helm of an instrumentalized corporeality, where the multiple other "bodies" evoked by the dance are subordinated to the will and power of the singular body that dances, Posthumanism gives us a vocabulary for what dance—perhaps more than any other art form—has already shown us: that we are never singular beings with complete control over our bodies and surroundings. Perhaps not so strangely, it was precisely Fuller's quest for control over the Serpentine choreography that seems to have propelled the dance onto other bodies across wide swaths of time and space. It seems fitting that the multiple body of the Serpentine Dance should manifest, not just in the live performances by Fuller's imitators during her years touring New York and Paris, but also today, on the screens of our laptops and smart phones. The perpetual motion of the Serpentine embodies the shock of modernity *and* the immersive experience of the digital-era present. If modernism, famously, was an "unfinished project" (Habermas), then posthuman dance is powerful because it can be seen as a signpost to the unspecified moment in the future when the modern might finally happen.

Even the "imitators" who copy Fuller's dance reinforce the Benjaminian aura of Fuller's original invention, in that mimesis requires an original to copy. Yet the "mechanical" transmission of the Serpentine Dance by camera, where the multiple Serpentine films that end up in the YouTube archive are mis-attributed to Fuller and therefore prompt viewers to mistake other dancers for Fuller herself presents a different process of reproduction. The Serpentine dancers are not identical or standardized like commodities on an assembly line, but they have a

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visible sameness that makes telling them apart difficult: the multiple Serpentine Dancers presents plurality not as a string of exact copies but as a conglomerate of bodies that approximate sameness. The measures Fuller took to prevent others from doing her dance, such as claiming authorship in her autobiography, and publishing patents of the set designs and costumes speak once again to her anxiety over ownership. As California Riverside dance professor Anthea Kraut writes, "Fuller's image…was thus an embodied one but also capable of being dis-embodied (or re-embodied by another)" and "this duality raised the stakes and amplified the complexities of trying to control the traffic in her image, and thus protect her subject status, by controlling the circulation of her choreography."[202] Kraut has written at length about dance and copyright, with a specific focus on Fuller's 1892 lawsuit against Minnie Renwood Bemis, another Serpentine dancer who she believed was profiting from her dance.

With her lawsuit, Kraut explains, Fuller appealed to "the Romantic notion of originary authorship [which] constructs the artist as a singular visionary whose work is by definition new and unique rather than imitative or derivative."[203] Given the way that Fuller's name persistently attaches itself even to videos of the Serpentine dance which do not feature her in any way, it seems she still does achieve credit for "originary authorship," regardless of who is dancing the dance. Yet, the multiplying effect of the Serpentine's reproduction also points to a core of uncertainty or confusion (or transformative potential) that lies at the heart of the dance. In *Valuing Dance: Commodities and Gifts in Motion*, Susan Leigh Foster explains the relationship between dance and commodification as such:

> "For dance movement to be salable, it must be given firmer borders and boundaries, and clearer shapes and patterning. The ephemeral messiness of movement must be sorted out and regularized, replacing its indecipherable blurriness, uncontainable wiggling, endless flow, or unpredictably sequenced bursts of action with individuated moves, steps, and sequences that are precisely shaped and metrically timed. This augmentation in movement's concreteness makes it more identifiable and consequently repeatable."[204]

Foster's definition of salable movement is at odds with the Serpentine Dance, which was defined by its "indecipherable blurriness" and "endless flow" and nonetheless was highly "repeatable," and is therefore haunted by a discourse of stolen choreography.

Fuller's patents (**Figures 13, 14 and 15**) display the technical wizardry necessary to produce such an unstable and imaginative image. They also set up technique as the ground of ethereality in dance, and therefore, technique as a *technology* for imagination/freedom, in the

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sense that freedom is something that can be artificially produced by rigid discipline. In a sense, it is the technique/technology of the Serpentine Dance that propagates itself across bodies, and that technique is visible not in the obscured and abstracted dancer's body, but in the materials manipulated by that (highly disciplined) body, as well as in the space traversed, the duration of the performance and, perhaps most distinctly, in the affect it produces in the audience. While dance technique can be understood as the repetitive standardization of the body, there is also something about the Serpentine dance that resists such standardization, as is obvious from the different styles or approaches to the dance in the videos drawn together under the umbrella of Serpentine, preventing the dance from being categorized as commodity, which, in the words of Mark Seltzer, "stands still," "waiting to be sold."[205] Yet Fuller did profit off of the Serpentine during her time as a performer, and even if she is disputed as its creator, her name continues to accrue what Pierre Bourdieu calls "institutionalized cultural capital," in which her esteem increases with every academic citation or YouTube comment that links her to the dance.

Tracing Contagion

Rosi Braidotti writes that the "posthuman knowing subject" must "be understood as a relational embodied and embedded, affective and accountable entity and not only as a transcendental consciousness."[206] Considering Fuller in terms of her "multiple body" is an attempt to illustrate a posthuman subject that is always already multiple and is constructed through its relation to others. The contagion of the Serpentine can be seen as existing on a continuum with viral content under advanced capitalism. Like today's "emotes" from *Fortnite*, dance sequences which arepurchased to be performed by video game avatars, and which gather popularity by a logic of virality—the more they are shared and transferred between screens, performed in public and captured and shared again on screen, the more they come to matter—The Serpentine Dance presents this relational multiplicity as a kind of contagion. The word "contagion," which derives from the Latin *con,* meaning "together", and *tangere*, meaning "to touch," helps contextualize the virality of the Serpentine Dance, in which many dancers whose bodies likely never actually met are joined through a collectivity of gesture.[207] The fact that these dancers are further linked on the platform of YouTube, a site where videos often "go viral," speaks to what media theorist Jussi Parikka defines as the "new logics of viral media" in a recent post for *Boundary 2*. As he writes: "To think […] contagions through a media theory frame is,

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for a number of reasons, a complex task. We are, after all, dealing with an ecology of technological, biological, and affective realities moving about in strange feedback loops. Contagious agents are not simply biological; their agency always arrives in plurality."[208]

Much of the scholarship on Fuller frames the messy trajectory of her contribution through the figure of the trace. In her book on Fuller, titled *Traces of Light*, Anne Cooper Albright frames dance as a practice of "tracing" histories: an embodied experience of all the "material artifacts that constitute the stuff of historical inquiry, the bits and pieces of a life that scholars follow, gather up and survey."[209] Albright inhabits Fuller's choreography to better understand the traces – "the actual imprint of a figure that has passed, the footprint, mark or impression of a person or event"—of her work.[210] Albright's project is a postmodern one, but there are many modernist examples of this obsession with tracing human movement. Muybridge and Marey's chronophotographic motion studies at the turn of the century and Marcel Duchamp's cinematic painting, "Nude Descending a Staircase" (1912) are good examples. The bodily residue of the dancer, extracted and animated through the technique of rotoscoping in early Disney films is another example, and one that paves the way for today's experiments with motion capture technologies and computer generated animations—and I explore this in greater detail in chapter four. Despite Albright's endeavour, to recover something of Fuller's original presence in the face of her double erasure (the ephemerality of live dance compounded by Fuller's refusal to be filmed), the impossibility of this quest points as again to posthumanism, by way of Derrida for whom "There are only, everywhere, differences and traces of traces."[211] Although the trace may seem to implicate the practice of forensics, evoking the scrutinized body that posthumanism stands against, the deconstructive approach to the trace underscores that the opposite is true: the trace is "not reducible to the sign…[and cannot] be turned back into one;" it is "always the trace of the trace and is never purely originary."[212]

I, too, found myself playing detective while viewing Serpentine videos on YouTube, pausing playback on those swirling dancers in a moment where their faces were visible and comparing those stilled faces to photographs of Fuller, attempting to trace and identify the bodies on screen. However, over and over again I have found it impossible to perfectly trace the Serpentine back to any one dancer, including Fuller as proclaimed inventor. More work undoubtedly could be done in the archives to ascertain that the origin of the choreography is indeed Fuller herself, but that quest for truth, the tracing of clues back to the "true" source, is

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counter-productive to a posthuman theory of dance. Michel Foucault, whose work has been foundational for posthuman thought, argues that what drives our constant search for beginnings as a "principle of coherence and the outline of a future unity" is our fidelity to concepts of evolutionary progress.[213] in *Archaeology of Knowledge* he writes that these concepts compel our attempts to "master time through a perpetually reversible relation between an origin" and what we see as the "order of discourse": "Beyond any apparent beginning, there is always a secret origin—so secret and so fundamental that it can never be quite grasped in itself. Thus one is led inevitably, through the naivety of chronologies, towards an ever-receding point that is never itself present in any history; this point is merely its own void; and from that point all beginnings can never be more than recommencements or occultation…."[214] In the case of the Serpentine, this receding origin is secret not only because it's impossible (thus speaking to the dance as posthuman) but because of the intersecting factors of race, labour, white privilege and dance as transferrable spectacle. Even as the Serpentine Dance (and all dance) deflects ownership, making it a useful figuration for posthuman thought, that same refusal to be attributed to any one source or body also risks facilitating acts of appropriation.

For example, Anthea Kraut points out that for all of Fuller's anxieties about being recognized as the *true* creator of the dance, the origins of the Serpentine likely stretch back further, to vaudeville skirt dancing, in which the dancer's legs were revealed seductively with every turn of the fabric, which in turn evolves out of "Nautch dancing, the generic, colonialist term for Indian dance in the nineteenth and twentieth centuries."[215] In a chapter of her autobiography titled "How I Invented the Serpentine Dance," Fuller explains that her costume was a "Hindu skirt…sent [to her] by two young officers" who she describes as "essentially and purely English."[216] Even while she mentions the "Hindu skirt"—the material that literally *dances* in her stage show—Fuller fails to recognize the Hindu Nautch dancers as an influence on the Serpentine, instead naming the colonial British officers as stewards of the fabric and active contributors to her invention. Fuller's narrative, bolstered by humanist values of divine inspiration and individual creation, reflects Kraut's observation that "the history of dance in the United States is also the history of white "borrowing" from racially subjugated communities, almost always without credit or compensation."[217] Fuller's refusal to acknowledge Nautch dancing as influence is unsurprising whether we consider the Serpentine to be a key modernist text or a prime example of posthuman dance. Across the historical continuum, from modernism

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to advanced capitalism, there is a common erasure of racialized bodies and labour that speaks to both modernist aesthetics of abstraction and disembodiment and to the uncomfortable silence around race in much of critical posthumanism, as remarked upon by scholars like Zakiyyah Iman Jackson and Jinthana Haritaworn.[218] Fuller's Serpentine Dance is my inaugural example of posthuman dance because it illustrates these tensions, erasures and complexities.

The Viral Echo

Fuller is but one body of the Serpentine's multiple bodies, each of which are in complex relation. The Serpentine presents the act of copying, not just as reproduction of a set of cultural techniques, but as an unintentional symptom of the relational aura of the work, a relational aura that might be qualified through the image of the echo. For an echo to be produced, sound ricochets off surfaces and is redoubled, to be sensed again and again. Animals such as bats, whales and dolphins use echolocation to sense the world around them in great detail. In an echo, sound waves actually take the shape of the objects they bounce off of, meaning that the echo is simultaneously a machine of mimesis and transformation. In her memoir, Fuller attempts to trace each "echo" of the Serpentine back to herself as inventor, but the dance slips away from her. In a chapter titled "The Value of a Name," Fuller writes of the uncanny experience of watching one of her imitator's dance the Serpentine, an experience that allowed her to "see with [her] own eyes 'la Loïe Fuller' dance before [her] face."[219] This image, of Fuller facing "Fuller"—twin dancers doubled by the repetition of technique—demonstrates the ability of the dance to multiply the subject in uncanny fashion and produce affect. In an experience that no doubt registered in Fuller's body also calls up what John Martin calls "metakinesis," or the transference of energy between dancer and spectator, where, "because of the inherent contagion of bodily movement," the "onlooker [feels] sympathetically in his own musculature."[220] Like metakinesis in dance, an echo is a process of relation, putting bodies (human and non-) into mutually affecting networks. The Serpentine Dance is therefore not only posthuman because it transforms the dancer's body with motion, fabric and electricity, and not just because it predicted cinema and the proliferating quality of filmic media. In its symbolic rejection of stasis, the Serpentine also resists commodification or ownership, thus contesting processes of capitalism that seek to define it. In its embrace of fluid motion without beginning or end, the Serpentine moves against notions of

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linear history and the inscriptive tools of power (writing, choreography) that work to uphold teleological views.

Yet this same boundlessness, this aura that is distinctly anti-auratic and therefore anti-indexical, also performs a kind of erasure of the distinct bodies, in particular female bodies, that have inhabited the dance over time. In both academic and popular writing, the Serpentine Dance has come to stand for the subject-less abstract of Symbolism, the depersonalized visions of Futurism, and even the dispersed cyborg of posthumanism, making it particularly amenable to a fantasy of disembodiment. Where that fantasy is politicized—for example, the idea that Fuller, in disappearing her body within the silks, is actively participating in a feminist protest against the objectified female body—is also where it risks offering up a vision of the future that is post-body, and therefore post-gender and -race. The Serpentine Dance is posthuman because it calls the sovereign self, embodied in the individual dancer, into question, offering instead a many-bodied dancer, a cyborg dance in which the distribution of movement (and therefore agency) across material and technological actors, mirrors the dispersal of truth (or historical fact) across written memoirs, academic articles and YouTube comments sections. The Serpentine Dance, like a sonic echo, is both *of* the material bodies that work and move to produce it, and an invisible signal, felt in the bodies where it resonates.

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CHAPTER 2
Dance as a Cultural Technique of the Soul: from Automation to Animation

The "line of gravity" that the marionette follows is "nothing other than the path of the dancer's soul" – Heinrich von Kleist (1810)[221]

"That feeling when a robot dances better than you…" – YouTube commenter on a 2020 music video featuring CGI Influencer, Lil Miquela

Introduction: Engineering Life

My first chapter was an exploration of the copy and dance's complex relationship to ownership, authenticity and Benjaminian aura through Loïe Fuller's "Serpentine Dance," a posthuman assemblage of electricity, fabric and embodied labour. I now turn to another type of posthuman dancer: *the dancing machine*.[222] I have argued that Fuller's dance is posthuman in part because, despite the fact that under her swirl of fabric and lights there is a human body dancing, that body remains largely hidden. The dancing machine I describe in this chapter does the opposite: while it often approximates the appearance of a dancer with a human body, there is no actual *human* under the façade. The nonhuman components that comprise the dancing machine include gears, automated gesture sequences, computer-generated images, kinetic motion data, algorithmic sequences, and imagined narratives. In this chapter, I turn to four different examples of the dancing machine, spanning from the year 1816 to the present (2022). These four dancing machines, all of whom are feminine, come from fiction, film and animated computer-generated imagery (CGI) for screen-based social media. Just as Loïe Fuller is a posthuman subject, so too are these four dancing machines, even though their posthuman qualities are articulated differently. Each of my case studies in this chapter present the dancing subject as a figuration for exploring the capacity for non-human agency. Whereas Fuller's *human* agency was complicated by the non-human agents in her performances, the dancing machines I present in this chapter stir up an illusion of human agency with their moving, kinetic bodies, ultimately bypassing the presence of an actual human being in the production of life. Here, dance contributes to the material and fictional engineering of life across cultural texts spanning the years 1816 to 2022. Throughout these examples, the dancing *female* body plays an important structuring role in the historical narrative.

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An ongoing question in my theory of posthuman dance is how the dancer's "soul" is formulated not as a pre-existing essence that diminishes via replication, but rather as a quality that can itself be manufactured, simulated or engineered, *through the technique and technology of dance.* Fuller and the posthuman dancers of this chapter are linked through this concept of soul (a term which at first may seem deeply at odds with critical posthumanism). Symbolist poet Stéphane Mallarmé once described Fuller's performance as "the dizziness of soul made visible by an artifice," presenting the "Serpentine Dance" as the thing that reveals the *real* soul at the core of the dancer.[223] This is in keeping with the traditional view of dance as a channel to the inner feeling and personality of the subject. The dancing machine I am addressing in this chapter, however, does the opposite: it engineers the *appearance* of a soul through the dizziness of dance. In constructing the feeling of soul, the dancing machine thereby reveals the artificiality of all souls (and subjects, more generally), or the nature of the soul as something that is produced. It is important to note that my use of "soul" here, following Michel Foucault's use of the term, is secular and is articulated to *agency* rather than to Christian theological or other religious understandings of the word. Foucault writes that the "non-corporeal soul is not a substance; it is the element in which are articulated the effects of a certain type of power and the reference of a certain type of knowledge" that has been the foundation for both "scientific techniques and discourses and the moral claims of humanism."[224] If, according to Michel Foucault, the soul is "the effect and the instrument of a political anatomy" that is "born out of methods of […] supervision and constraint," dance can help us better understand the relationship between the concept of soul, the production of agency or liveness, and the maintenance of power via techniques of the body and more specifically dance as "cultural technique" (Siegert). This line of inquiry gives space for the crucial questions in a posthuman theory of dance: who owns the dance of the dancing body, and the soul-effects of that dance? How might dance (and especially dance technique and choreography) both challenge and complicate humanist values such as free will, individual agency and the valuation of certain bodies or subjects over others? Why should we care about the idea of soul today, especially in relation to dance?

Just as Fuller's Serpentine receded her human subjectivity into a swarm of vibrant movement, allowing her dancing to transpose the liveness produced by her hidden body onto the silk swathes of her costume and bringing an apparition of the nonhuman fabric to "life," dance ties the mechanical or nonhuman body to the concept of "liveliness." Dance instills the fabric

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with agency, in Bruno Latour's sense of agency as something that makes a difference, produces a transformation and leaves a trace.[225] We automatically associate agency with the human, so, in presenting as agency, the kinetic quality of dance transfigures the robotic or inhuman quality of the machine into something alive. Put another way, if a robot or automaton can master the technique of dance in a convincingly human way, it can more easily convince a viewer that it is human-like. This is partially due to a Western cultural and philosophical definition, stemming from Aristotle's *De Anima* (350 BCE), of the soul as both "the first actuality of a natural body which has life potentially" and as a kind of "strange, invisible 'air'" which "suffuse[s] everything with an enigmatic buoyancy," making "words and things move when they [are] not supposed to be swaying."[226] These early associations between kinesis, movement, or animation and *soul*—the Latin word for soul is *anima*—complement dance as both ephemeral, breeze-like movement that can inhabit bodies both human and non-, and as a recognized signifier for inner *human* expression. In this way, dance brings machines to life. I am proposing that a posthuman dance demonstrates how the dancer's "soul" is formulated not as a pre-existing essence that diminishes via replication, but rather as a quality that can itself be manufactured, simulated or engineered, *through the technique and technology of dance.*

Dance as Cultural Technique

Technique produces dancers as well as dance; it is "exterior" in the sense that it occurs on the level of regimes of power, rather than on the symbolic or semiotic level. Following Friedrich Kittler, the study of "cultural techniques" in German media studies (Siegert; Winthrop-Young; Vismann; Parikka) can help make sense of dance technique as something inscribed on and in dancers' bodies. The concept of cultural techniques (*Kulturtechniken*) comes out of domestic and agrarian practices of "cultivating the soil and settling the land" (as the Latin etymology of "culture"—*colere* and *cultura*—implies).[227] This approach takes seriously the "concrete practices and symbolic operations" of culture and, as such, "[aligns] cultural history and media history" through an "analytics of power," while also proposing a "crucial shift within posthumanistic media studies."[228] Cultural techniques are therefore an important intervention into posthumanism, and work especially well to theorize posthuman dance, helping to decenter the human subject or make visible the network of forces, operations, materialities and techniques that comprise dance, beyond the individual human body. Likewise, cultural techniques contradict

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the notion that "only the subject can carry out actions and rule over things."[229] Instead, as Cornelia Vismann writes, cultural techniques reveal that it is the "operation itself that produces the subject."[230]

If, as German cultural history professor Thomas Macho writes, "Cultural techniques—such as writing, reading, painting, counting, making music—are always older than the concepts that are generated from them," then what are the concepts and subsequent techniques that dance (as a very old cultural practice) generates?[231] One set of outputs are the many dance notation systems that have been devised to record dance, and which I analyze in my fourth chapter, including Beauchamp-Feuillet notation (1700), Labanotation (1928), Benesh Movement Notation (1956), and Sutton Dance Writing (1981), but these systems are often difficult for a layperson to read and interpret, and are meant more for the preservation and remounting of heritage dance works than for the active instrumentalization, creation or dissemination of dance as a cultural technique. As an ephemeral form, dance displays itself on the body and then disappears unless it is captured—by notation, by another body, or more likely, by the camera. Furthermore, dance is inextricable from the technique (the *pliés*, *pirouettes* and *grand battements*, for example) that dancers practice over and over in front of the mirror. Siegert argues that cultural techniques are the "exteriority [or] materiality of the signifier."[232] Dance offers a special case of this, because its "materialized signifier" is the body in motion. Because technique produces dancers as well as dance, it is exterior in the sense that it occurs on the level of regimes of power rather than on the semiotic level. In this way, the dancer's body is *both* expressive signifier (as it crumples tenderly to the floor, for example) and signified (body as legible object or *product*). To make this even more complex, the dancer's body is simultaneously signifier and signified in both a *symbolic* sense (as it crumples, the body is read as fragile, overcome by emotion, burdened and breaking down) and in the *material* sense of the cultural technique required to orchestrate such an action (the subtle bend of the knees, the engagement of the psoas muscle, the body's relaxation as it succumbs to its own weight…).

If a posthuman theory of dance is one that decenters ultimate agency from the human subject, dispersing it onto a web of actants, not least of all the body itself as an elastic materiality, the lens of cultural techniques shows that for dancing bodies, concepts like "subjective agency" and "training" are not at opposite ends of a spectrum but woven together. In this dissertation, I am attempting to articulate not only the various cultural techniques that stem

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from the practice of dance (notation systems, mo-cap data, dance on film, rotoscoping), but, especially in this chapter, I argue that *the idea or image of dance* is itself implemented as a cultural technique to animate mechanical beings, cartoons, or robots, so as to bring them to "life."

OLYMPIA (1816)

I will begin my overview of the dancing machine by focusing on one of the first literary depictions of a dancing automaton: Olympia. Olympia (sometimes spelled *Olimpia*) is a character from "*Der Sandmann*" ("The Sandman"), a short story by German Romantic author E.T.A. Hoffmann (1776-1822) published in 1816. "The Sandman" follows a man named Nathanael as he deals with childhood trauma around the nightmarish death of his father at the hands of an alchemist (known to young Nathanael as the "sandman" from the children's fable) who constructs false eyes out of glass. In the story, Nathanael meets a professor named Spalanzani who keeps his "daughter" Olympia shut away in a glass cabinet. This daughter is actually the creation of Spalanzani—a mechanical, wooden, glass-eyed doll who can sing, play instruments, dance and exclaim "Ah!" Nathanael, who spies on Olympia from across the street with a telescope, describes her as "a very tall and slender lady, extremely well-proportioned and most splendidly attired."[233] He says that she has an "angelic countenance" but an "unvarying gaze," remarking that there is "something fixed about her eyes as if, I might almost say, she had no power of sight."[234] At first, Nathanael recognizes her as somewhat mechanical, but this shifts when Spalanzani debuts his mechanical daughter at a ball hosted at his home, and Nathanael observes Olympia dancing, performing the harpsichord and singing for the guests. He notes that her gaze actually holds a lot of agency, and is thrilled to find that all of that agency is directed with desire towards him: "Ah! then he saw with what a longing glance she gazed towards him, and how every note of her song plainly sprang from that loving glance, whose fire penetrated his inmost soul."[235] It is really only once Olympia has been articulated to the performance assemblage of the harpsichord and the audience—as well as the desiring force of Nathanael's imagination—that she begins to seem full of agency; this reveals that agency is always a product of assembly or composition, rather than a quality innate to the individual (human or non-). Olympia also throws Nathanael's own (human) agency into question. When Nathanael invites

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her to dance, Olympia, who dances with a "peculiarly steady rhythm" causes Nathanael to view his own sense of time as "most defective."[236]

Hoffman's work has a close relationship with dance (or more specifically, mechanical dancers); "The Sandman" was later adapted into a ballet titled *Coppelius*, and he is also the author of *The Nutcracker and the Mouse King*, a novella about a dancing doll who comes to life, on which Tchaikovsky's ballet *The Nutcracker* is based. "The Sandman" illustrates the use of dance as a litmus test for whether an inanimate or mechanized body can perform the role of "human" in a convincing manner. Spalanzani hosts his ball expressly to debut his invention and have his guests marvel at his handiwork, but also to have them question whether Olympia is indeed a real, human, woman. Olympia's rigid, militant dancing, in which "every movement seems to depend on some wound-up clockwork," betrays her as potentially "spiritless."[237] This reveals the trepidatious line that classical dance technique straddles, between the complete synchronicity of the corps de ballet, which mechanizes the human but nonetheless evidences the impressive skill of the dancing body, and the more expressive dance gestures that articulate the dancer to a sense of individual agency. Nathanael's friends of course recognize Olympia's inhuman nature before he does. In a Pygmalion fantasy, Nathanael projects an image of an affectionate, human woman onto Olympia's cold, beautiful exterior, breathing life into her body: "He looked into her eyes, which beamed back full of love and desire, and at the same time it seemed as though her pulse began to beat and her life's blood to flow into her cold hand. And in the soul of Nathanael the joy of love rose still higher; he clasped the beautiful Olympia, and with her flew through the dance."[238] Here again, Olympia's agentic soul is the product of intersecting forces and fantasies, and the act of dancing plays a productive role.

Relatedly, Friedrich Kittler begins his book *Discourse Networks* by analyzing the sigh ("*ach*!") in German poetry. He writes: "If this is not the sigh of a nameless self—no self appears in the sentence—it is certainly not the sigh of any known author. What moves through the cadence of old German Knittel-verse is a pure soul" and is, Kittler argues, "pre-language."[239] Tying Olympia to the German poetic sigh ("oh!")—since the only word the automaton can utter is "Ah!"— Kittler writes that "Olympia is the soul that, instead of speaking, makes her lover speak and speak exactly that inner life. The promised beyond of language, also called love, ensures that Nathanael talks and talks until all the women "vanish from his memory" and only Woman remains. Her unique signifier brings about a complete individualization of speech. It

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does the impossible: not only to designate but also to signify an individual. And to make the impossible as true as it is reproducible, one had only to construct an automaton [who is also] Woman, a mechanical effect of discourse."[240] As a mechanical, soulless automaton, Olympia reveals the always-already posthuman notion of the soul. Her "Oh!/Ah!" (along with her dancing, which Kittler does not focus on), produces the appearance of soul where there is none. In this way, Soul, like Woman, becomes a "mechanical effect of discourse." Olympia's soul is extrapolated by Nathanael's *imagination*; her sigh, like her dancing, is productive of soul.

Hoffmann's tale is probably best-known as the subject of analysis for Sigmund Freud's widely-read essay, "The Uncanny" (1919). Few analyses of the story, Freud's included, pay much attention to Olympia's dancing. When Freud mentions Olympia, he focuses mainly on her eyes, which Coppola removes at the end of the story, but he refuses to see Olympia as the locus of the uncanny in the story; that place, he argues, belongs to the "figure of the Sand-Man, that is, to the idea of being robbed of one's eyes"—an idea he connects to the "fear of castration."[241] To me, however, Olympia is the most interesting thing about Hoffmann's story. I see her as an early example of the dancing machine. The word "automaton," which comes from the Greek term for "self-mover," can mean both a machine capable of independent motion and a person incapable of independent action or thought.[242] The conflict at the heart of this definition maps well onto binary tensions such as animacy/mimesis, freedom/control, order/chaos and slavery/revolt. Because she is a *dancing* automaton, Olympia embodies the role of dance—in which the body is both a "self-mover" and an entity mechanized through repetition—in relation to histories and theories of automation. In his study on the history of automata, Minsoo Kang writes:

> "Because an automaton is a humanmade object, as opposed to one found in nature, and one that mimics life, it suggests all kinds of essential and disturbing questions about what exactly a human being is […] Are we also mere machines consisting of matter functioning according to a preset program, or is there also a nonmechanical and nonmaterial aspect of us?"[243]

The automata of the 18th century were directly inspired by the mechanistic philosophies of the 17th and 18th centuries. In Descartes' 1662 *Treatise on Man*, he describes the functions of the organs of the human body with no reference to an immaterial soul. Descartes compares the organs and their drives to the gears and parts that brought automata to life—the human body is thoroughly connected to the 'great machine' governing the world.[244] Furthermore, Descartes' separation between the mechanistic body and the non-material soul undermined the separation

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between mechanical and biological bodies, making it possible for a non-biological, non-human body to be (technically) in possession of a soul.

Popular automata created during the Enlightenment include the harpsichord player and the dulcimer player (made between 1730 and 1810), both of whom could play their musical instruments with realistic motions of arms, hands and fingers, and even breathe, blink and bow their heads. Clockwork mechanisms hidden within their bodies enabled them to move this way.[245] During this time, it was popular to attend automata exhibitions, which showcased mechanical self-movers such as those made by inventor Jacques de Vaucanson. Onlookers scrutinized these automata, marveling at their ability to move unmanipulated, as if alive. Now we view Enlightenment automata as "forerunners and figureheads of modern, industrial machine age, an age in which the economic, social, cultural and aesthetic constitution of human changed fundamentally and supposedly became 'mechanized.'"[246] There are limited instances of *dancing* automata from this time (likely because it was quite difficult to build a mechanical dancer with smooth, life-like gestures, as we see in Hoffmann's fictionalized account), but most automata did have some sort of performative aspect, and it is not a stretch to imagine that a dancing automaton would be a fascinating specimen in such a display.

In a related anecdote, the so-called "father of the computer," English mathematician and inventor Charles Babbage (1791-1891), recalls viewing automata (in an exhibition designed by John Joseph Merlin) at a young age. Kang explains that Babbage was fascinated in particular by a twelve-inch female figure: a silver dancer with a moving bird perched on her hand. When the dancer became available for purchase at an auction, Babbage acquired it as one of two objects he would pass around to impress his guests at dinner parties, the other being his calculator prototype. Kang writes that Babbage's guests were more drawn to the dancing woman with "her life-imitating power…[and] her mechanical allure" than they were to the "ancestor of the modern computer" that was Babbage's calculator.[247] Of course, it is unsurprising that a dancer would be more interesting to gaze upon than a mechanical math device. Dance is about the spectacle of the body in motion—dance not only asks for an audience, but it reminds us of the blurred line between life and automatization. Like Babbage's dancing machine, the examples I give in this chapter go beyond dance as an attraction to the notion of dance as having a particular kind of purpose: to prove something is convincingly *alive*.

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MARIA (1927)

From the public audiences at Renaissance automata fairs, to the captive audience in a darkened movie theatre, the spectacle of the dancing machine always draws the gaze. If Olympia is the one of the first literary dancing machines, Maria, the "maschinenmensch" from Fritz Lang's 1927 film *Metropolis,* is one of the first cinematic dancing machines (**Figure 20**). *Metropolis* is a German expressionist sci-fi film is about what happens when, in the vain attempt to engineer life, technology goes rogue and turns on its maker. Here, the unruly technology is a feminized robot crafted in the likeness of a woman named Maria (played by Brigitte Helm). Human Maria poses a threat to the city of Metropolis because she is attempting to bring the workers, who toil in the underbelly of the futuristic city for the benefit of the rich, to class consciousness. Because her wish to unite the working and ruling classes poses a threat to the smooth operation of the city, the city's ruler, Joh Frederson, collaborates with an inventor named Rotwang to create a robot identical in appearance to Maria who will ruin her reputation with the workers. Indeed, "false Maria" wreaks havoc on the city by convincing the workers to revolt. It is paradoxical that this robot, "false Maria" should be the one to teach the dehumanized workers, who are mere cogs in the wheel of Metropolis, to be more human. And it is precisely the revolutionary anarchy that results from this humanizing process that leads to the inevitable destruction of "false Maria," the agent of change. Maria's punishment is a public death: she is burned like a witch at the stake, the flames exposing her "true" metallic interior, proving her cold and soulless by extension.

Early in the film, in an experiment meant to showcase the *maschinenmensch*'s life-like qualities, robot Maria performs a seductive dance for an all-male audience. Typical to 1920s modern dance, her choreography comprises a series of static poses, displayed in profile, and various angular gestures. She moves between machinic rib isolations and minimal yet sensual hip circles. She begins her dance shrouded in a transparent cape, lit from behind to display her slight figure, and slowly strips down to a fringed skirt and nipple tassels (**Figure 21**). Scenes like this were not unusual to American films pre-1929 (the "Hays Code" or Motion Picture Production Code, which censored nudity and overt references to sex began in the period just following).[248] This scene, which illustrates the expressionist aesthetics of Lang's film and also conveys Maria's robotic yet seductive nature, is spliced together with a montage of the audience in which the men's hungry eyes apprehend the dance with lust, thereby constituting the male gaze as itself a

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kind of machinic presence, both actively manipulating and *manipulated by* the mechanics of the dancer's body.

This scene demonstrates the key role of the audience in turning the mechanical dancer human. In Hoffmann's story, Olympia's debut happens at Spalanzani's ball—a space of performativity and display—in front of the onlookers, many of whom are watching her dance in order to actively assess whether she is a real, human woman. In *Metropolis*, false-Maria dances for the men who watch her on stage, and the audience assemblage is extended also, through the camera, to all future cinema audiences and solo-laptop audiences like myself. Lang's film seems to be aware of the posthuman (or at least organic-machinic) assemblage of its audience, as articulated through the shots of collaged eyeballs, in which the men's ravenous eyes appear to be cut from their faces, flipped, turned and kaleidoscoped into a wall-of-gaze in which there is no *individual* watcher, nor are there distinct, multiple bodies (**Figure 22**). This is a kind of desiring machine, assembled from individual eyes—the part of the assemblage that activates the transfiguration of robot into dancing-body-with-soul. The soul here is articulated as something constituted by collective desire, as well as something which desires. These shots of the many eyes emerge out of intensifying close-ups on the men's faces, twisted in pain or pleasure, or both, linking the eye/gaze to the desiring mind, and the expression of emotions as wrought on the surface of the face (**Figure 23**). In Hoffmann's story and Lang's film, the imagination (of the fictional audiences and of the external reader and viewer) does real work, mapping a soul over the gears and cogs of the dancing machine. But it is not only the imagination that does the work here. There is also the material, embodied work of the dancer.

> In his seminal analysis of Lang's film, Andreas Huyssen writes:
> …the male eye, which is always simultaneously the mechanical eye of the camera, constructs its female object as a technological artifact (i.e., as a robot) and then makes it come to life through multiple instances of male vision inscribed into the narrative. This gaze is an ambiguous mesh of desires: desire to control, desire to rape, and ultimately desire to kill, which finds *its* gratification in the burning of the robot.[249]

The dance scene from *Metropolis* sets up the primacy of vision, fortified by the new medium of film, as an instrument of power and control. As I have noted, the film is edited to draw this comparison, through a collage of eyes divorced from their bodies. Walter Benjamin has written that the "social function of film is to establish equilibrium between human beings and the apparatus,"[250] a statement that reinforces *Metropolis's* ocularcentric cyborgification of the film

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viewer. Contrary to Huyssen's reading however, which asserts the ultimate power of the male gaze (here equated with the camera) as the force that both animates and destroys Maria, I argue that the scene first and foremost reveals the power of *dance's* enlivening magnetic agency. Dance is the element that brings life to the *maschinenmensch* and the audience's attention is captivated by that proof of life, even if (and perhaps because) they do not quite believe it. The technique of dance, which produces both subject and object here, is a crucial component of dance's enlivening element. Ben Spatz's work on technique, for example, positions it as a "keyword for critical thought in the current era," while also maintaining that "all practices, including the most mundane, exceed the technique that structures them."[251] Dance seems like a special example here in that the technique of it sometimes literally produces a feeling of excess or an uncontainable quality—and this is part of what humanizes and spectacularizes Maria in this scene, granting her dance assemblage power and control over its audience.

Here, it is Maria's dancing that controls the gaze rather than the gaze that controls Maria's dancing body. It is not the male gaze that makes Maria "come to life;" it is her dancing. In turn, Maria's dance hypnotizes the men in the audience. They seem to lose control of themselves as they become more and more frenzied and less like powerful wielders of the gaze. Her dancing compels them, perhaps even against their will, to watch lecherously as she gyrates on stage. Maria's own gaze is fierce and the camera captures its intensity of focus in medium shots of her as she dances. The stylized orbs that decorate the backdrop behind Maria look a bit like giant eyeballs themselves, further extending the machinic gaze assemblage to the performative space of the stage, and giving Maria a posthuman apparatus for looking back at her audience (**Figure 21**). While it is true that dance often desires (if not requires) an audience, here it becomes apparent that the male audience's gaze is the thing captured by the dance, rather than the other way around. Dance here is both the attraction that draws the posthuman gaze (comprised of camera, Maria's audience and the audience of *Metropolis* more broadly) and the grounding of that assemblaged gaze in a body—the "fleshly" dancer on which the eye (of camera and viewers) comes to rest. In this way, Maria's dancing is also a kind of Turing test wherein the spectator's lust arises not only from her seductive choreography but from the excitement of not being able to distinguish the mechanical from the organic. Dance is also the catalyst of confusion; as Maria strips off her clothes in a series of jerky, robotic movements, the men gaze upon her and are enchanted by the mystery of whether or not she is "real"—the space of the real being precisely the gap between human and mechanical that

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cannot be resolved. Like the uncanny, which Freud suggests is frightening precisely because it leads us back to something familiar and intimate, the imaginary space of the Real is the locus of both intimate desire and terrifying violence, and dance is one component in the assemblage that mobilizes the Real to veil the violence Maria is capable of. This violence draws the gaze and, given Freud's obsession with the eyes as a source of power in his essay on the uncanny, it seems fitting that uncanny Maria both harnesses and threatens the power of the eyes that look upon her.

False-Maria's dance scene mirrors her later death scene in the sense that both feature a stripping-down impulse that seeks to verify what she truly is at her core. While Maria's strip tease on stage for the male audience should, in theory, reveal her robotic interior, her instrumentalization of dance in fact facilitates the opposite: dance becomes layered upon her body like a shroud that convinces her onlookers of her identity as a human woman. By contrast, at the end of the film when Maria is burned "alive," the flames melt her humanness away, exposing the metallic body of the robot. In this visceral and violent death, Maria is tied to the stake and unable to move (never mind dance). As she is tied up by a group of men, Maria throws back her head and laughs with abandon. The audience here is even somewhat similar to that of the strip tease in its affective response: they cheer and throwing their arms in the air with excitement at the promise of the violence that will be enacted on Maria's body. When the fire strips her down to her mechanical body, however, the crowd is horrified and retreats in terror. This is a process that enacts yet another posthuman transfiguration in which the imaginary has tangible effects.

KYOKO (2014)

The second cinematic dancing machine that I want to address is from Alex Garland's film *Ex Machina* (2014), released almost 100 years after *Metropolis*.[252] In Garland's film, which, like Lang's, is also about the ethical and material dangers of attempting to harness technological power and simulate human life, programmer Caleb Smith (Domhnall Gleeson) arrives by helicopter at a secluded island to visit the lavish and top-secret home of his CEO, Nathan Bateman (Oscar Isaac). Smith is there to help perform a Turing test on a humanoid AI named Ava (Alicia Vikander) who Bateman has designed. [253] The film centers around Ava, but during his visit, Smith learns that Bateman has also developed several other robot women, all of whom are programmed to be convincingly sentient and flirtatious, including his Japanese maid, Kyoko (Sonoya Mizuno).[254] In one scene that, like Maria's dance scene, combines a pseudo strip-tease with a choreographed

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dance number, Smith tries to speak privately with Kyoko. Unprompted, she begins unbuttoning her top, but he is uncomfortable and tells her to stop. Bateman enters the room and upon seeing the two, tells Smith, "I told you, you're wasting your time talking to her. However, you would *not* be wasting your time if you were dancing with her." Bateman flips a switch on the wall behind him, initiating lights that fill the room with a red glow. Oliver Cheatham's 1983 disco track, "Get Down Saturday Night" begins to play and immediately Kyoko's body starts swaying, registering the song's rhythm in her shoulders and hips. "Go ahead. Dance with her," Bateman urges Smith aggressively. "You don't like dancing?" he asks. 'She does." He gestures to Kyoko, speaking for her as her moving body gathers speed.

In a demonstration of narcissism and control, Bateman begins to perform a synchronized dance routine with Kyoko in front of Smith (**Figure 24**). Bateman and Kyoko's bodies move in unison to Cheatham's lyrics, which evoke the theme of embodied labour: "You work all week long, you work your fingers to the bone." They shuffle and slide, locking eyes with Smith, their uneasy yet impressed audience of one. Smith here stands in for the viewers of the film and underscores the audience as a key component in the soul-producing assemblage of the dancing machine. This scene once again relies on dance as a spectacle of liveliness and as a feat of engineering. Whether the dance routine was pre-programmed into Kyoko by Bateman or whether she was designed as an expert dancer by way of machine learning, one thing is certain: dance here is both a kind of work *and* a fantasy elision of that labour. The work of the dance sequence is an illustration both of Kyoko's submission—to synchronicity and to her creator's ego—and of mastery: to be specific, Kyoko's posthuman ability to master a technically complex movement sequence with impressive precision.

Rather than dance alone for an audience of men, like Maria, Kyoko dances *with* her maker, thereby establishing his power over her. Unlike Hoffmann's Nathanael, who believed his own dance abilities were overshadowed by Olympia's superhuman rhythm, Bateman makes himself posthuman by dancing alongside Kyoko. As they dance together, Bateman gets to feel the energy of dance course through him and feel the audience's gaze on his body as well, but more importantly, by dancing with Kyoko, he aligns himself with the ingeniousness of his own invention. Maria and Kyoko are two feminized automata who, even though they appear nearly a century apart on screen, are sisters in the Pygmalion semiology of popular culture cyborgs. Both characters are created and owned by a male scientist figure, situating them within a lineage of

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feminized robot dancers designed by and profited off of by creators who are men. Kyoko, like Maria, demonstrates the common tendency in which novel forms of "technology [are] embodied in a female robot [or] a machine-vamp,"[255] but also where the ability to dance becomes tied to the display of that technology's newness and prowess. This is a frequent trope in many films, literary texts and video games. These characters labour under the control of their male creators, and one facet of this labour is the dancing they have to do in order to prove their "realness."

The notion of dance as *proof of liveness* is one that will come up often in this dissertation, but in this chapter liveness takes on a particular significance: when Maria and Kyoko prove their liveness through dance, it does not serve to imbue them with humanist value, making them persons worthy of ethical consideration. Instead, the function of their dancing bypasses them altogether, eliding their positionality as women/individuals with feelings and needs, and coming to land instead on the personhood of the inventors who created them. Their skill as dancers is therefore not proof of *them* as skilled entities but of their creators as skilled programmers. This phenomenon, of the dancer as a tool or instrument for a more powerful creator, is already embedded within the traditional structure of dancer-choreographer, as dance scholar André Lepecki describes: "In dance, the figure of the "manipulative subject" is powerfully linked to the authoritative figure of the choreographer, to his or her authorial function in dictating steps, controlling gestures, and directing moves to the minutest details. To choreograph is, in part, to control and dictate, and then be obeyed with precision: this is why choreographer William Forsythe once described choreography as 'an art of command.'"[256] The connection between choreography and cybernetics—the science of communication and control theory—here becomes quite clear, as cybernetics can also be defined as a series of commands. Much like the human dancer who performs choreography with impressive skill and grace, only to have the audience praise the choreographer for their visionary ability to shape and create the dance, the skill of these dancing machines makes them just human enough to convince others of their inventors' power, but not human enough to be in personal possession of that power. In *Ex Machina*, Kyoko's ability to move in synchronization with Bateman proves his expertise as an engineer of life (and the power of "technology," like dance, as a force untethered to any one body) more than it proves her capacity to live and be treated as a living being. In *Metropolis*, Maria's ability to entrance her audience with her dance speaks more to the brilliance of Rotwang's invention (and the sublime terror of technological newness) than it does to her skill at

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approximating a human dancer. This attribution of skill to the robots' creators further dehumanizes Maria and Kyoko even as their ability to dance allows them to simulate humanness, and this shifts us once again into the posthuman, a realm that Bateman and Rotwang can visit without risk of losing their positions of power in the human realm. Yet, Felicia McCarren argues that dance is often conceived of as an "art that conceals its workings" and which "is driven by a "superhuman control."[257] Whereas the creators of these dancing robots want to take the credit, the prevailing interpretation of the "dancing machine" is that it is "being animated by something other than human artifice."[258] That something, I argue, takes the recognizable form of the soul.

The Kinetic Uncanny

In an essay for *Discourse* titled "Movements of the Soul: Traversing Animism, Fetishism and the Uncanny," Spyros Papapetros cites Aristotle's *De Anima*, Gottfried Wilhelm Leibniz's *Monadology*, and the animistic theories of the seventeenth-century medical philosopher G. E. Stahl to show how traditional conceptions see the soul as a "travelling substance" or one defined first and foremost by movement.[259] In these conceptions, the value of soul (derived from the Latin word, *anima*) lies in its "endless promiscuity, its inability to be permanently attached to any person, thing, or concept": "Three-dimensional bodies are mere containers of this mobile entity that is either invisible or flashing, intermittently, and at the very threshold of the visible […] Kinesis is the fixed core of animation."[260] Furthermore, he writes that it "does not even matter whether the organism is in fact an automated mechanism whose movement is without consciousness" because "the anima is a mobile energy that is independent from the bodies it infuses."[261] I argue that dance and soul have a similarly-articulated relationship in our cultural imagination: even if the dancer's body is mechanical—the presence of dance, like that of the kinetic *anima* or soul, enlivens that body as it resides there, regardless of its ephemeral course.

Furthermore, both Maria and Kyoko are weaponized by the end of their respective films, demonstrating the thin line between the dancing machine and the killing machine. At the end of *Ex Machina*, Kyoko and her sister cyborg, Ava, reveal their functions as machines of violence; they work together to murder their inventor, Nathan, who manages to disable Kyoko before she stabs him in the back with her Japanese chef's knife. Ava, however, escapes. Having fooled her Turing Test interlocutor Caleb into falling in love with her and leaving him for dead, she flees the island for the city where she can presumably masquerade as a convincing human woman. At

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the end of *Metropolis*, the *machinenmensch* is revealed to be a weaponized robot. In order to squander the threat of her technologized power, she is burned publicly, like a witch, a fiery death that underscores the undeniably gendered position she occupies as a double target of misogyny and technophobia. Huyssen writes that here, the "destructive potential of modern technology […] had to be displaced and projected onto the machine-woman so that it could be metaphorically purged."[262] While these two characters have different fates, their function both as dancers and weapons speak to a similar trope in which the assemblage of audience, gaze, choreography and dancing robot produces the soul, and the production of this soul in part masks (or distracts from) the robot's potential for violence. Dance here is about the *production* of liveness only, not about actual liveness. Neither Olympia, false-Maria nor Kyoko are ensouled enough to spare them punishment for being the locus of technologized power—a power productive of soul.

This is why, in "The Sandman," Olympia must be revealed in the end to be a "lifeless doll" with a "deathly pale waxen face" containing "no eyes but merely black holes."[263] This is why the narrative framework of *Metropolis* presents false-Maria's public death in a fiery blaze as reassuring rather than disturbing. Olympia's "death" is linked with Maria's through the image of fire; when he sees that Olympia is nothing but a wooden doll, Nathanael screams, "Whirl, whirl, whirl! Circle of fire! Circle of fire! Whirl round, circle of fire! Merrily, merrily! Aha, lovely wooden doll, whirl round!"[264] Here, fire is given dance-like qualities, evoking the posthuman agency of a dancing flame and connecting that agency with the soul that Olympia produced. Kyoko also "dies" or is deactivated, rather, when Bateman strikes her violently with a dumbbell handle at the end of Garland's film. The dancing machine is only valuable (and threatening) when agentic/ensouled, and even as she threatens to dance forever, propelled by an uncanny death drive, her ultimate destruction is essential to the restoration of humanist narrative order. In this way, the death of the dancing machine is worth less than the death of a human in the same story. Take for example, the way that *Ex Machina* presents the foreshadowed but unseen death of Caleb (a human man) as much more horrifying than the murder of dancing fembot Kyoko by her inventor Nathan, which the film displays freely on screen. Or, the way that Nathanael's suicide in "The Sandman"—he jumps off a tower in a fit of madness, and shatters his head on the pavement—is presented as evidence of his "lacerated soul," but Olympia's end has her exposed for the soulless doll that she is.[265]

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The proximity of the dancing machine to death and violence illustrates the importance of her uncanny nature: she is uncanny because she *has too much life.* The successful production of soul for these characters relies in large part on the uncanny quality of the nonhuman dancer, where dance is proof of liveness, or lends agency to an nonhuman/inanimate object. The uncanny also provides an important link between the dancing machine who overflows with life or animacy, and the *eye* of the spectator. In his essay on the uncanny, Freud famously analyzed fears about harm of the eyes in connection with "castration," or, symbolically, the death of the father.[266] While I am not so interested in Freud's castration theory, I am aware that each of my case studies in this chapter appeal to the motif of the eye—where the gaze of the spectator is both arrested by the kinetics of the dancing body *and* propels that body to dance. The gaze of the spectator is over-theorized in general, but the eyes of the dancing machine herself have been overlooked. All three characters mentioned here—Olympia, Maria and Kyoko—have moments in which their eyes are critical to their identities as ensouled/agentic beings. Olympia's glass eyes, which Freud focuses on in his essay, end up being torn from her head by Spalanzini and Coppelius (a name which itself refers to the Italian word for eye socket: *Coppa*) and thrown aside, resulting in "a pair of bloody eyes staring up at [Nathanael] from the floor."[267] Kyoko, in a moment of intimacy and an attempt to seduce (or perhaps confide in) Caleb, peels off her synthetic skin to reveal an exposed eye socket and her mechanical inner-workings (**Figure 25**). Kyoko's "strip tease" here speaks to Anne Anlin Cheng's remark that "Asiatic femininity in the Western racial imagination does not need to pass through the biological or the natural in order to acquire its most palpable, fully sensorial, supple and vibrant presence."[268] When Kyoko reveals her unnatural metallic interior, she produces a sense of vibrant unease in the viewer because there is a haze of the Real that lingers around her, even once we know she is a cyborg. This haze of the Real is produced, at least in part, by the uncanny dance scene she delivered earlier.

The most well-known scene from Lang's film is Maria's "transformation scene," or the robot's anthropogenesis, in which the inventor Rotwang, who, like Hoffmann's Coppelius, is a kind of alchemist or mad scientist figure, appears at the helm of this process from behind his flasks, tubes and vials in his laboratory. The robot sits in a chair and is connected to human-Maria by a series of wires and nodes that activate rings of electric energy that encircle the robot's body, eventually transferring Maria's likeness to false-Maria's metallic body (**Figure 26**). In the moment of transfer, we are given a close-up that cuts between the faces of both Maria and the

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maschinenmensch, eventually transposing the two faces on top of one another and dissolving from the robot's face, with its cold metallic eyes that display faint pupils, to the human face of Maria, whose eyes open slowly to reveal an uncanny fixed stare, signaling that the transformation is complete. Sandra Huber has written about false-Maria's slowly opening eyes in this scene as a kind of "wink," that points toward a "secretive knowledge" or suggestion of deception.[269] This ties the cyborg's mechanical yet agentic eyes to the magic of cinematic special effects, which *Metropolis* displays impressively.

In her 2021 book, *Special Effects and German Silent Film*, Katharina Loew writes that Lang and cinematographer Gunter Rittau have historically been very opaque about how this transformation sequence was orchestrated, but eventually some details about the scene emerged:

> …Ritau first created a plywood silhouette of the seated robot covered in black velvet and two circular neon lights in different sizes that both fit comfortably over the plywood silhouette. One after the other, the rings were suspended horizonally on three wires from what Kettelhut calls a "fixed elevator," which was custom-built around the silhouette outside of the camera's field of view…Due to a horizontal grease film on a small glass pane close to the lens, the neon rings, which were moved up and down at a steady pace, appear as blurred discs of moving light. For every shot in which the rings appear, Rittau, using one of Ufa's two new Mitchell cameras, recorded each ring up to six times; their pacing, starting, and end positions were meticulously planned…[270]

The transmogrifying haloes in this scene, which by this account are actually quite simple in form (neon rings of light) really become tricky and meticulous only in their *choreography*. The moving of the lights at "a steady pace" up and down the silhouette—a kind of choreographic sequence—is what causes the appearance of magical, electric energy in this seminal piece of cinema. Electricity as a force that can enliven both organic and inorganic bodies here is akin to the kinetics of dance, or the Aristotlean definition of soul or "anima," as "a mobile energy that is independent from the bodies it infuses" with life.[271]

Mimesis

When the machine dances, it is often via a kind of mimesis, or approximation of the human dancer. In a sense, this is not all that different from the way humans dance, at least in a formal sense, training their own bodies by mimicking their teachers or more experienced dancers. In classical dance training, human dancers are governed by the mimetic tool of the mirror and by the powerful influence of the imaginary—the way we would like to be seen. Very

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young dancers study their bodies and the bodies of their classmates in a large mirror, and then shape their gestures to mimic the dance model or ideal presented by their teacher or choreographer. Dancers are trained to use the techniques they practice daily, not only to imitate one another, but to imitate natural forms like the waves of the ocean and a flock of birds. In this way, the mimetic machine and the dancer are linked. Interestingly, in Garland's film, the actors playing cyborg characters (Vikander and Mizuno) move in a very subtle yet specific, machinic way. Their gait is measured, they turn their heads slowly and sometimes have slight tics in their movement. The fact that their bodies are choreographed in this way dovetails with the importance of dance to the narrative of these films. Both Kyoko and Lang's Maria are mechanical dancers who presumably learn to dance by imitation, but they are also *copies*; created in the likeness of human women, they are programmed to imitate their referents so accurately that it becomes unclear where mimesis ends and liveliness begins.

In his work on Plato, Aritstotle, and ancient philosophy, Matthew Potolsky writes that *mimesis*, which "describes the relationship between artistic images and reality," is often insufficiently translated from the Greek as "imitation," positioning art as a mere "copy of the real."[272] He provides a list of terms to demonstrate the way the concept has developed over time, in different historical contexts; mimesis relates to ideas such as "emulation, mimicry, dissimulation, doubling, theatricality, realism, identification, correspondence, depiction, verisimilitude, [and] resemblance."[273] The rich variety of these terms demonstrate the importance of mimesis to Western culture and thought, but that discourse has been largely contained to considerations of literature and representational painting and sculpture (See Auerbach; Halliwell 2002). It is strange that dance is more rarely analyzed in relation to mimesis, since it is a practice that requires continual embodied mimetic processes on the part of the dancer. This affinity between dance and mimesis takes on yet another level of importance when we encounter the dancing machine, or the robot (already a mimetic humanoid form) that learns dance via mimesis in order to prove its veracity as a lifeform with agency and soul.

Simulacra

Jean Baudrillard's theory of simulacra is relevant here. In his 1981 treatise on postmodern society, symbols and reality, *Simulacres et Simulation*, Baudrillard argues that we have lost all ability to make sense of the distinction between nature and artifice. In order to

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illustrate this, he describes "three orders" of simulacra: the counterfeit, the copy and the pure simulation, in which all forms are understood from the "point-of-view of their very reproducibility."[274] In my first chapter I argued that Loïe Fuller is understood as the author of a technique (the Serpentine Dance choreography) that can be repeated. If making automata dance—or making films and stories about dancing automata—is also a technique, then we can understand Fuller as commensurate with Hoffmann, Lang, or Garland. Fuller—a human dancer whose choreography was imitated by countless other dancers so convincingly that her name became welded to their dances as well, embodies Jean Baudrillard's a simulacrum of the first order, the "counterfeit." However, Hoffmann's Olympia, the dancing wooden doll, exemplifies Baudrillard's description of the counterfeit *automaton* (also of the "first order"), as an "interrogation upon nature, the mystery of the existence or non-existence of the soul, the dilemma of appearance and being."[275] Whereas the counterfeit is a straightforward copy intended to deceive, the automaton is meant for scrutiny; it tempts you to figure out how it works by having you ask, "what's underneath it all, what's inside? What's in the back of it?"[276] Maria and Kyoko, who both invite this kind of probing, fall somewhere between Baudrillard's first order, that of the automaton or counterfeit, and his second order, exemplified by the *robot.*[277] I have already argued that Kyoko has a different relationship to her creator than Maria—she dances alongside Bateman before murdering him at the end of the film, showing a more transgressive agency characteristic of posthuman cyborg characters under advanced capitalism. This is in comparison with Maria, who Loew argues embodies the "technological sublime" of a 1920s' "techno-romantic paradigm."[278] All three characters are mute: Maria, by virtue of the silent film medium; Kyoko never speaks; and Olympia only sighs—she emits an "Ahh" sound that Nathanael extrapolates into full sentences through his fantasy.

The "second order" for Baudrillard is deeply tied to mechanical reproduction, the "dominant scheme of the industrial era" and to a series of copies without an original.[279] For Baudrillard, this is the order of the robot, whose "only truth is in its mechanical efficacy" and for whom "being and appearance are melted into a common substance of production and work," and it is also the order of the mass-produced commodity and the assembly line.[280] Maria and Kyoko occupy both of these categories: that of the automaton who asks you to look inside and figure out whether it is "real," and that of the robot who is the ideal worker and commodified product. The *dancing* robot is therefore the example par excellence of Baudrillard's first and second order

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simulacra; its "truth" is proven by its ability to dance, and its ability to dance makes it an excellent worker and commodity.

If we take the dancing robot as a product that is mechanically reproduced but yet still has a relationship to soul, Walter Benjamin's argument about mechanical reproduction complicates things. Benjamin writes that the "here and now" of an art object – its specific spatiotemporal location, especially at the time of its creation—is a highly "sensitive core" or "nucleus":

> That core is its authenticity. The authenticity of a thing is the quintessence of all that is transmissible in it from its origin on, ranging from its physical duration to the historical testimony relating to it. Since the historical testimony is founded on physical duration, the former, too, is jeopardized by reproduction, in which the physical duration plays no part.[281]

In other words, Benjamin argues, it is the original, or the first instance of the thing that is most *authentic*, according to the logic of traditional art-making. All subsequent iterations are just dilutions of the original's authentic "aura." Because for Benjamin aura is deeply connected to tradition, and because tradition is very much reliant on the concept of origins, it is the haunting presence of an origin that endows the art object with "aura." A posthuman theory of dance challenges not only tradition but tradition's reliance on origin. Once again, posthumanism, which eschews origins in favour of processes of becoming, is well-matched with dance, with its gestural flow and the inability to trace choreography back to any one creator. Yet, paradoxically, dance is an art that adheres tightly to concepts of aura, in the Benjaminian sense, even in the case of the (mechanically reproduced) dancing machine. Romanticist notions of dance as proof of the dancer's soul or the instrument of self-expression persist through modernism, postmodernism and to our current, post-digital era. This is why dance is such an attractive quality to those trying to engineer life: we make robots dance because it associates them to authentic interiority.

Dance as Technique of Aura

I contend that dance has a special relationship to what Walter Benjamin calls "aura." Benjaminian aura is most commonly exemplified through physical art objects like oil paintings on canvas, stone sculptures or hand-woven tapestries. In these artifacts, the handiwork of the individual artist is palpable, linking the objects to a specific time and place. Live performance is not perhaps the first example that comes to mind when considering aura. Dance, when performed live, is ephemeral and fleeting, but offers a slippery chance at a spatio-temporal encounter with

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what we perceive as the inner feeling of the dancer, as expressed on and through their body in the immediate event. With the development of the technology of photography and film, as discussed in my first chapter, dance is no longer bound to the time and space in which it originates. Katrinka Somdahl-Sands and John C. Finn discuss how how "mediated performances have the ability to relocate what once occurred in a specific place and at a specific time to an experience that can happen at many times and in many places, while one is alone or with others."[282] However, they argue that this mediated experience of performance still "constitutes an authentic, "shared" performance," thereby troubling the "assumed division between live and mediated performance based on Benjamin's ideas of aura and authenticity."[283] Somdahl-Sands and Finn focus mainly on screendance in their analysis, but film is not the only agent in this process. With the potential to animate and choreograph digital avatars and material automatons using machine learning, Mo-Cap and other technological developments, the question of dance's "aura" is no longer limited to the time and space in which the (human) dancer originally danced.

My posthuman theory of dance suggests that the soul is not a pre-existing essence that diminishes via replication, but rather is a quality that can itself by manufactured, simulated or engineered, *through the technique and technology of dance.* Baudrillard opens his book with the following sentence: "The simulacrum is never that which conceals the truth—it is the truth which conceals that there is none. The simulacrum is true."[284] This is another way of saying that the Real is found in the space between the physical world and the imaginary. If posthuman dance is a kind of simulacrum, it uses mimesis to present what appears as a "faithful copy" but what is really a "copy without an original." What interests me here is the semiotic function of the term "soul" as it signifies the human, at contrast with the robot or soulless machine, and second, the way in which soul might be mechanically reproduced and performed by the "dancing machine."

In presenting the notion of soul in such a generic manner, I am of course neglecting to present the rich history of postmodern dance here, which sought minimalist objectivism unbound by narrative or recognizable emotions (or spiritual concepts like "soul"), and which was interested mainly in the quotidian or abstract gesture. Postmodern dance, which emerged in the 1960s and continued into the 1990s, would have no interest in dance as a technology of soul. This is illustrated by the contributions of postmodern dance pioneers like Yvonne Rainer, whose 1965 "No Manifesto" specifically rejected "spectacle," "virtuosity," and "the seduction of spectator by the wiles of the performer," and for whom choreography was an exploration of the

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infinite gestural potential of the dancing body, rather than of the human dancer's ability to drive a narrative or perform inner emotion.[285] Merce Cunningham, whose work with musician John Cage involved non-human, chance-based choreographic methods like coin tossing, and whose collaborations with digital artists Paul Kaiser and Shelley Eshkar in the late '90s explored motion-capture technology as a form of dance creation, is another influential member of the postmodern dance scene, and one whose work speaks to posthuman themes. However postmodern Cunningham and Rainer's work may have been, though, it was nevertheless rooted in the human body and returned again and again to the human as the site from which all art springs, making it difficult to place within posthuman frameworks and organizational strategies not centered on the human. This is why I turn to the soul as a generative concept in posthuman dance. Even as the common occurrence of the robot who dances to convince us of her humanness reinforces the traditional/Romantic narrative of dance as proof of soul, it also reveals the Romantic or humanist concept of soul—used here as strategy or mimetic performance—as a fiction, narrative or myth. If we use dance to humanize machines (or give them the appearance of cognition, sensation and emotion) and we use machines to dehumanize dance (to abstract bodies and turn them into dancing *images*), here is the twist: *dance itself is already a kind of machine*, or mechanization of the human, in that it relies so innately on *technique.*

> Judith Hamera writes:
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> Technique is both the animating aesthetic principle and the core ambivalence housed in every dance studio and manipulated by every teacher, every choreographer, every performer. It is both taskmaster and mastered, both warden and liberator. It demands to be replicated even as it asks to be exceeded.[286]

This quote demonstrates the complicated relationship between technique and dance whereby dancers orchestrate an aesthetics of emotional freedom and virtuosity with the help of their "warden," *technique*. The practice of dance technique produces the dancer (*as* dancer) and the dance itself. Dancers draw from their embodied storehouse of movement vocabulary, banked through rigorous kinetic repetition, in order to appear spontaneous and free in their movements. The "soul" of the dancer therefore emerges out of a process that could be called artificial.

Ben Spatz has written extensively on technique as an embodied knowledge in his book *What a Body Can Do* (2015). Spatz "rejects the idea that the value of a practice lies in its ephemerality" focusing instead on that which is "relatively stable and transmissible in embodied

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practice, and [using technique] to show how much value, as well as danger, is to be found in repeatability."[287] Spatz traces the usage of the word "technique" to the Romantic-era poet Samuel Taylor Coleridge, who, writing on William Wordsworth in 1817, may have been the first to use the term "technique" in the English language. Coleridge views technique as an obstacle to genius, or "that which must be transcended in order for true genius to appear," and this is common also in the writings of Martin Heidegger (*The Question Concerning Technology*, 1977) and Lewis Mumford (*Art and Technics*, 1952), who write extensively about technique, but often primarily as rote mechanics and not the stuff of real artistry.[288] This also plays into what Spatz calls the "trope of excess:" the Romantic notion of 'genius' as that which spills over the structure of technique, or lingers afterward. I want to suggest, however, that there is a strong link between embodied techniques (like dance) and the concept of aura as described by Benjamin. If the auratic painting or sculpture is that which contains traces of the artist's body—evidence of their hand movements in the brushstroke or a fingerprint in the side of a vase—then dance is a doubly auratic artform in that the evidence or trace of embodied techniques is seen and felt on the body of the dancer itself, even if that body is not an organic, human body.

In *Les techniques du corps* (1934), Marcel Mauss takes up an anthropological study of our routine bodily gestures to show how they reflect or embed certain aspects of the culture in which they were learned. Mauss's experience as a soldier doing group drills influences his understanding of body techniques and can be compared, materially and ideologically, to the acquisition of dance technique. Technique, according to Mauss, is not innate but *acquired* and as such, has an important effect on how we understand agency. Spatz makes a historical distinction here, explaining that "at the time of Mauss's writing, it might have been possible to imagine a coherent inner self or subject that makes instrumental use of the body to accomplish its goals," a feat that a posthuman theory of dance interrogates.[289] According to Mauss, the human body is the "first and most natural instrument" and dance articulates this while also challenging the idea of that instrument as "natural."[290] The postmodern work on technique that follows Mauss—such as Pierre Bourdieu's theory of habitus and Judith Butler's theory of performativity, "suggests a different and more complex understanding of agency."[291] For Michel Foucault, who thinks about how institutionally-sanctioned procedures and methods contribute to structures of power, "technique" and "discipline" are related terms. Spatz argues that "when Mauss's idea of bodily technique is inflected by Foucault's analysis of power, we may begin to grasp how the training we each receive reflects not

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only a variable knowledge of technique but also the social hierarchies that determine how this knowledge is distributed."[292] Perhaps the body is only the first natural instrument insofar as we learn technique to play it (the body) only after power trains it to be played. Thinking about the dancer's body as a trained instrument allows us to consider how it is also an object that can be replicated, reproduced and standardized, all through the repetition of gestural technique. Thinking the dancer as object-like rather than fully subjective, and constructed by various outside forces rather than at the helm of their self-manipulated body, facilitates a posthuman approach to the consideration of agency and subjectivity in dance, but it also challenges the myth of the dancer as a "natural" instrument.

In her book *Dancing Machines*, Felicia McCarren writes that "Like athletes, dancers are often read as moving unconsciously, or naturally, with a kind of animal speed or grace—as if their movement were driven by instinct…."[293] McCarren observes that dancers are associated with the "pre-linguistic or pre-technological, the animal or the "primitive" that is the obverse, but not the opposite, of the machine."[294] This perception of dance as emanating from a primitive or instinctual interiority again taps into the potential for dance to act as proof of whether an entity is living/natural or engineered/automized. However, this equation of dance with pure inner instinct is a myth. Dance is already a kind of mechanical reproduction even before the film camera records and duplicates the dancing body, before animation techniques like rotoscoping and motion-capture that extract kinetics from the body to enliven avatars or hand-drawn figures, and even before the invention of dancing automata or robots. Through examples such as the ballet des corps, the chorus line and unison dance in general, McCarren argues that dance predicts the mechanical age. Dance, as a repeated—even mechanized—practice rooted in the body, establishes technique through repetition, or a series of reproduced sets of gestures.

Vital Movement / Virtual Gesture

How might formalized dance technique both predict the mechanical age, as McCarren suggests, and serve as an instrument for the production of soul, thereby bringing both extremes of Benjamin's argument together? In fact, it is precisely formalized dance technique that gives the *appearance* of soul, and this argument is supported by Susanne K. Langer's concept of "virtuality." Langer writes, "no art suffers more misunderstanding, sentimental judgement, and mystical interpretation than the art of dancing."[295] She explains that "the most widely accepted

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view is that the essence of dance is musical: the dancer expresses in gesture what he feels as the emotional content of the music which is the efficient and supporting cause of his dance. He reacts as we all would if we were not inhibited; his dance is self-expression, and is beautiful because the stimulus is beautiful."[296] The reason people believe the dancer is always expressing what they feel, Langer argues, is because "all dance motion is gesture" and "gesture is vital movement."[297] Following Langer, I argue that it is this connection between dance as embodied gesture and gesture as a symbol of vitality that facilitates dancing as a technique for the production of soul. Langer continues:

> Gesture is vital movement; to the one who performs it, it is known very precisely as a kinetic experience, i.e. as action, and somewhat more vaguely by sight, as an effect. To others it appears as a visible motion, but not a motion of things, sliding or waving or rolling around—it is seen and understood as vital movement. So it is always at once subjective and objective, personal and public, willed (or evoked) and perceived. In actual life gestures function as signals or symptoms of our desires, intentions, expectations, demands and feelings.[…] Gesticulation, as part of our actual behaviour, is not art. It is simply vital movement. […] It is not dancing.[298]

When we see someone dance, we immediately see the body of the dancer as a "center of vital force" whose "expressive movements" are "signals of its will."[299] This is what dance gives us. But this, Langer, explains, is also the *trick* of dance. Because "the primary illusion of dance is a virtual realm of Power—not actual, physically exerted power, but appearances of influence and agency created by virtual gesture."[300] She elaborates that in dance, "the actual and virtual aspects of gesture are mingled in complex ways, sometimes in ways not even comprehended by dancers themselves."[301] The dancer's movements, "of course, are actual; they spring from an intention and are in this sense actual gestures; but they are not the gestures they seem to be, because they seem to spring from feeling, as indeed they [often] do not."[302] In this way, "the dancer's actual gestures are used to create a semblance of self-expression, and are thereby transformed into virtual spontaneous movement, or virtual gesture."[303] In other words, every human dancer is already a bit like the dancing robot, using gesture to express, rather than self-express, a *symbol* of vitality or vital will, understood as soul.

In a similar vein, McCarren argues that "the perfectly autonomous, self-creating, liberated body of the modern dancer *is itself a technological fantasy* [emphasis mine]."[304] This is also true of Loïe Fuller from my first chapter, who occupies a complex position in this continuum between the assumed aesthetic of modern dance (which McCarren qualifies as

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liberatory and humanistic in its "freedom of expression and mobility of identity") and the concept of the technologized body controlled from the outside—whether by an animator, mechanical gears or even by the exterior mechanism of dance technique.[305] Fuller, like dancer Isadora Duncan, contributed to a conceptual "dancer of the future"—a modern dancer with the "highest intelligence in the freest [sic] body."[306] This "dancer of the future" embodies a position between the modernist adherence to "genius" and the Romantic-era values of free expression. As I mention in my introduction to this dissertation, for Duncan, who was unable to recognize the limitations of such an exclusionary vision, the dancer of the future is one whose "body and soul have grown so harmoniously together that the natural language of the soul will have become the movement of the body."[307] In this often-quoted statement, Duncan's Victorianism is on full display, putting her at odds with both a modernist secularism and a posthuman ethos. However, Duncan, the "inventor" of modern dance, was known to "[position] her choreography at the juncture of motorized movement and soulful expression" and even wrote in her 1927 autobiography that in order to dance, "[she] must place a motor in [her] soul."[308] This vacillation between mechanization and inner feeling is commonly found in modernist art and writing, but Duncan's approach highlights the paradoxical quality of dance in particular, in relation to these themes. Duncan preferred modern dance improvisation to classical technique, and in fact rejected ballet for its rigid technical structures; in this way, the "motor" that she refers to is not technique so much as a particularly modern view of the soul.

Kittler and Soul

I accommodate this tension, between dance as pre-technological, primal or natural and dance as a kind of technology, through a methodology that acknowledges the historical shifts between modernism, postmodernism and advanced capitalism. In his 1985 book, Kittler delineates between two epochs—"1800" and "1900." Kittler's *Discourse Networks* is in part a response to Foucault's archaeology of discourse in *The Order of Things*, which ends in 1850, before the second industrial revolution. Kittler picks up where Foucault leaves off and sets his discourse network of 1800, characterized by hermeneutics, "natural" language and the solitary figure of the Romantic poet, against that of 1900 (beginning with the second industrial revolution), a period he associates with inscription, data storage and transmission. One concept that Kittler tracks across these epochs in relation to speaking and writing is that of the "soul."

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Kittler argues that post-1900, the "isolated routines of readings, listening and speaking become automatic and impersonal, […] [r]ather than being rooted together in one voice from the inmost soul."[309] Kittler focuses on handwriting in particular, not as an external trace of the inner individual, but as an expression of training.[310] Kittler's attention is mainly on literature (spoken and written), but his interest in authorial techniques works well to elucidate some of the mythologies that likewise plague dance. After all, scholars like Thomas Lamarre (2000)[311], Scott deLahunta (2003), André Lepecki (2003) and Frédéric Pouillaude (2017)[312] have theorized dance as a kind of writing/inscription enacted with and upon the body. When these writers draw comparisons between dance and writing, they sometimes present dance as a translation of ephemeral feeling into something legible.

If dance is constructed out of modular, acquired language, rather than, like Kittler's reading of the German sigh ("oh!"), a spontaneous eruption of feeling[313], a dancer's embodied gesture, just like a writer's penmanship, displays quirks that communicate their learned technique/habitus or than their individuality/unique inner feeling. However, unlike handwriting, which is displayed on the page, at a distance from the hand that produced it, dance "feeling" or technique is legible *on the body itself*. In transposing Kittler's argument here to the field of dance, it becomes apparent that dance has shifted from a Romantic practice evocative of soul (like the handwritten letter) to modern experiments in automatic impulse and improvisation, and mechanical or impersonal modes of choreography (like the typewritten text), and that throughout (or even in spite of) these shifts, dance continues to produce soul or a sense of the human.

Kittler's work is posthuman in its preference for the "presuppositions of exteriority and mediality," over "creative human subjects, [or] psychology and its internalizations."[314] This is what David E. Welberry calls Kittler's "presupposition of corporeality," an approach that yields several "major methodological consequences," one of which being a de-investment in questions of agency as tied uniquely to the human body as an "agent or actor."[315] As a result, Wellberry argues—in rhetoric that relies heavily on the metaphor of stage performance—that culture is "no longer viewed as a drama in which actors carry out their various projects:"

> Rather, the focus of analysis shifts to the processes that make that drama possible: to the writing of the script, the rehearsals and memorizations, the orders that emanate from the directorial authority… post-hermeneutic criticism replaces the foundational notion of praxis (the materialist version of subjective agency) with that of *training* [emphasis mine]. Culture is just that: the regimen that bodies pass through.[316]

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Wellberry's focus on training and performance here points us back to the notion of technique and performance in dance. What does this have to do with the "soul" or dance as proof of soul? If training replaces subjective agency, wherein subjective agency as proof of the unique inner self (or soul), this relates to the practice of dance wherein training, implemented in the form of technique, often conveys a sense of humanity or "vital gesture." A sense of vitality is still produced, but the human is no longer at the centre of the assemblage. This means that soul can appear elsewhere—in a machine or a computer network, for example.

LIL MIQUELA (2022)

I have argued, through my analysis of several case studies, from Hoffmann's dancing German-Romantic automaton Olympia, to Lang's modern robot Maria, to Garland's dancing fembot Kyoko, that dance plays a unique role in the narrative of engineered life. These examples demonstrate not only the pervasive trope of the dancing machine, but the way in which this figure is multiply-mediated, by way of its mechanical body which simulates the real, and by whichever media it inhabits (fiction, film, screen-based social media, etc.). I turn now to one last example: digital Instagram influencer Lil Miquela. As a very recently-invented dancing machine born out of advanced capitalism, Miquela demonstrates the persistence of the themes associated with posthuman dance across my historical continuum, as well as the new features of the dancing machine that emerge when it is articulated to the malleability of digital media.

On October 3, 2018, Lil Miquela, also known as Miquela Sousa, released the music video for "Hate Me," co-produced with Baauer.[317] In the video, Miquela, whose fans often refer to her as a "robot," moves her body for the first time on camera, thus proving to her fans that she is "real" (**See Figure 27**). Miquela's movements—which I consider dance in this context—include a subtle tilt and turn of the head and a medium close-up shot of her standing up from a seated position. She is flanked by human dancers to infuse her music video with life, and standing in a row with these women positions her as one in a series of organic bodies. The trained dancers around her jump, slide, pulsate and twirl in an empty warehouse, animating the screen with the flow of dance. Miquela stands amid it all, her stoic digital body energized by the excess of bodily activity.

A selection of comments beneath the Instagram post of the music video include the following:

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"How are you moving?" (longhair_gurl95)
"I'm sorry but that head turn creeped me out" (eb0ny_)
"you are the most beautiful robot" (pim_toy_club)
"I'm so uncomfortable with her mannerisms" (mrbrendenshults)
"Notice she aint dancing, and just standin"(asapjade)
"This Is Freaky How She Can Move" (nsfwjimin123)
"Damn they didn't have the budget to animate her dancing" (jeezfig)
"Wait. Hold on. You're like a legit robot???" (tatixxlockwood)
"There's no way this girl/thing is a robot" (oliviasterriker)

These comments demonstrate the varied responses to Miquela – from curiosity and admiration to discomfort and suspicion of her uncanny appearance and movements – as well as the slipperiness of a term like "robot" in today's social discourse. Miquela, who often makes jokes about her "gears" and ability to change her appearance on a whim, identifies as a "robot" in her Instagram diary entries (she has a story highlight in her profile where she archives her journals), demonstrating the way this term has changed over time.

The word robot was first used in Karel Čapek's science fiction play *R.U.R.* (1920), where R.U.R. stands for "Rossum's Universal Robots." Brittanica Dictionary defines "robot" as "any automatically operated machine that replaces human effort," but today the term seems to have become a catch-all for automata, AI, digital avatars and CGI characters, losing its connection to the "automatically operated" part of the definition. This can be understood as the discourse network of robotics, in which the meaning of "robot" changes historically as the assemblage surrounding the word changes. The imprecision with which Miquela's followers use the term reflects not so much their lack of understanding of what a robot is, but rather a new, more expansive (or even tongue-in-cheek) meaning of the term. Like the bodies of Enlightenment-era automata, which were scrutinized to reveal their life-giving mechanisms (Kang 2011), Miquela's body is probed in the comments section of her social media account: "I don't understand. This bitch is human or a doll or a robt (*sic*). Can anyone tell me pliiiiiiiz" (@max_mysically); "[she's a] digital design. She's a human that alters her photos to look robotic but she's not a robot" (@obersting); "either she's a robot or used a heck of a lot of face tune lmao" (@Alayna.andersonn). The confusion in these comments points towards the uneasy feminized space that Miquela occupies, between object and subject, emphasized by *Refinery29*'s labelling of Lil Miquela as "The Model…With No Soul" (Jones 2018). Miquela's capacity to move and dance articulates her to some fuzzy concept of "soul," even as articles written about her declare that she is "soulless."

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Lil Miquela's Instagram account, which dates back to April 2016, chronicles her daily life as a 19-year-old Gen Z musician and fashion model living in LA. She has three million followers. Miquela (whose full name is Miquela Sousa) was conceptualized and designed by Brud, the LA-based startup founded by Trevor McFedries and funded by venture capital firm Sequoia Capital. Brud's latest funding initiative brought in approximately six million dollars, making Lil Miquela the face of a very rich (and media-savvy) company.[318] Sousa is a simulation: a digital doll with light caramel skin, pouty lips and freckles, who Brud describes as a "robot" modelled to appear Brazilian-American. Like *Time Magazine*'s 1993 cover image titled "The New Face of America," which was meant to reflect the impact of immigration on American multiculturalism, Miquela is the beautiful, exotic digital composite of today (**Figure 28**).[319] She is both racialized and technologized, aligning her with an aesthetics of Afrofuturism, which addresses themes and concerns of the African diaspora, as well as North American Black and POC identities, through technoculture and speculative fiction.[320] In her book *Ornamentalism*, Anne Anlin Cheng writes, "What happens when we consider ornamental forms and fungible surfaces, rather than organic flesh, as foundational terms in the process of race making?"[321] Miquela's modifiable digital skin makes her similar to *Ex Machina's* Kyoko, whose Japanese skin is synthetic and removeable. Both characters exemplify what Cheng calls the "dream of second skin," a "mutual fantasy" shared by "modernists seeking to be outside of their own skins and by racialized subjects looking to escape the burdens of epidermal inscription."[322] Most of all, Lil Miquela's racial ambiguity and sexual fluidity mean that her "perfection as a brand ambassador is twofold, rooted in her malleability and her ubiquitous potential"—her digital presence also facilitates endless movement across space and time.[323]

Although her Instagram account presents Miquela as a still image, there is plenty of movement implied out of frame on her Instagram grid. She appears in indoor and outdoor locations, in group photos, fashion shoots for Prada, and in the pages of fashion magazines like *Vogue*, *High Snobiety* and *Paper*. A recent issue of *Garage Magazine* photoshops Miquela into photographs from the 1970s and 80s next to deceased celebrities like Prince, Michael Jackson, and Princess Diana. In a particularly meta move, Miquela even provided a blurb for Legacy Russel's recent book of theory, *Glitch Feminism*. Lil Miquela, who is "forever 19," will never die. For all her fluctuations, Miquela is also a fixed entity in the sense that her designers have carefully crafted a complex narrative around her that overrides her Pygmalion origins and the problem of Brud's

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essential ownership of and profit off of her female body. Any potential she may have to align with Donna Haraway's rebellious cyborg, who also "skips the step of original unity, of identification with nature in the Western sense" is complicated by the fact that Miquela was created in the male-dominated world of Silicon Valley by a very wealthy company, essentially to perform labour for free, thus satisfying the etymological origins of the word robot (from Czech, *rabota* meaning "servitude or forced labour").[324]

This successful marketing strategy, which has spawned entire comment threads debating whether Miquela is "real," a "robot," or made of CGI, deploys a futuristic gimmick derived from a very old concept. Lil Miquela is but one example in a long history of dance as a method of engineering life. If dance evokes (perhaps paradoxically) the non-mechanized body, via the traditional understanding of dancing as an emotional channel to the dancer's inner (human) emotions and impulses, then the "proof" of the human in the working machine is its *capacity to dance.* Since her first music video, Miquela has released several others in which her full body is seen dancing on screen. In calling her followers to witness her dance, Miquela's creators are tapping into the historical link between dance and proof of life.

In a 2020 music video for her song, "Hard Feelings," Miquela performs a choreographed dance routine on top of a speeding train (**Figure 29**). The virtuosic camera frames her from above, spinning to disorient its viewer. She dances in formation with a set of other digitally-animated bodies, cloaked in full-body and face-covering leotards (perhaps to further dehumanize them and render Miquela more life-like by contrast). They dance in complete unison and with a weightless, digital quality to their movements that suggests they are animated. Yet, there is something uncanny about Miquela's dancing here that also gives the appearance of life (one commenter remarks that she "looks like she's from the Polar Express," referencing a benchmark film in the history of uncanny digital animation).[325] It is unclear whether or not her choreography was extracted from a human dancer through mo-cap technology before being used to animate her digital body, but nevertheless, Miquela's movements do not seem entirely synthetic. There is something of the "grain" of the dancer there (an idea I explore more fully in chapter four). Miquela is a super-human dancer. She can perform casually on top of a train that is hurtling through the desert without risk of injury. The viewers of the video accept this. Yet, they do not fully accept that she is purely animated, as demonstrated by the "creepiness" they feel when watching her. What is it about Miquela's dancing here and in other videos that positions her as

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more than just a CGI character? In her social media posts, she often poses with celebrities like model Bella Hadid, but in our post-truth era, where practiced readers of visual media have developed a necessary skepticism towards photos as proof, this type of post is less likely to confound viewers than her dance videos. And this confusion, which is also bound up in the discourse of her label, "robot," ties back to the other examples of the dancing machines I have referenced throughout the chapter. The robot that can move, in a functional, practical manner is an impressive feat of engineering. The robot that can dance, however, is one that can *feel*. The dancing machine has a soul just because it dances.

Conclusion

The discourse of automata, CGI "robots" and other technologized bodies—even when fictional—often reinforces the capitalist myth of progress in which technologically-engineered life represents the apex of human scientific knowledge and ability. However, the fantasies presented by this discourse have not evolved beyond slight changes in the technology; they still center on the body of woman as a commodified and ownable object. Furthermore, the use of dance as Turing test continues to be employed strategically throughout history, showing that we have not really progressed past the Romantic obsession with soul, and the association between soul and artistic expression. I began this chapter with a discussion of Olympia, E.T.A. Hoffmann's fictional automaton whose ability to dance is used to test her life-likeness, and I end it with Lil' Miquela, a CGI Instagram influencer whose music videos likewise mobilize dance as proof of life. These two case studies, occurring over 100 years apart, demonstrate a lack of historical "progress." This is unsurprising, given that both characters are part of the same discourse network. Even though Olympia is an automated doll made of wood, glass and gears, and Miquela is a digital image undergoing constant mediation, their stories are the same. Despite the fact that they reference different tools and techniques, both are stories about a technologized girl with an untrustworthy body, where dance acts as a litmus test of humanity. Given the lack of progress that occurs across my case studies, which take place at various points in history, it is important that I take a genealogical approach to my historical analysis. Michel Foucault's definition of genealogy acknowledges "power [as] a strategy attributable to functions (dispositions, maneuvers, tactics, techniques)" which does not "originate in either the economy or politics" but exists as "an

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infinitely complex network of 'micro-powers,' of power relations that permeate every aspect of social life."[326]

Why is the dancing machine so often gendered female? The longevity of the Pygmalion myth in literature, theatre and visual art means that the project of engineering life becomes a paradigm for the enduring male desire to create a fantasy woman. This fantasy is also one of power and control, and connects with the trope of a female mechanical body that bears scrutiny to determine its inner workings, or "trick." In his 2011 history of the automaton in the European imagination, Minsoo Kang explains that while the Medieval and Renaissance conception of the automaton was linked to magic and occult forces, where automatons were considered trans-categorical shape-shifters that possessed special powers, with the heightened focus on mechanical craft that came about during the Enlightenment, the automaton became a model of mechanistic science and "pure rationality."[327] As such, automata in this time were subject to invasive tests and examinations to uncover their impetus for movement. Their bodies were scrutinized in the name of science. This is true of all the female cyborg figures I refer to in this chapter—from Olympia, whose body is put on display at the ball and dissected by alchemists and inventors, to Miquela, whose social media posts host endless comments about her appearance, her body, and whether or not she is "real."

There is a general mistrust around the technologized female body. Kang writes that the introduction of vitalism in the late-enlightenment brought about the fear that vital humans might be turned into machines, and as explanations for the magical became secular, powerful ambiguous emotions were transferred to machines, especially automatons, which were anthropomorphic[328]. The attribution of stereotypically feminine qualities to technological objects is an old trick that works to unite woman and machine as unpredictable entities and then contain that threat through their objectification. This narrative can also help explain why female cyborgs are so often conceptualized as "soulless." In Villiers de l'Isle-Adam's 1886 novel "L'eve future" (*Tomorrow's Eve*), an artificial woman named Hadaly (Arabic for "ideal") is created and said to have a magnificent and mechanically perfect body, yet she lacks a soul. Hadaly's body is therefore configured—like Olympia's—as an empty container. Miquela, on the other hand, is less empty container than plastic image; she displays what Heather Warren-Crow identifies as key attributes of digital culture: "malleability, transmediation and instability."[329] She is both a figure of resistance, a "nimble, labile girl-subject of digital culture [who] can squeeze through

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the cracks of oppressive power structures."[330] Paradoxically, as a "plastic image," she is also a "vehicle of hegemony [that] can satisfy a neoliberal mandate to respond to market demands…"[331] Miquela is a particularly relevant example of the dancing machine in that her plasticity as a digital image matches up with *dance as plastic form.* And so her dancing is her currency in advanced capitalism: it reinforces her malleability, in a sense, while also reassuring viewers that what they're looking at is not merely a commodity or a vector of brand power but, in some way, real. Miquela, Kyoko, Maria and Olympia are all dancing machines and posthuman dancers. They illustrate the mechanical body's commodity potential as a specimen of engineered life—a potential that is realized through dance. This chapter accounts for the trickier elements of posthuman dance, ones at odds with feminism and non-anthropocentrism, demonstrating the ways in which human- and capital-centered power still circulates, perhaps even more so, in the absence of an individual human dancer.

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Chapter 3:
"Dancers Make Good Workers": Military Technology, Choreographed Labour and the Machinic Gaze

Introduction: White Robots, Black Souls

In December 2020, American engineering firm Boston Dynamics posted a set of videos to YouTube featuring dancing robots. In the opening frames of one of these videos, a shiny white humanoid robot with articulated limbs and fin-like feet stands in a large, glass-walled warehouse. The opening chords for The Contours' 1962 pop hit "Do You Love Me?" fills the space (**See Figure 30**). The robot, whose name is Atlas, sways from side to side and even fidgets a little as it waits for the performance to begin. As the drums swell, leading into the chorus, Atlas launches into its choreography, step-touching and grape-vining to the rhythm of the song. It twirls, jumps, twists and hand jives with the exuberance, awkwardness and dogged rhythmic fidelity of one who has newly learned—or been programmed—to dance. The video was released by the robotics design company as a marketing strategy, and has 34 million views as of October 2021. The camera zooms out and pans in a circle as other robots designed by Boston Dynamics—"Spot" the "dog," "Handle" the warehouse-worker and "Pick," who is skilled in "depalletizing"— join in the choreography (**Fig. 31**). They do the running man in unison, performing neck isolations, leg extensions and fluid, supple squats and jumps, imparting an impressive quality of weight while also lifting off the ground effortlessly. As they hop, shuffle, do the slide and the twist, they demonstrate the common conflation of technique and technology toward a fantasy of capitalist synchronicity.

Dance is the lubrication of this fantasy, and it casts a veil over one of the more troubling aspects of Boston Dynamics: their military contracts. The fact that the Boston Dynamics robots are currently being tested in France for military reconnaissance missions, effectively making them weapons, may at first seem incommensurate with them as a dancing spectacle, but I will show how dance and militarization are imbricated. Using their promotional videos as a case study, this chapter analyzes the Boston Dynamics as weaponized bodies, and also as an example of the complicated relationship between *race* and posthuman dance. The video notably features very white robots dancing to Black soul music. The robots are racialized in their articulation to The Contours' music so that when the band croons, "Do you love me? … Now that I can

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dance?", we associate the Black singing voice with the entreating robots. These robots—another type of posthuman dancer—present a convergence of capitalism, dehumanization, enslaved bodies, and the appropriation of Black soul music to sell machines of war, thus underscoring one of my main critiques of posthumanism: its general dismissal of race as a structuring component in the historical definition of the human. The Boston Dynamics robots also facilitate my examination of choreography as a technology of work and the camera as a choreographic apparatus, through which to explore machinic vision or the posthuman gaze, and the role of filmic spectacle in screendance.

In order to make their robots dance, Boston Dynamics brought in a professional choreographer and dancer named Monica Thomas to help design the performance and the routine was later polished by Danish robotic movement consultant, Jakob Welner. The impressive end-product is the result of painstaking positioning and programming of the robots using a software called Autodesk Maya and a publicly-released interface called Choreographer (which is already being used by sports teams and theme parks). "Dancing is a form of highly accelerated lifecycle testing for the hardware" that leads to "rapid innovation in how a robot can move," notes Eric Whitman, a Boston Dynamics roboticist.[332] Here, dance is used primarily as a means for improvement in the physicality of the robot/worker; dance is a way of making the body both more mechanically reliable *and* more human-like. This view of dance as a method of body-improvement or -mastery can be seen also in a recent project called Dance Biometrics founded by competitive ballroom dance Alessia Minaeva, Dreamworks animator Chris Grun and robotics engineer Oleg Pariser. Dance Biometrics is a dance motion learning system that teaches dance with real-time feedback. By measuring "body motion with unmatched fidelity," using "biofeedback" and visual "overlay" to compare the input of the dancer with "proper technique" as performed by the dance expert, Dance Biometrics uses surveillance tools to helps users improve their dance ability.[333]

When biometrics is introduced, it is often for the purpose of *improvement* (of the body, of the body's technique); Dance Biometrics' slogan, for example, is "we help people move better."[334] This slogan sees technology as a tool of mastery over the body, and dance as a similar instrumentalized method of efficiency, control and improvement. From a marketing standpoint, the Boston Dynamics robots also dance in order to display the prowess of their inventors, who have created a work technology (and a working body) unhindered by fatigue, hunger, boredom

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or desire. And their bodies are further mechanized through the implementation of technique and choreography, which, because it is made of data and can be repeated with standardized consistency, proves these robots' ability to operate with error-free reliability. This is a phenomenon that speaks to speaks to an age-old adage and one I heard often in my time training at Winnipeg's School of Contemporary Dance: "dancers make good workers."[335]

In my previous chapter, I explored the role of dance—as cultural technique—in the production of soul in nonliving bodies. In this chapter, I will expand the corollary links between dance as cultural technique and the standardized, labouring body. I will think about the role of dance in relation to the posthuman body under surveillance, and the space between the eye of the camera and the body of the dancer as one of both possibility and violence. If dancers make good workers, a dancing *robot* might be understood as the ultimate worker, given that "Robot" is a Czech word that derives from the Slavonic term *Rabota*, meaning "servitude" or "forced labour."[336] These dancing robots, whose bodies will never improvise are model members of a physical labour force, and dance plays a complex role in their commercial depiction. This successful marketing strategy, in which robots can dance so well there are entire Reddit threads dedicated to exposing the videos as masterpieces of CGI[337], sneakily works to mask not only their symbolic exploitation as over-worked bodies in an army of capitalist cogs, but also the violence their bodies are capable of as potential military robots.

My first chapter addressed Loïe Fuller, a dancer who refused to be captured by the camera's lens, whose technique and persona nonetheless ended up on screen, albeit divorced from her "original" body. My second chapter examined the links between the embodied cultural technique of dance, the figure of the dancing machine and the role of the audience in producing soul. This chapter continues to examine the role of techniques—including robotic design, programming, choreography, editing, marketing—in posthuman dance. I am here extending the line of inquiry I introduced in my second chapter, where the four case studies I examined (Olympia, Kyoko, Maria and Lil Miquela) presented machinic dancers who were also workers, or whose dancing was a kind of work in the assemblage that produces soul. This chapter proposes that the dancing machine is about containment and de-animation as much as it is about movement. If screendance (or dance on film) is the genre that underpins my dissertation, here I seek to link the dancing robot with the "apparatus of capture," to show how dancing machines are not only produced by the camera, but can themselves be technologies of a posthuman gaze that is not primarily visual but also machinic

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or even mathematical. Dance is also articulated to techniques such as math and calculation, perhaps even more so in our current era of digital media, and the institutional and capitalist choreography of working bodies can be seen as a concurrent history to screendance, one that is itself a posthuman apparatus of capture and arrangement. By looking at an expanded array of cameras in this chapter, from Marey's camera-gun to the thermographic cameras used in military reconnaissance, I track the more-than-visual history of the camera as weapon, and I explore how such devices might not act only as technologies of entrapment and extraction, but as agents (or performers) in the production of soul.

This chapter will be an exploration of posthuman dance from the history of the scrutiny, containment and mechanical reproduction of human motion. Whereas a study of Fuller as a posthuman dancer sets up dance as that which overflows the human body, thereby illustrating the power of dance as a kind of life force that always exceeds the mechanisms of capture trying to make sense of it, the case studies I will bring into this chapter address dance's complicated relationship to standardization, containment and commercialization. In considering technologies of capture, dance as a marketing strategy, and what it means to choreograph labour, I start to trace the relationship between the lively quality of dance motion and the "apparatus," defined by Giorgio Agamben as "anything that has in some way the capacity to capture, orient, determine, intercept, model, control or secure the gestures, behaviors, opinions or discourses of living beings."[338] I establish that posthuman dance is often constituted as such under a *posthuman gaze*: that of the camera as an apparatus that de-animates or dissects in order to *re*-animate, projecting life via the moving image. What kind of dance does the posthuman gaze of the camera solicit?

Apparatus/*Dispositif*

André Lepecki's definition of choreography as an "apparatus for the control of gestures, mobility, dispositions, body types, bodily intentions and inclinations for the sake of a spectacular display of a body's presence" is furthered by the apparatus-role of the camera in relation to choreography, both in an archival sense and in the way that the camera has an agentic influence on the bodies it captures and propels.[339] The human motion studies of Eadweard Muybridge, Etienne Jules Marey, Frank Gilbreth & Lillian Moller Gilbreth and Frederick Winslow Taylor during the second industrial revolution (1870-1914), a time of rapid standardization and increased productivity, illustrate the camera *as choreographic apparatus* – one that facilitates the

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mechanization of labouring bodies on assembly lines in the name of efficiency, fusing the worker with the machine. Since the notion of apparatus is key to my thinking here, I should distinguish between Agamben's use of the term apparatus and that of Michel Foucault and French Marxist Louis Althusser. Althusser's use of "apparatus" is in relation to his theory of ideology, and in particular, the "ideological state apparatus," and the process by which individuals are constituted as subjects under such ideology—a process he calls "interpellation."[340] He argues that state apparatuses are "insidious machinations controlled by the capitalist ruling ideology in the context of a class struggle to repress, exploit, extort and subjugate the ruled class."[341] Because he is interested in how power might articulate itself in a way not based on classical sovereignty, Agamben (2009) adapts his arguments about the apparatus from Foucault's definition of *dispositif* (French for apparatus) rather than from Althusser. Foucault, who discusses the term in his 1977 "The Confession of the Flesh" interview, defines *dispositif* as a "heterogeneous set," ensemble or assembly comprised of "discourses, institutions, architectural forms, regulatory decisions, laws, administrative measures, scientific statements, philosophical, moral and philanthropic propositions."[342] A *dispositif*, more specifically, is the network of relations between these things, which are articulated together through various discursive formations, power relations and "linguistic and nonlinguistic" *strategies*, and, as Davide Panagia writes, Foucault's thinking on this concept is "especially rich for such an investigation is because his terminology marks a shift in the political, aesthetic, and methodological parameters for thinking about the relationship between media, aesthetics, and politics."[343] A *dispositif* in Foucault's sense is larger than Althusser's Ideological State Apparatuses (ISA), or what Foucault calls "institutions." Foucault's *dispositif* might include several ISAs; it is an assemblage on a societal level. For both Foucault and Agamben, the *dispositif* facilitates the transformation of the human being into both a subject, and an object, of power relations.

This history of human motion and productivity, as articulated to choreography, becomes a *dispositif* in Foucault and Agamben's sense of the term: a practice that can animate non-human or machinic bodies *and* de-animate human bodies (or make them machinic) in the name of productivity. The photographic motion studies mentioned in this chapter participate in controlling the working body by harnessing its efficient kinetic potential—a process that manufactures soul and produces new kinds of subjects. There is a violence that permeates this

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history of technologies of capture: it instrumentalizes bodies by choreographing them into sequences of pre-determined poses best suited to efficient work. This is a dehumanizing impulse that is also posthuman. The various examples in this chapter facilitate a line of questioning necessary in defining of posthuman theory of dance: How does the machine dance and to what effect? Who owns the dance of the machine? How do choreography, labour and exploitation work together to create a process of dispossession? How might dispossession or detachment expand the potential of the dancing body, and what does this expansion gesture towards? Through these questions I will explore the relationship between posthumanism and dance as framed through the slippery notions of ownership, sovereignty, consumption and profit.

Industrial Motion

Another Boston Dynamics video, released on YouTube in June of 2021 titled "Spot's On It," has five of the same model—Spot, the "canine" robot—dancing together in perfectly-timed formation (**Figure 32**).[344] They begin in single file, one robot directly behind the other, so that from the camera's view it looks like a singular dancer (**Figure 33**). They proceed to fan out their long, supple necks which can move organically thanks to smoothly articulated joints. This makes the formation look Medusa-like, as if it is one body with many snake-like "limbs." Eventually, the robots step out of line and into the group choreography, revealing their bodies as exact copies of one another. The Spots can dance in complete unison or in synchronized formation. In a blog post for Boston Dynamics, Calvin Hennick writes that in this performance, their "motions are so smooth and harmonious, that you might think the robots are actually listening and responding to the music. But they're not; they're listening to their synchronized inner clocks. For all their sophisticated sensors, the robots don't even know that music is playing."[345] This is an example of what Nick Thurston in his 2013 poetry collection *Of the Subcontract*, calls "Artificial Artificial Intelligence," where we imagine the AI entity to be self-operating and emulating the human, but really there is a human controller or programmer who sets up the conditions for them to appear intelligent. As Darren Wershler writes in the Afterword to Thurston's book, "The point is not that the mechanism is empty, like some kind of neutral reproducer. The point is that it is a mechanism that it already includes a spot for you […] whether that spot is in front of it as a player, inside it as the operator, behind it as the spectator being shown its misleading components, [or] from afar as the critic describing and demystifying it by virtue of your

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criticism."[346] Wershler notes the importance of imagination in assemblages such as "Spot's On It!," which include the human (choreographer, robotics engineer, camera operator, YouTube viewer), but not at the centre. These robots don't use AI or computer vision to sense their surroundings. Instead, their dancing was choreographed by professional dancer Monica Thomas, who has said that it was difficult to think and move like Spot in the creation process. As a human dancer attempting to embody Spot and create movement that would look good on the robot's body, Thomas illustrates a reciprocal move to the mimetic dance of Olympia, Kyoko and Maria in my second chapter; Thomas is another kind of posthuman dancer.

Spot's routine was later polished by Danish robotic movement consultant Jakob Welner and is the result of painstaking positioning and programming using a software called Autodesk Maya and a publicly-released interface designed for Spot, called Choreographer (which is already being used by sports teams and theme parks).[347] Instead of dance acting as the apotheosis of achievements in robotics, dance here actually uncovers potential improvements in the physical design of the robot. Or, as Boston Dynamics' roboticist Eric Whitman puts it: "Dancing is a form of highly accelerated lifecycle testing for the hardware."[348] "An athletic performance like dance stresses the mechanical design of the robot, and it also stresses the algorithms in the software," says Marc Raibert, founder and chairman of Boston Dynamics, giving "developers a creative target that leads to rapid innovation in how the robot can move."[349] In this example, dance is linked to a sense of aliveness (or even humanness) as well as the machinic-capitalist values of innovation and success. The dancing robot evokes both a body free in its physical and emotional expression, lost in the rhythm of the music, in relation with other bodies, and on the other hand it reminds us of that which is impossible for the human body: the impeccable, rigorous, repeatable, exactitude of the machine.

This video of the multiple Spot-models dancing is reminiscent of the dance numbers of 1930s film director Busby Berkeley, whose choreography was often shot from above to display his (human) dancers' bodies like gears in a wheel or ants in a snaking chain. *Footlight Parade* (1933) features a group dance comprised of nearly identical young blond women whose synchronized bodies fall into concentric circles and then lines (**Figure 34**). Seen in bird's-eye view, these dancers cease to appear as individuals and instead are absorbed into the machine of the dance formation as a synchronized mass. Like the choreography of the Boston Dynamics robots, Berkeley's choreographies relied on the physical, human ability of the dancers' bodies to

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create a dehumanized effect. Here, dance again produces life, but the kind of life that emerges is not the typical concept of human life, attached to inner feeling and soul. Instead, it is a teeming, buzzing life: a posthuman kinetics on the surface of the assemblage. The individual bodies cease to matter in Berkeley's numbers, and what does matter is the synchronization of the parts into a spectacle of fluid motion. Dance can be used in both directions—to posthumanize and to ensoul—and both directions can be understood as posthuman. In fact, Berkeley pivots between displaying his dancers from a distance, as depersonalized cogs in a wheel and alternately using the cinematic close-up to focus in on the individual faces of the glamorous women that make up this posthuman assemblage.

In Berkeley's *Dames* (1934), the camera is nearly as choreographed as the dancers, swooping and dipping to move through corridors of women's bodies bent at right angles, teasing out their geometrical affordances. Berkeley's vision brings to mind Jean Baudrillard's comments on the "industrial simulacrum," in which the concept of "series" becomes key.[350] In a series, Baudrillard writes, "the relation between [objects/bodies/commodities] is no longer that of an original to its counterfeit—neither analogy nor reflection—but equivalence, indifference…Only the obliteration of the original reference allows for the generalized law of equivalence, that is to say the *very possibility of production*" (97). Both "Spot's On It" and Berkeley's choreographies present images of cloned dancers whose superhuman ability for synchronization and sustained body control is complemented by the virtuosic contribution of the camera, which swoops and soars, capturing the choreography from distances and spaces impossible for the human eye. In the dance spectacles produced by Boston Dynamics and Berkeley, uncanny, posthuman liveness emerges from the gap between synchronized movement and, to quote Baudrillard, "the very possibility of production."[351] Berkeley uses human dancers and Boston Dynamics uses robots—the more true simulacra given that they are formally identical, as a set of technical specifications—both present an assemblage of many dancers that make up a mass of bodies (or is it one body?) a disciplined, militarized swarm that is undeniably alive.

A comparison of Berkeley's choreographies and the Boston Dynamics robots can help tease out a shift in the assemblages that congregate around posthuman dance between modernism and advanced capitalism. Berkeley's modernist vision, filmed with analog, optical camera, and danced by human bodies, tethers the assemblage of posthuman dance back to the individual creator (Berkeley himself) who is always credited for the work. Boston Dynamics' digital robot

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choreographies are not attributed to any one, genius, creator, but rather serve to glorify the corporate entity that Boston Dynamics is. There are also things that persist along the historical continuum that stretches between the two examples; Berkeley's star power and the corporate spectacle of the dancing robots differ in terms of capital, but what remains consistent between the two examples is the structuring process of systemic sexism and racism that allows us to view these dancing bodies as both dehumanized and spectacular. In both cases, the role of the imaginary is key in getting us to ignore what's really behind the curtain, so to speak.

Boston Dynamics unabashedly uses The Contours as soundtrack, enlivening their dancing robots through their articulation to Black soul music, yet erasing the Black bodies associated with the labour of ensouling, and Berkeley's choreographies do something similar: they dissolve the ensouling labour of his female dancers within a posthuman spectacle, dispersing soul quality onto the many-bodied assemblage of the dance and effectively dehumanizing soul through an erasure (or transfiguration) of the individual human bodies involved (**Figure 35**). For Siegfried Kracauer, whose writing on the performance troupe the Tiller Girls has often been used to analyze Berkeley's choreographies (See Hansen, 1992[352]; Ockman 2003; Robertson 1996[353]; McCarren 2009), these *en masse* dances give the appearance that there are "no longer individual girls, but indissoluble girl clusters whose movements are demonstrations of mathematics."[354] He writes of what he calls the "mass ornament," composed in this case of the dancers who are "mere building blocks, […] only as parts of a mass, not as individuals who believe themselves to be formed from within, do people become fractions of a figure."[355] Not only do these dancers not have souls in the Romantic sense, or even a sense of themselves as individuals, for Kracauer the Tiller Girls also exemplify the Taylorist choreography of labour; he writes that "the hands in the factory correspond to the legs of the Tiller Girls," legs which are themselves, an "abstract designation of their bodies."[356] This move, from individuality to anonymity, via a utopic imagining of group choreography, reflects the driving force of modernity, but also a shift towards a posthuman sensibility, in which dance belongs to no one body, but to the machinic assemblage itself.

Alain Badiou writes that the "opposite of dance" for the philosopher Nietzche "is the German, the bad German, whom he defines as follows: Obedience and long legs."[357] He continues:

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> The essence of this bad Germany is the military parade, the aligned and hammering body, the servile and sonorous body. The body of beaten cadence. Dance instead is the aerial and broken body, the vertical body. Not at all the hammering body, but the body "on points," the body that pricks the floor just as one would puncture a cloud. Above all, it is the silent body, set against the body that prescribes the thunder of its own heavy strike, the body of the military parade.[358]

Following Nietzche, Badiou contrasts dance with the "military parade," yet his description of dance as the "aerial," "broken," "vertical" and "silent" quite aptly describes the bodies of Berkeley's dancers in formation—choreographed dances which certainly evoke the military parade. What is it about military repetition that both threatens and constitutes dance? It is worth noting that before he was a Broadway and Hollywood musical choreographer, Busby Berkeley was a field artillery lieutenant in World War I where, between 1917 and 1919, he "created and directed large-scale drill parades for men."[359] Berkeley's military experience is evident from his attention to precision, synchronization and highly regimented pattern in his group dances—his world is one of deep control in which every body remains in its particular place.

The Broadway genre of "Precision Dance" was embodied by troupes like the Tiller Girls and the Allan K. Foster Girls who "performed crisp geometric routines," many of which were originally inspired by military drill. Striner quotes John Tiller as stating that "The very foundation of our dancing is the regulation military step," and remarks that "the resulting dances were so popular by 1929, according to *The Dance Magazine*, that the genre was almost omnipresent on Broadway."[360] Kracauer's description of the Tiller Girls's choreographed dances as reflective of "the entire contemporary situation [of] the capitalist production process," can be applied too to Berkeley's choreographies, where dancers become mere copies in a succession, reflecting the assembly line and the new mechanized technologies of commodity production.[361]

Standardizing Gesture / Choreographing Work

The human motion studies of the late 1800s, including the photographic experiments by French physiologist Etienne-Jules Marey (1830-1904), who in the final decade of the 19th century used chronophotography to capture and study moving bodies, act as a precursor to both the Taylorist assembly line and the cinematograph. Marey was a great inspiration to American photographer Eadweard Muybridge (1830-1904), who also devised photographic apparatuses to observe the mechanics of the body in motion. Their friend and associate Thomas Eakins, the

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American painter, worked alongside Muybridge and learned a lot from his process. While Muybridge used several cameras set side by side to capture trajectories of body movement, Eakins used one camera and long-exposure shots to explore the photodynamism of a body moving across the frame in his creative process. Marey, Muybridge and Eakins' studies of neuromotor movement served the means of industrial capitalism by focusing on the questions of productivity and efficiency linked to regulation of workers, standardization of products, and ultimately, profit. These studies had a deep impact on the concept of the working body (or the organization of work), as emerging on the assembly line and in factories during the Second Industrial Revolution (1870-1914). The photographers often used dancers in their studies, and even though they were not as interested in choreography as they were in "the visualization of the passage of time via the objectification of movement," their subjects performed predetermined (or choreographed) sequences of gestures through space.[362] These were often simple gestures, like jumping, twirling or even just standing and sitting (**Figure 36**).

It is important to note that Muybridge and Marey had different aesthetic approaches: Muybridge's stop motion photographs, which feature the realist subject captured at successive points throughout the performance of a gesture, acted as a precursor to cinema. Marey's chronophotographic technique, combined with the fact that his subjects wore tight black costumes with white stripes running down their limbs, abstracted the photographed body into a series of lines that ripple across the frame, making his work a predecessor to animation techniques like motion capture technology (**See Figure 37**). Elizabeth Stephens notes that Marey's images were impositional—depicting the full range of movement in a single image.[363] This impositional tendency is also seen in visual art at the time, including Marcel Duchamp's "Nude Descending a Staircase," where time is compressed and the many possibilities of the moving body can be seen all at once, in the same image. Muybridge's studies were chronological and sequential, giving way to a narrative of gesture. Because Muybridge "retroactively" ordered his individual photos into sequences, "arranging fragments of the world into temporal sequences," they became narratively legible, and "could then be dramatically transformed into histories."[364] By contrast, Wolfgang Ernst argues that Marey's "gaze [was] more analytical in a media-archaeological sense," pushing "against the tradition of perspective" to introduce "a genuine media perspective" that was more interested in multiple exposure and "virtually optical 'noise'" than in "material for narration."[365]

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For this reason, I argue that Marey's gaze teased out a *dance* impulse in his subjects, viewing them as layers of potential and swirls of emergent movement. Muybridge's approach was to break movement down to its quantifiable parts in still frames, thereby viewing human bodies through the lens of Enlightenment-era biometric knowledge. Muybridge's photos in effect extracted motion from the body, allowing it to be externalized and simulated with the movement from frame to frame. American theorist Fred Moten, who works at the intersection of critical race theory, cultural studies and performance studies, writes that Muybridge's work "exhibits a scientism that moves in the direction of an ever-greater accuracy that is itself the effect of an ever-greater deanimation of the body," a "near-pathological deanimation."[366] This quest for scientific accuracy works alongside the stopping of the body—a state of stasis—to further, as Moten calls it, "a certain photographic naturalism that seeks to reflect and to attach itself to a law of development or movement—the mechanics of a more-than-personal history."[367] In other words, Muybridge's studies attempt to standardize and generalize natural "truths" about bodies, irrespective of their histories, personal and otherwise. Muybridge breaks movement down into its component parts in order to better understand it but loses emotional, personal and cultural resonances in the process. He views the body in motion as a machine whose analysis can benefit scientific progress and efficiency of labour.

Between 1913 and 1917, American industrial engineers Frank and Lillian Moller Gilbreth completed a series of motion studies for the express purpose of studying the minimum gesture of the worker's body. The Gilbreths used a chronocyclegraph to record the gestures of manual labourers such as brick layers and factory workers, who wore small lamps on their wrists and limbs and were then captured by the time lapse photographic technique. The resulting photodynamic streams of light were like maps of the way these workers' bodies moved through space as they went about their tasks. The Gilbreths argued that by reducing the amount of unnecessary movements done by the workers, they could increase efficiency and productivity. As Elizabeth Stephens notes, the purpose was to identify and eliminate "industrial waste" in the form of movement. "Waste" in this context doesn't mean idleness or the squandering of resources that already existed, but rather a "kind of untapped margin of potential between current levels of productivity, and the maximum amount of productivity they could engineer."[368] The Gilbreth motion studies reveal that the best type of working body is a machinic one. A machinic

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body that does not deviate from the expected routine (or improvise at all) makes a reliable and productive worker.

Figure 38 depicts a worker engaged in the repetitive gestures that comprise her daily labour. The job she is doing is not entirely clear from the photograph, but what is apparent is that this is work she does mainly with her hands, while sitting. In a reflection for the *Design Observer*, Rick Poynor writes about this particular photo, noting "the combination of the spectral figure of the woman—her boots under the table are the most solid thing about her—and the grids behind her and covering the tabletop."[369] He observes that "the erasure of the phantom woman's identity within this hard-edged chamber of grids […] looks like an unintentional warning of the dehumanizing pressure of the relentlessly monitored production line."[370] The Gilbreth motion studies indeed served both to scrutinize the mechanization of workers' bodies via the medium of photography and film and also used those technological tools to further standardize those bodies. Their studies demonstrate the ways in which emergent 20th century recording technologies were used not only to archive history, but to measure and visualize—in fact *produce*—a new kind of body through emergent forms of quantified knowledge. Felicia McCarren writes: "The minimum gesture that the machine age cultivates is figured, and in part produced, by a picture-making process—photographic instantaneity—born toward the end of the nineteenth century."[371] Motion studies such as the Gilbreths' use photography and film to present the gestures of working bodies as data that can be optimized for maximum productivity, thereby reinstating the value of efficiency. In fact, Gilbreth's studies revealed that a bricklayer could double the bricks laid from 350 to 700 per hour by stacking bricks on a trolley and not bending down every time. Like Taylor's principles of scientific management, the Gilbreth motion studies demonstrate that the best type of working body is a machinic one; a machinic body that does not deviate from the expected routine makes a reliable and productive worker.

Black and white film footage shot by the Gilbreths depicts receptionists, factory workers and brick layers at their jobs. The camera is stationary in order to capture the workers' movements through space over time. The repetitive nature of the workers' motions hones the preciseness of their gestures. This is a choreography of work, but can we fairly understand this as a type of dance? One example in particular interests me: two bricklayers are working at getting a pile of stones from the ground up to the first level of a house. To do so they ascend a makeshift wooden ramp one at a time, to bring the rectangular stones up, and descend a similar ramp to go

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back down and collect more. They follow each other in a loop of activity; one goes up while the other comes down. This on its own could be seen as a kind of postmodern dance, but it is the moments of pause that make this video dance-like to me. At about their eighth loop of brick-carrying, the workers begin to move more quickly. They start to run up the ramp, following each other in increasingly frenetic movement. Then, suddenly, they sit down next to each other on a half ledge. They take a break. They swing their legs and rub their arms. They chat. Crowded together on the short ledge, the workers' shoulders touch; they become aware of one another as bodies in exertion. This intimate pause punctuates the efficiency of their choreographed loop, rendering the effort of that choreography visible. These are not machines but bodies that tire and need rest. They can actively choose to sit, sip water, swing their legs and gear up to go again.

It is precisely these breaks in movement that the Gilbreths were attempting to weed out in their studies of human motion and efficiency. The dancing robots made by Boston Dynamics have no need to take breaks. Their bodies do not need rest to carry on working. Given Aristotle's statement in his *Poetics* that dance is rhythmic movement whose purpose is "to represent men's characters as well as what they do and suffer," it seems likely that quotidian labour such as that represented in the Gilbreth videos falls under the category of dance, but so too does the space of rest, in which the suffering perpetuated by the rhythmic movement of work settles into the body.[372] In the Gilbreth video, the pauses are moments of repose. The workers' bodies relax. Their feet swing aimlessly. Their purpose, in those moments, is to recover so that they can continue to work and be productive. So what is it about the pauses in the Gilbreth video that suggest dance, more than the frenetic movement does? What is it about the pause, or moment of suspense in general, that evokes dance? Karl Marx's theory of surplus labour suggests that the work done over the course of a standard work day always has an excess. I want to suggest that dance can be felt in that excess. Much like in the dance translation project I describe in the introduction to this dissertation, where Miku's avatar body responds to excess by glitching, dance is expressed in the effects of repetitive gesture that spill out, over and on top of the worker's body in moments of suspense and repose, as well as instances of zany resistance to the prescribed choreography.

The unrealistic expectation, produced by the camera as tool of standardization, in which the human body with its flaws is expected to labour mechanically without rest or fail, also produces a great number of filmic responses in the early part of the 20th century, from the

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dehumanized geometric aesthetics of Busby Berkeley's choreographed dance numbers to the slapstick capers of Charlie Chaplin (*Modern Times*) and Lucille Ball ("I Love Lucy") which satirized Taylorism and assembly line work.[373]

If the choreography of labouring bodies is also a distribution of power, what is at stake here is the matter of control. And it is precisely when things fly out of control on the assembly line, cultural theorist Sianne Ngai argues, that we are confronted with the aesthetic category of the "zany," an affect that "asks us to regard form not as structure but as activity" (30). In *Modern Times*, for example, Charlie Chaplin's Tramp character is working on the line when he is eaten by the machine, effectively turning his rebellious body into a commodity on the conveyer belt (**Figure 39**). Lucille Ball's stint as a chocolate factory worker on "I Love Lucy," in which she is overwhelmed by the speed of the conveyer belt and ends up stuffing her mouth with chocolates in order to keep up with the pace required of her as a worker (**Figure 40**), also demonstrates the comedic potential of the incompatibility between the human and the machine, a potential that is perhaps rooted in, as Sianne Ngai puts it, the "anarchic refusal to be productive."[374] Whereas the bodies of Berkeley's dancers can be understood as the replicated commodity or the *object* that is bought or sold, the satirical visions of Charlie Chaplin and Lucille Ball mobilize dance-like gesture to portray the mechanized *bodies* of workers in factories, bodies whose mechanization is not merely a "conduit to … increased production" but, as Owen Hatherly argues, a potential "generator of pleasure."[375] If dance is seen as the excess, or the zany "pleasure" that results from the bodily experience that cannot be standardized by the machine, it is an active resistance to the choreography of labour and also a *justification* for, or *aestheticization* of, that labour.

I will return to Nietzsche's definition of dance which I gave earlier. He writes that in dance there is "a mobility that is firmly fastened to itself, a mobility that is not inscribed within an external determination, but instead moves without detaching itself from its own center. This mobility is not imposed, it unfolds as if it were an expansion of its center."[376] This is another way of saying that dance is productive of soul and interiority, an argument that I have been making throughout this dissertation. No, Gilbreth's workers are not dancers, but in them we see an illustration of the choreography of labour, in which gestures are imposed from without. This is done first by externalizing and studying these gestures via the camera and then by prescribing the repetition of a pre-determined gestural path in the body as the key to improvement and increased efficiency. Reading the repeated machinic gestures of assembly line workers as a kind of dance

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facilitates a potential mis-attribution of the body's labour to the "center" (soul/interior/will/agency) of the worker. Does choreographed gesture come from within or from without? Here, the slippery definition of "dance" that plagues my dissertation introduces a new problem. The question "What is dance?" may help us also get to the question: "What is a human?" or "What is gesture, motion and agency in the absence of the human?"

In the photodynamism of the Gilbreth's images (**Fig. 8**), the labourer's body, hard at work, is replaced by the aesthetic beauty of the light trails left behind by their gestures through space. These images in effect *erase* the working body, leaving only the path of their productivity[377]. The camera here becomes not only a tool of extraction but a kind of weaponized entity that works to illustrate, perhaps more perfectly than any other medium, what cinema scholar Laura Mulvey identifies as two human fascinations: "one with the boundary between life and death and the other with the mechanical animation of the inanimate, particularly the human, figure."[378] This combination of body-erasure with the choreography of hyper-embodied labour gets at the uncanny heart of what makes dance posthuman: dance is both *of* the body and can exist outside of the body—choreographed gesture can be extracted and instrumentalized, used to animate other bodies, both human- and non-. In the process, the subject constituted by the dance gaze is both objectified as a product of the camera-technique-performance assemblage, and appears as one with a rich centre of agency and action.

Dancing Weapons

In the photos I provide to illustrate Muybridge and Marey's motion studies above, Muybridge has photographed a woman hopping on one foot in a circle (**Figure 36**). While it is not unusual that she is topless in the photos—Muybridge often photographed his subjects (of both genders) in various states of undress, perhaps in order to better assess their anatomical presence—her potential sexual objectification is here at high contrast with the example I provide from Marey's work: a dehumanized set of lines depicting the motion of a soldier walking (**Fig. 37).** I find it significant that Marey's subject is not only abstracted, but a *soldier*. I chose these particular examples in order to help facilitate a rhetorical shift, from the objectified female dancing machine I addressed in my second chapter, to the choreographies of Busby Berkeley (a former soldier), and the dehumanized dancing robots of Boston Dynamics' invention. Although the weaponized body of the dancing machine was a latent characteristic in my chapter two

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analysis of Maria and Kyoko, I now wish to tie the worker's body, engineered for unfeeling productivity and choreographed to be posthuman in its efficiency, to the dancing machine *as* weapon. The motion studies of Muybridge, Marey and Gilbreth move us through the space of the quantifiable, instrumentalized body, and prepare us for the weaponized body, both of which are connected through a choreographic sensibility.

If dance is the thing that transfixes the viewer, convincing them of the machine's liveness just enough to impart prestige on the inventor, but not enough to demand an ethical treatment of that same mechanical entity, I want to extend this notion into a different, related, realm: the current day design of military technology and the function of dance in the marketing of a fantasy narrative about that technology. To do so, I will return to The Boston Dynamics viral videos, which offer a contemporary case study for the militarized dance body that allows us to trace the links between motion studies, Taylorism, choreographic sequences, and the spectacular liveness of the dancing robot. Spot the robot "dog," for example, is in fact not just an excellent dancer, but a military asset in training. An article by James Vincent for *The Verge*, published earlier this year reveals that the French army is currently testing Spot in military exercises, with "the intention of assessing the usefulness of robots on future battlefields."[379] Pictures released on Twitter by France's foremost military school, the École Spéciale Militaire de Saint-Cyr, confirm this (**Figure 41**). French newspaper *Ouest-France* suggests that Spot is mainly being tested for use in reconnaissance missions, a process which requires the robot to be equipped with cameras and remote-controlled, making it a useful contributor to both commercial markets and simulated battlefields. As Vincent notes, Boston Dynamics has a "long history of developing robots for the US army," and the NYPD has recently been testing Spot for their use as well.

In my second chapter, I focused on Lang's Maria and Garland's Kyoko because they are both dancers with weaponized bodies where dancing is one facet of their weaponization. When Maria dances for the audience of leering men, she seduces them with her angular gyrations, but she also sets up a conduit of dance-power between her body and their gaze that harbours a violent energy, capable of destruction. In this chapter I show how the Boston Dynamics' robots, which are likewise *enlivened* through dance (and through their articulation to soul music, and the expressive voices of The Contours, an all-Black group), are also used to *extinguish* life. They are essentially machines of war positioned between life (where dance connotes liveliness as well as a Freudian death drive) and death (in their potential violence and deadened morals). The dancing

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of the Boston Dynamics robots makes them just alive enough to perform as weaponized servants for the military, but not so alive that there would be qualms about harming them in warfare.[380] Does aestheticizing labour (thinking of it as dance, for example) somehow de-politicize the stakes of working bodies? Does framing the Boston Dynamics robots as dancers serve mainly as a distraction from their potential military application? The dancing robots produced by Boston Dynamics are designed and trained to execute gestures with perfect precision. These are post-anthropocentric dancers in form, yet their reliance on dance technique as indexed to correct and incorrect execution speaks to a very neoliberal, human-centered understanding of gesture, where precision and progress are tied to values of success. In light of this new information about the robots—namely their weaponization—their perfectly synchronized dance routines start to look a little different. Here we see that dance is not necessarily the opposite of the weaponized, synchronized body (the "military parade" as Nietzche suggests), but can also be an instrument in its training as obedient mover, moreover as a weapon. I am drawing threads here between the dancing machine, the camera, and the military apparatus. Spot dances for the camera, but Spot also *is* the camera, observing battlefields coldly and strategically in order to choreograph motion around the bodies that reside there.

It seems important to note that Etienne-Jules Marey's original photographs were taken with an instrument he referred to as his "gun." Whereas Muybridge's equipment in 1870 was "heavy and unsuitably clumsy to capture the rapid movements of birds and insects," Marey attempted to avoid this pitfall by designing a "Device that was about the size of a hunting rifle, portable and free to aim from any angle."[381] As described by Pasi Valiaho, "The photographic lens was located in the barrel, while the bottom end of the barrel housed a magazine containing a cylindrical glass plate alongside two disks with shutters. Pulling the trigger made a clocked mechanism of the three disks move inside the magazine and record pictures sequentially."[382] The gun-camera here is doubly evocative (as weapon and photographic lens) of Gilles Deleuze and Felix Guattari's "apparatus of capture," a device that stills, abstracts and homogenizes the activity of living beings in order to "profit from their productivity."[383] Following from capture, there is something about stillness here that feels pertinent, especially in relation to dance. The cameras used in the motion studies of Muybridge, Marey and Gilbreth still the moving body in time in order to make its gesture legible and productive. Yet, in the sequences performed by Charlie Chaplin and Lucille Ball, their bodies act as obstinate objects that interfere with the

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smooth operations of the machinic assembly line. Chaplin and Ball are not still (as Sianne Ngai points out, they are "zany" and frenzied), but they threaten to stop the forward motion of the machine. And in the Gilbreths' motion studies, the moments of stillness the workers indulge in are similarly rebellious against a machinic logic. How might stillness act as both an intervention and an accomplice to the choreography of work and war?

The Posthuman Spectator

Throughout this chapter I have been circling around the camera as both an observer of dance and as an active agent in the choreography of the labouring body. Spot the military robot becomes a kind of camera that can seek and find bodies and weapons when in battle, but Spot can also dance *for* the camera. The bodies of workers at the turn of the century were organized, regulated, standardized—choreographed, essentially—by the cameras of Muybridge, Gilbreth and Marey (who referred to his camera as a gun) until they themselves became machinic. If posthuman dance is constituted in part under a posthuman gaze, Alain Badiou's writing on the audience of dance may help clarify just what a posthuman gaze might be. In his chapter, "Dance as Metaphor for Thought," Badiou expands on Stéphane Mallarmé's writing to think about the spectator of dance: "Just as the dancer—who is an emblem—is never someone, so the spectator of dance must be rigorously impersonal. The spectator of dance cannot in any way be the singularity of the one who's watching."[384] What is needed, Badiou explains, is what Mallarmé calls "an impersonal or fulgurant absolute gaze […] one that commands the essential nakedness of the dancers…" (with "nakedness" implying impersonality or non-singularity) .[385] Mallarmé would certainly be thinking about live dance here, and Badiou makes no explicit mention of mediated dance or dance on film, but it strikes me that this "fulgurant gaze" is epitomized by the camera. "Fulguration," which originates from the Latin word for lightning, means flash-like or glancing, much like the camera's shutter, as it suddenly closes on the image. A "fulgurant gaze," according to Badiou is that which attempts to grasp a "vanishing gesture" in order to "keep it pure, outside of any empirical memory."[386] Badiou writes that the fulgurant gaze of the dance spectator should not be one that projects personal desires onto the bodies of the dancers, but rather a gaze that "belongs to no one."[387] I argue that a posthuman gaze should also serve as an alternative to the optical limitations of the camera.

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The camera is of course an instrument of empirical memory, associated with visual knowledge, and critical posthumanism critiques ocularcentrism as an Enlightenment-era fascination with visible proof. Scholar of critical posthumanism, Rosi Braidotti, notes the "omnipotence of visual media" in Western culture, suggesting that visualization has become the "ultimate form of control" in which objects are held apart from the perceiving subject and either reified or scrutinized.[388] Braidotti's feminist approach critiques vision as the primary sense because of the way that the eyes have been linked to the brain, delineating it from the body and perpetuating the gendered problematics of Cartesian dualism. There are obvious links between ocularcentrism, tools of vision like the camera, and the Enlightenment (an era whose name pivots on light as image). Barbara Bolt writes that "the metaphorics of light" have "informed European philosophy from Plato's cave until its apotheosis in Enlightenment thinking," aligning knowledge and understanding with luminosity.[389] To privilege vision, or light seen at a distance, is to separate "matter from illumination" or body from "truth."[390] If dance is a practice that is primarily engaged with by an audience through vision, and dance on screen is especially ocularcentric, encountered via the mediation of the camera, can screendance be properly called "posthuman?" I am interested in how screendance might counter or complicate the power dynamic and anthropocentrism that an ocularcentric approach assumes.[391] In order to counteract the occularcentrism of Enlightenment thinking, I argue that there is a shift between mid-century optical surveillance (used by Taylor and Ford) and the digital surveillance emerging under advanced capitalism (embodied by the Boston Dynamics robots).[392] The difference between the two is partly informed by the interaction between surveillance device and the content captured. Electromechanical media such as the cameras used by Muybridge, Marey and the Gilbreths chop up flow, piece fragments back into sequences and analyze them in order to assign value (or standardize workers bodies, etc). Digital media, on the other hand, make this process algorithmic and mathematical (Manovich 2001), threatening a more insidious (and invisible) kind of control, while also offering an increased potential for posthuman relation.

I will turn now to an example I classify as posthuman dance—*ORA*, a 2011 National Film Board collaboration between Montréal choreographer José Navas and Montréal filmmaker Philippe Baylaucq—a work of screendance that explores the intersection of surveillance technology, luminosity and "capture," navigating the camera-as-weapon against its intended use. Filmed with 3D thermal imaging technology, *ORA* renders the dancers' body temperature,

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usually imperceptible to the naked eye, visible (**Figure 42**). Every subtle variation in heat is detected by rare and extremely sensitive cameras developed by American defense and security company Lockheed Martin which are usually limited to military, scientific and medical applications. The history of using military cameras to film dance and performance goes back to Robert Rauschenberg's "Open Score" (1966) as part of *Nine Evenings*, but *ORA* is the first full-length art film that utilizes this technology.[393] The combination of military surveillance technology with dance in *ORA* presents a unique assemblage in which a machine of control in fact works to engender intimacy rather than alienation or fear. This decoupling of the military machinery from its regular assemblage and its articulation to dance fosters an intimate aesthetics of the posthuman body that swaps technophilic materiality (steel, gears, wires, circuits) for a sensual presence that invites touch and interaction.

A thermal imaging camera like the one used by Baylaucq detects infrared energy emitted by the body and converts that data into electronic signals which are then processed to produce images on a video monitor, translating heat into something visible, and further rendered in post-production through editing and colourization of the gray-scale footage. Such is the case with *ORA*, in which the intimate sensation of heat, usually only felt at close proximity to the warm object (or in this case, body), is translated into glowing patterns and colours, an image perceivable from a distance. Because *ORA* was shot in complete darkness, the dancers' bodies (warm, alive), become the only source of light in the film. Glowing softly, the human forms look like computer-generated avatars whose liveliness is symbolized by the "aura" of light that emanates from inside them (**Figure 43**). This light is also the most animal thing about the dancers—their *heat*. As the dancers stroke the walls, which are outfitted with textured, heat-reflective aluminum panels, the surface glistens, reflecting the body heat of the dancers, and turning the walls into performing objects of a sort (**Fig. 42**). Conversely, there is a deathly veneer to the dancing human forms, even as they glow with life. The places where the dancers' faces lack the warm flow of blood (the nose and the eyes) remain dark and cavernous, drawing attention not just to the life pulsing through these bodies, but to their skeletons as well, configuring them in a kind of *danse macabre*. It is significant that the dancers' eyes—their ocular-receptors—are revealed as heatless zones: being without illumination, their eyes become soulless in this conception. How ironic that the very signs of life in these bodies (heat) should make them look more dead (or simulated) than alive.

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Whereas in science, instruments of vision are often used to penetrate the human body in pursuit of information, the human-machine interface in *ORA* evades such mastery by presenting a unique body—what Douglas Rosenberg calls a "double graft, both screenic and kinesthetic"—situated in between our own unseen visceral corporeality and the specific materiality of the infrared camera.[394] The strange, auratic forms on screen are visual, yes, but they are also revealed to be "impressionable and conductive, like skin…" returning the viewer to a multisensory relationship with their own body and inviting haptic engagement with the images on screen, or as Laura Marks calls it, a "touching with the eyes."[395] The way these bodies look—their skinless radiance, their textured innards—invites Marks' cinema theory of "haptic visuality," which can add nuance to a reading of *ORA*, complicating the film's perceived tendency towards ocularcentrism. With haptic visuality, Marks explains, we do not see things on the screen as sharply defined objects (as in optical visuality). Rather, our eyes "graze" across the image, feeling for texture rather than form: "While optical perception privileges the representational power of the image, haptic perception privileges the material presence of the image."[396] As I watch, I begin to identify with the presence on-screen, to feel a kinship stimulated as much by the awareness that my own body would also appear alien under the thermographic gaze. This follows Marks' suggestion that film is not just a bearer of signs, but rather that "our experience of cinema is mimetic, or an experience of bodily similarity to the audiovisual images we take in."[397]

The thermographic camera reveals the "transitory" nature of our bodies, not just as subjects, but as objects, that transmit heat like energy. As Elena Beregow writes, "Strictly speaking, there are no thermal objects, there is only thermal action."[398] Here, heat—a transfer of energy between material forms—also bears similarities to *dance as action* and relation. Beregow continues: "This understanding doesn't rely on the 'cold' reason of Western enlightenment that derives from the visual paradigm of rational observation, but rather it formulates an alternative model of 'warm' reason through thermal intersubjectivity that is possible through the melting and mingling of bodies."[399] Donna Haraway, who has also written against the West's obsession with ocularcentrism as a form of patriarchal control, prefers to rely on "situated" or "embodied" knowledge than what she names "a conquering gaze from nowhere"—the gaze of science and military.[400] Infrared cameras like the ones used by Baylaucq and Navas are regularly employed in surveillance, for thermal weapon sight, in medical imaging and tests, and for global

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monitoring of environmental pollution and climate change; these devices are invasive of our privacy and crucial to medical, scientific and military practices.[401] Although *ORA* makes use of the very instruments of omnipotent surveillance that Haraway rejects, the film also distributes power and agency across multiple acts of relationality between machine, performer and audience. The dancers in *ORA* notice one another just as the camera notices them, feeling for presence in the dark. The scientific technology in *ORA* invites the viewer to share in its haptic engagement, giving us a way to reimagine the body, not just as a self-directed, contained instrument of function (hands that operate machinery, bodies that can perform tasks, the body as a tool for mimesis) but as a porous entity that imprints other bodies.

One point of departure for understanding surveillance "can be found in Lyon's explanation of surveillance being about both caring and controlling."[402] The medical and military use of surveillance technologies have historically sought out the body's heat only to treat it as an object of distanced, objective study. However, against its prescribed military use, *ORA*'s thermographic camera gazes upon a dark room full of dancers who are also willing participants. The dancers expose their bodies to the camera and make themselves vulnerable to the heat-seeking technology. This opening, one to the other, constitutes a human-machine interface that is founded on intimacy; rather than hold the body at a distance in order to label or contain it, the camera brings the body nearer through its heat-seeking sensibility—its own sense of touch. Dancers are, of course, used to being in close proximity with one another's bodies, and sensate interaction is part of their daily work. In the making of *ORA*, the dancers worked in complete darkness, forgoing sight and relying on other senses, particularly their capacity to feel one another's bodies nearby.[403] Without access to clear vision, their participation in *ORA* required a lot of vulnerability and trust from the dancers. The thermographic quality of the camera reaches out in much the same way the dancers do in the dark, seeking the radiating heat, the warmth of a body, rather than the outlines of its form in space. In this way, the infrared cameras penetrate beyond the skin or shape of the dancers' bodies to their inner vitality. That the dancers are consenting participants in this interaction is crucial, given the invasive history of surveillance technologies and the dancers' inability to see the camera penetrating their bodies in the dark. Like its homonym "aura," *ORA* "enjoins a temporal immediacy, a co-presence, between viewer and object" that inspires a "form of yielding to one's environment rather than dominating it."[404]

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In *ORA*, the ocularcentrism of film media is rearranged through the textured quality of the infrared image and the haptic nature of dance.

Conclusion

Through the example of *ORA*, I have tried to show another facet of posthuman dance, beyond the historical trajectory of the literal dancing machine, or machine that dances (encompassing Maria, Kyoko, Lil Miquela and the Boston Dynamics robots among others), and toward an overlap of human, machine, military technology and the camera's gaze. This chapter covers quite a bit of ground, moving from the dancing robot who validates its working body and masks its weaponization by mastering choreography, through the motion studies of the late 19th century, and their impact on work science and Taylorism, to the spectral dancing forms produced by an instrument of war. This has been a chapter about the way power is distributed across a posthuman dance assemblage. From the resistant materiality of the body—the way Chaplin and Ball use their bodies as obstacles to capitalist production on the assembly line, for example—to the rigorous and repetitive choreographing of the body via the apparatus of capture that is the camera, power can be initiated and maintained by humans, technologies, and techniques. How might posthuman dance, in this case, be thought of doubly: first, in a literal sense, as it relates to the dancing military robots who step in time without adherence to a human body, and second, as a mode of relation between bodies in which the performative impulse springs up outside of the realm of human intention? What role does dance play in the obscuring of power relations, as related to the weaponized camera, the gaze that constructs an ideal working body, or the skinless, expressionless, posthuman dancing figures in *ORA*?

ORA offers up a spectacular fantasy of dancing bodies as trails of heat and energy, but it does not address the power dynamics of what it means to use military technology to film dance. One particularly posthuman quality of the film is the fact that the camera itself has a lot of agency; in the process of rehearsing for and filming *ORA*, the infrared camera produced so much heat that it had to be periodically cooled with liquid nitrogen. The camera was like another performer in the film. Pierre Plouffe, Technical Supervisor and Digital Imaging Specialist for *ORA*, describes the inaugural use of the camera in production as a kind of "performance" in which the dancers huddled around in hushed awe, using their cell phones to record the dry ice billowing from the apparatus and even breaking into applause. Additionally, in order for *ORA* to

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be produced in 3D, it had to be shot using two cameras, "placed side-by-side and synchronized, like human eyes."[405] These special cameras had equally special requirements for their handling. Because the cameras are owned by Lockheed Martin, an American security company, they could not travel outside the United States. The Canadian crew travelled to Vermont to shoot the film in a set of early 19th-century foundries, and the lack of insulation in the stone walls made it difficult to maintain a constant ambient temperature. Baylaucq's use of high-definition, stereoscopic cameras ensured that the heat patterns of his dancers' bodies were precisely defined. In *ORA*, it could be argued that the agent with the most power—the only agent capable of "seeing" clearly in the dark—is the thermographic camera. This decenters the human participants from the hierarchy of power as attached to knowledge or, better yet—vision, rendering them streams and swirls of energy rather than powerful, all-knowing humanist subjects. Yet the dance film also holds tight to the concept of "aura" as linked to soul, through the emanating light of the dancers' body heat as proof of inner vitality. The dancers' choreography too, acts metaphorically as proof of life, as their body movements and the post-production effects communicate images of atoms splitting, embryos expanding and organic matter reproducing, drawing connections to the natural world by way of a technological image.

Although the dancers in *ORA* wear briefs, the camera denudes them further, revealing their individual patterns of blood flow like leopard spots or "virtual leotards."[406] The body images that *ORA* delivers to the viewer are posthuman in a number of ways. They are not only representational, mimetic, or symbolic; they are also material, immediate and sensual. The dancers' moving bodies are revealed to be more than singular units; inhabited by many visible currents (blood, heartbeats, breath), they help us visualize the "assemblage of forces, or flows, intensities and passions that solidify in space and consolidate in time, within the singular configuration commonly known as an "individual" self."[407] These are not de-gendered bodies—the dancers who have breasts are identifiable because they are zones where less blood circulates and therefore less heat is emanated (see **Fig. 43**)—but they are, in a sense, de-racialized bodies. Because ORA essentially does away with the skin of its dancers, permeating instead to their internal bodies as glowing, pulsing, vital sources of heat, any identifiable ocular proof of race is done away with. Like the shiny white Boston Dynamics robots, who evoke non-visual associations with Black performance, creativity and soul thanks to their soundtrack of The Contours, and yet are de-racialized (and dehumanized) in their robot form, the dancers in ORA

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also participate in a posthuman vision of racial erasure, which in a way serves to reestablish whiteness as a "neutral" baseline.

I want to propose that these de-raced bodies work to forge a particular posthuman fantasy—one in which the flattening of the division between human and non-human agents is enacted through the erasure of visual identity markers. This posthuman tendency towards abstraction is one I will explore in my fourth chapter, on mo-cap and extraction of dance movement from the body. As I have shown in this chapter, Taylorism and its corresponding photographic motion studies sought to reduce the working body to a series of gestures that was not only minimal, but *abstract*. The assembly line was not only a method of choreographing the working body, it also had far-reaching influence on the kinds of art produced at the beginning of the 20th century. We see this influence not only in Chaplin's satirical films, but also in the tendency towards abstraction in visual art more generally. The modernist ambition to create art that was dehumanized and therefore "pure" is one on full display in José Ortega y Gasset's 1925 book *The Dehumanization of Art and Other Essays on Art, Culture, and Literature*. Gasset writes, "Although a pure art may not be possible, there is no doubt that there is room for a movement towards it. This would lead to a progressive elimination of the human or too human elements characteristic of romantic and naturalistic works of art, and a point will be reached in which the human content of the work diminishes until it can scarcely be seen…"[408] This "purity" is especially hard to achieve with dance as a medium, given the canvas in dance is the expressive human form.

The modernist tendency towards purity/abstraction/dehumanization is also one that manifests in posthuman art. It is worth noting that the language of purity is harmful here, especially given the implication that race stands as an obstacle to "pure" form. Yet I detect in commercial posthuman art a tendency toward the fantasy of dehumanized agency that is nonetheless driven by recognizable signifiers of race. These signifiers are either manufactured, through music or animation, or, oftentimes, they are residual—traces of the living body that provided dance motion to the animated avatar, say. Racialized movement is the ghost in the machine of digital abstraction. The Boston Dynamics robots seem to operate in a world where race and gender does not exist, yet in this fantasy sphere of deracialized bodies, power (or cultural capital) is still tied to the "neutral" dancing robot body by way of residual signifiers of

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Black culture. As I have noted above, the song that the Boston Dynamics robots dance to in their first viral video is "Do You Love Me? (Now That I Can Dance)."

The song is by The Contours, an African American soul group signed to Motown Records, who topped the charts with "Do You Love Me?" in 1962 and again in 1988 (following the release of the film *Dirty Dancing* in 1987, which featured the song) (**Figure 44**). Boston Dynamics' choice of song here is somewhat tongue-in-cheek—the lyrics are humorous when attributed to the dancing robots, who seem as though they are singing as they dance, asking the audience to love them—but the robots also replicate many of the dance moves mentioned in the lyrics of the song (the twist, the mashed potato, etc.), all of which are associated with Black culture in the 60s, and the mention of "soul" in the lyrics as well brings together the music genre with the concept that has been driving this and previous chapters of my dissertation: dance as proof of soul. Here, soul evokes not only the Romantic-era genius poet, whose soul spills out in the form of lyrical expression, but also the stereotypical associations between Black American soul music and heartfelt, genuine, even pained, expression.

The presumed correlation between Black culture, authenticity and nature is one that has been critiqued by Afrofuturists like Kodwo Eshun and Alexander Weheliye who argue that "black subjectivity appears as the antithesis to the Enlightenment subject by virtue of not only having a body but by *being* the body [emphasis mine]."[409] Weheliye writes that "within Enlightenment discourses blackness is the body and nothing else."[410] In *Blackness and Value: Seeing Double*, Lindon Barret further analyzes this association between Blackness and embodiment through the auditory register. He names the "*signing voice*" that which represents the "literacy of the white Enlightenment subject"—"full humanity, whiteness and disembodiment" –whereas the "*singing voice* metonymically enacts blackness, embodiment and subhumanity."[411] Weheliye argues that because "Black sacred and later secular music [takes] on two simultaneous functions: proving black peoples' soul and standing in for the soul of all U.S. culture," when that Black singing voice is extracted from its source and recontextualized, as in the case of the Contours' voices in the Boston Dynamics robots, the "'soul,' and by extension 'humanity' of black subjects, therefore, is often imbricated in white mainstream culture."[412] The shiny white cybernetic Boston Dynamics robots are therefore articulated both to whiteness and to the post- or super-human subject, but are also enlivened or ensouled (and of course

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commodified), by both dance and the singing voices of the Contours, along with all the attendant signifiers: Motown, Soul, nature, embodiment, and authenticity.

In this chapter I have argued that posthuman dance is undergirded by a history of work science, photographic motion studies and abstraction of the labouring body towards capitalist ends. Although these histories attempt to neutralize markers of identity such as gender and race, towards a problematic schema of "purity," there is also a facet of commercial posthuman dance that relies on those same identity markers for the cultural capital they lend. In my next chapter I will explore this relationship between extraction, race and the dancing body in more depth, focusing particularly on digital technologies such as Motion Capture (Mo-Cap) which mine dance-data from human bodies in order to animate digital abstract, animal or de-humanized animations. The questions that tie these two chapters together are as follows: Must posthuman dance move through abstraction? Where does the body go these processes of mediation, and what emerges out the other end? What other bodies exist here, or how is our notion of "body" expanded or called into question?

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Chapter 4:

The Grain of the Body and the An-Ontology of Digital Dance

Introduction

In an essay devoted to dance in his *Handbook of Inaesthetics* (2005), Alain Badiou writes "Dance is, first and foremost, the image of a thought subtracted from every spirit of heaviness. Dance frees the body from all social mimicry, from all gravity and conformity."[413] This definition—of dance as freedom from compliance—runs counter to the histories of choreographed labour, Taylorism and machinic/minimal gesture I have been exploring over the last two chapters, and returns us to the conception articulated in my first chapter on Loïe Fuller, of dance as a process of constant, emergent becoming, and a freedom from rigid social forms. It also frames dance as an escape *from the body itself*, where the material artifact of the body is a means to capitalist ends but its gestures hold the promise of rebellious agency. This association with dance as an escape from the body—as a fugitive force that exceeds embodied limits—is a common one in philosophy. Gilles Deleuze, who has theorized dance as an illustration of Henri Bergson's philosophy at the turn of the century, writes that dance "abandon[s] figures and poses to release values which [are] not posed, not measured, which relate movements to any-instant-whatever."[414] In contrast with the militarized camera's gaze, *dance* is the thing, Deleuze argues, that resists measurement, containment and the assignment of values. Similarly, Giorgio Agamben describes early modern dance gestures as a "means without end" or "corporeal actions that subvert the economy of production in which gestures work toward a predetermined outcome."[415] Like Badiou, these thinkers often posit dance as anti-instrumental, anti-stillness, and anti-singularity. Dance, according to these philosophers, does not reside in a singular dancing body, but can exist on its own terms in the world, in a constant state of unfolding and becoming. Dance has agency outside of the human body. This is a posthuman notion.

There is a connection here between dance and animation, which Deborah Levitt writes is replacing cinema as "the dominant medium of the 21st century."[416] In her book *The Animatic Apparatus*, Levitt argues that animation is an "increasingly powerful pop cultural form" that contributes to the way we perceive "life" today as plastic, transformative and "an-ontological," or without a sense of *being*.[417] The concept of dance as emergent, nascent, and ever-transforming

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pairs well with what Levitt calls the "an-ontology of the animatic body," which is also, she explains a type of "virtuality."[418] *Animation is a kind of dance, and dance is a kind of animation*: both rely on motion to defy fixed form, gravity, and temporal rigidity. The screendance body is therefore implicated into this an-ontology in posthuman ways. In her work on mid-century Canadian animator Norman McLaren, whose drawn-on film animations were non-extractive/indexical and featured dancers and dance-like imagery, Alanna Thain suggests that "animation in cinema should be understood as an ongoing negotiation between the human and the technological, precisely at the intersection of the body."[419] Because animation is the illusion of movement "and thus the illusion of life," Thain argues, it marks a "deathly indetermination between real and unreal, life and death, representation and simulation, live action and cartoon."[420] Levitt also gives an analysis of animation as uncanny or undead, writing, "There is no death in animation, because there is no being—no existence—to begin with. There are no necessarily limiting features, no essential finitude—everything is shadowed by its possible metamorphosis, erasure, and resurrection—and there is thus no ontology."[421]

The relationship between animation and ontology must change when the animation is not hand-drawn or rendered from scratch but takes as its starting point gestural data, extracted from the body. This is the case in animation methods such as rotoscoping and motion capture (mo-cap), both of which have historically utilized dance to experiment with the limits of their mediums. What kind of bodies are produced by these modes of animation, and what kinds of subjects? If the dancer's body is a material that can be shaped by the application of technique in different ways, the posthuman subjectivity that emerges navigates the relationship between dance and soul, where dance exceeds and spills over the individual body, linking multiple bodies, techniques and modes of liveliness. What if we considered movement, or dance, as an agent in the production and erasure of race? If the optical surface of the skin has historically been solidified into "race," the plastic and elastic kinetic qualities of *dance* seem to represent something deracialized, yet gesture/movement is often extracted from dancers of colour and applied to animated bodies (humanoid, animal and object-oriented). In this chapter, I argue that this extracted movement may function as a kind of digital blackface, where the material, embodied quality of the dancer's labour is applied (as proof of humanity and soul) to the dancing body of the nonhuman or animated entity. In this case, material bodies are elided in favour of the transformative capitalistic appeal of their gestures—which are captured as data and are therefore

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transferrable across bodies. The spectacle of screendance meanwhile veils this process as one of racist exploitation and appropriation.

Dance as Prime Mover

Alain Badiou is not known as a dance scholar. His theory of dance as a metaphor for thought—a theory that instrumentalizes dance for the uses of philosophy, and which presumes to evoke an "ahistorical model of dance" that lacks cultural specificity—is somewhat unsatisfactory from a dance studies perspective.[422] Yet I cite Badiou because his definition of dance works to move us away from a humanist or human-centered perspective and toward dance as an agentic energy produced by technique and productive of soul. He writes:

> Dance is like a circle in space, but a circle that is its own principle, a circle that is not drawn from the outside, but rather draws itself. Dance is the prime mover: Every gesture and every line of dance must present itself not as a consequence, but as the very source of mobility. And finally, dance is simply affirmation, because it makes the negative body—the shameful body—radiantly absent.[423]

The idea that dance is "not drawn from the outside, but rather draws itself" is posthuman. It is a posthuman idea because it decenters agency from the human subject, attributing it instead to the activity of dance itself. Here, Badiou understands dance (or perhaps more appropriately, technique) as preceding both the subject who uses the technique and the dance that is produced, so that dance and dancer emerge on par, or perhaps the dance even overshadows the dancer. Note that Badiou writes about "dance" as a thing capable of drawing/acting/moving on its own. He does not mention the *dancer*, but instead names dance itself as the "prime mover." He also comments on the performative quality of this agency: "Every gesture…*must present itself* not as a consequence, but as the very source of mobility" (emphasis mine). Here the dancer is erased in favour of the performative, thinking agency of dance, which appears as a source and not a consequence. Here, the idea that the dance does not belong to the dancer is the thread that connects dance as metaphor-for-thought (wherein the "dancing gesture" and not the dancer "invents its own beginning") to the notion of choregraphed labour (in which the worker cannot own their own gestures) and to dance as a cultural technique (which can be transposed from body to body). The relation between dance and ownership is the primary tension of a posthuman theory of dance. The posthuman idea that dance is an act of dispossession is both generative and problematic. The dancing body is the body that sweats and breathes and feels pain and joy. Dancing bodies, in their corporeal effort, can produce a dance that is flowering and emergent, not weighted with the effort of its creation: an

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agentic, energetic, transforming, self-driving life force. This is how dance produces soul in absence of a "shameful" (to use Badiou's word) body.

Throughout my dissertation, I have argued that dance plays a pivotal role in the production of soul, and that this is part of what makes dance posthuman. In this chapter, I want to return to a definition of posthumanism in order to demonstrate its roots in both modern and postmodern thought. The modernist proclivity for "purity" of form in art has overlap with the dreams of flight from the body espoused not only by philosophers like Badiou, Agamben and Deleuze and Guattari, who liken dance to thought, but by the thinkers and artists associated with 1990s cybertheory. These discourses feed directly into certain facets of posthumanism, or posthumanism verging on transhumanism, a philosophical movement for the enhancement and augmentation of humans via technological intervention[424]. This chapter examines the relationship between dance and animation methods such as rotoscoping and motion-capture technology (mocap), where gestural data is extracted from a dancer's body in order to enliven a cartoon character or digital avatar. Both these methods rely on dance as a kind of life-force that can be drawn out of the individual dancer, whose sweat, breath and embodiment is erased in the process, or abstracted into nonhuman shapes, lines, and patterns in motion. These animation methods use different approaches to reach the same goal: to leave the material/specific human body behind while retaining traces of its liveliness. A look at the historical relationship between dance and "extractive" techniques of animation can help elucidate the intersection between two goals: 1) to abstract dance away from the "impure" and limited human form and 2) to use extracted dance as a kind of "grain of the body" to infuse the nonhuman form with a human-like essence or emotional quality (soul). There is a tension here, between these two goals, that can be analyzed through Levitt's notion of an-ontology. How do animations derived from motion-captured dance both propose a fantasy of non-being, substituting virtuosic abstraction for recognizable human forms, *and* ground that fantasy in the material, embodied labour of the dancer? What is the relationship between animation and dance, and between extracted gesture and ontology?

The "Shameful" Body

According to Badiou, dance "makes the negative body—the shameful body—radiantly absent."[425] If dance already does this on its own, then techniques of extraction like rotoscoping and mocap further erase the "shameful [human] body," opening up myriad possibilities for the

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types of bodies (humanoid, animal, alien, abstract) which can be animated by the movement extracted from the human. What is presented here is a fantasy of erasure (of the obstinate, material, fleshly body) that moves towards plasticity—a plasticity that is evoked by dance and also by the digital images that dance can animate. When dance is animated, and when that animation stems from a referent human body, this juxtaposition between the ontology of the human and the an-ontology of dance (and of animation) is emphasized. If, as per Badiou and Langer, dance can be *lifted off* of the body in thought, the introduction of animation technologies like rotoscoping and digital motion capture (Mocap), as well as the dance notation systems that inform them, facilitate this process of lifting dance off the dancing body and transposing it onto other "bodies" or avatars: human, animal and abstract. The resulting animation, now in possession of its own liveliness (attributable to its "center") both erases the referent body and preserves it, like a ghostly memory in the gestures that unfurl.

What, exactly, constitutes Badiou's "shameful body"—the body that dance leaves behind? Is corporeal finitude in itself shameful, or are there particular qualities or types of bodies that are more shameful than others? The language of shame here is complemented by (or contrasted with) the language of purity used by both modernists and cybertheorists. This phenomenon, which I will comment on shortly, should alert us to a problematic tendency towards erasure of bodily markers of identity such as gender and race. I ended my last chapter by pointing out the common yet subtle use of racialized music and choreography in the animation of "neutral," posthuman forms, such as the Boston Dynamic Robots. In that example, music and the voice, as non-visual signifiers of race, are used as cultural capital to produce a sense of kernel, core, or soul in the posthuman dance body. All of this taps into discourses of essentialism, demonstrating how race continues to operate as a structuring category, even after traditional visual signifiers (skin, physiognomy) are done away with. Similarly, the fantasy of animation as a world of plasticity both erases the racialized body and, simultaneously, often relies on subtle markers of race (rooted in movement and gesture) to enliven or authenticate such plastic, posthuman figures.

Body movement and gesture are seldom understood as tied to a person's identity or sense of self, particularly when these features move through abstraction and are transposed onto animated bodies. In fact, dance scholar Danielle Goldman observes that many practitioners of motion-capture technology are enchanted by its ability to abstract the beauty of human movement away from "bodily distractions" such as gender and race.[426] She quotes Paul Kaiser, who praises

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motion-capture as a method of "clean[ing] out the eyes" in order to approach a more "pure" representation of movement.[427] This language reflects the scrutiny of a scientific gaze, presenting a problematic posthuman fantasy wherein gender and race are obstacles to the attainment of "pure" or "neutral" form. This is an obviously racist formulation wherein abstraction or neutrality is code for whiteness. While extractive animation methods often seek to achieve a de-anthropocentric or posthuman vision of dance through the act of erasure, I am particularly interested in thinking about how they also work to retain or *produce* a sense of interiority in the animated body, especially through associations with certain types of dance—namely Black social dance. This line of thought also opens up important questions about ownership, uncredited labour and appropriation as they relate to dance and animation.

In this chapter, I will return to a definition of posthuman dance in order to contextualize the influences of modernism and postmodernism/cybertheory on the broad (and often contradictory) category of the posthuman, particularly in terms of a fascination with body-transcendence and digital immateriality. I will show how dance notation systems and digital motion capture can speak to each other, linking the modern with the postmodern. I will then focus on two animation practices—rotoscoping and motion capture—to examine the relationship between dance, animation practices, and the posthuman fantasy of "pure," disembodied, deracialized form. This is a post-racial fantasy of disembodiment that nevertheless often relies on the labour of racialized bodies to produce a sense of "body" and interiority or humanness in the animated dancer.

Fantasies of Body Transcendence: from Modernism to Postmodernism

I find it pertinent to redefine posthuman dance in all its contradictions. While this chapter focuses on the introduction of technologies that can extract dance movement from the body and distribute the agency of dance to other, non-human, entities, dance is already posthuman, even before the interception of the camera or digital technologies of capture. The obsession with dance by the philosophers mentioned above point to the always-already of dance's posthuman qualities. Susanne Langer writes:

> What do dancers create? Obviously, a dance. … [but] they do not create the materials of the dance—neither their own bodies, nor the cloth that drapes them, nor the floor, nor any of the ambient space, light, musical tone, the forces of gravity, nor any other physical provisions; all these things […] create something over and above what is physically there:

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> the dance. What, then, is the dance? The dance is an appearance; if you like, an apparition. It springs from what the dancers do, yet it is something else. In watching a dance, you do not see what is physically before you—people running around or twisting their bodies; what you see is a display of interacting forces, by which the dance seems to be lifted, driven, drawn, closed or attenuated, whether it be solo or choric, whirling like the end of a dervish dance, or slow, centered, and single in its motion. One human body may put the whole play of mysterious powers before you. But these powers, these forces that seem to operate in the dance, are not the physical forces of the dancer's muscles, which actually cause the movements taking place. The forces we seem to perceive most directly and convincingly are created for our perception; and they exist only for it […] dance gives us a dynamic image that appears to be something charged with feeling. Yet this feeling is not necessarily what any or all of the dancers feel. *It belongs to the dance itself* [emphasis mine].[428]

This passage from Langer's book *Feeling and Form* isolates one of the most posthuman qualities of dance, and one that tracks through each of my chapters thus far: that dance can exceed the body that produces it, and can even be "lifted" off of that body in the mind of the perceiver. Of course this is true of any gestural movement: we can imagine the energy and motion (the *anima*!) of a pole vaulter's running approach and extravagant leap, or the repetitive lifting actions of a bricklayer (as seen in chapter 3), for example, outside of their labouring bodies. But Langer makes a clear distinction between athletic movement or quotidian gesture and *dance*, writing that "the forces" in dance that "we seem to perceive most directly and convincingly are created for our perception; and they exist only for it."[429] There is rarely an instrumental goal in dance, aside from the display or enactment of these "forces," which Langer also refers to as "virtual powers."[430] And here Langer uses the word "virtual" in order to distinguish the imaginary power from the actual power (the tensing muscles and quickened breath) of the dancers' bodies; dance gesture is always, in Langer's theory, both actual and virtual. Like Badiou, Langer does not often clarify which particular kind of dance she has in mind while writing, but I assume it might be contemporary solo and group choreographed dances, or even ballet, based on her description of the tension between the dancers' bodies, the swell of unison movement, and the "dynamic image charged with feeling."[431] Langer's work is therefore perhaps too generalizing in relation to dance as an artistic output, but what she names here is again something posthuman. Langer is not describing any kind of digital or technologically mediated dance—she is writing about live, in-the-flesh performance—but she uses the term "virtual" to signal the always-already posthuman nature of dance. There is also a sense that Langer—like the other philosophers I mention

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above—is fascinated by dance as a simultaneous product of, and *release from,* the materiality of the human body.

Langer's book, published in 1953 at the tail end of modernism, connects the philosophical proposition of dance as that which exceeds or transcends the body and modernist preoccupations with disembodiment or dehumanization. At the beginning of the 20th century, modernist writers and artists were turning away from realism and conventional representation or narrative-based works, and dance in particular was becoming distanced from its "traditional association with mimetic forms."[432] Mallarmé's fascination with Loïe Fuller's abstract and improvisational Serpentine Dance, which I explored in my first chapter, illustrates this turn. A turn to abstraction is also, for modernists, a turn to "pure" form, without the distractions of the sentimental human subject. As José Ortega y Gasset writes in 1925, "Although a pure art may not be possible, there is no doubt that there is room for a movement towards it. This would lead to a progressive elimination of the human or too human elements characteristic of romantic and naturalistic works of art, and a point will be reached in which the human content of the work diminishes until it can scarcely be seen…"[433] Gasset's text takes a posthuman approach which many modernist artists share, spurred both by their reaction to romanticism and to the Second Industrial Revolution, whose new technologies of telecommunication and electricity drastically changed quotidian life and the experience of human subjectivity and embodiment.

In the first half of the 20th century, bodies and machines were becoming more and more intertwined, and the effects of this change are seen in art produced during this period. Modernism is at least in part a reaction to the "demonic supplementation of the machine" or what Marshall McLuhan has called the "extensions and amputations of man" (also understood by Hal Foster as the "'double logic of the prosthesis,' which both extends and constricts/shrinks the living human body").[434] Patricia Waugh argues that the cybernetic machines of the 1940s propelled another kind of "pure" form: the "bio-informatic body" of postmodernism, where "the human is constructed in the terms of a technological sublime and the (genomic) machine is regarded increasingly as the epitome of the (optimum late capitalist) human: intelligent, responsive, efficient, controllable, engineerable."[435] Under postmodernism, disembodiment became both a utopic fantasy of multiplicity/immortality and a horrific prediction of loss of agency. As Allison Muri writes in a 2003 article for *Body & Society*, "One of the most pervasive themes in the fiction and theory of cyberculture of the past few decades has been that the human

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body is vanishing, irrelevant, or interfaced with the machine, an empty shell robbed of what is variously called spirit, consciousness or identity."[436] The rhetoric of disembodiment characteristic to cultural theory in the 1980s and 90s—a period which Arthur Kroker later defined as the "flesh-eating 90s"—conveyed a world in which "the human form … becomes an "electronic body…obsessed with its own disappearance."[437] These novel digital bodies could move in new, networked ways unhindered by the "shameful" weight of the human corporeal form. The era brought about a fantasy of body-transcendence and posthuman transformation—what William Gibson calls, in his classic book *Neuromancer*, "data made flesh."[438] In 1999, Roy Ascott writes: "Computer networking responds to our deep psychological desire for transcendence—to reach the immaterial, the spiritual—the wish to be out of body…to exceed the limitations of time and space, a kind of bio-technological theology."[439] And in 1993, Michael Heim writes that in the computer interface, "the spirit migrates from the body to a world of total representation. Information and images float through the Platonic mind without a grounding in bodily experience. You can lose your humanity at the throw of the dice."[440] The influences of cyber-fiction and theory have articulated body transcendence to the posthuman condition, contributing to the absolute confusion that resides in the overly broad term "posthuman."

Donna Haraway's cyborg is the most well-known example of posthuman embodiment explored in early cybertheory, yet Haraway herself admits that the cyborg is an "ironic" and "blasphemous" figuration—a metaphorical provocation more than a material reality.[441] In her other work, in particular "Situated Knowledges," Haraway actively writes against the fetishization of cybernetics in the "United States in the late-1980s," which she sees as a symptom of "scientific and technological, late-industrial, militarized, racist, and male-dominant societies."[442] The posthuman subject is supposed to be a reaction to the humanist (scientific, objective, male-dominant) subject of the Enlightenment, yet as Katherine Hayles argues, "the erasure of embodiment is a feature common to *both* the liberal humanist subject and the cybernetic posthuman" [emphasis mine].[443] Hayles demonstrates that this overlapping fascination with body-erasure between humanism and posthumanism is also a dual fascination with erasure of *difference*:

> Identified with the rational mind, the liberal subject possessed a body but was not usually represented as being a body. Only because the body is not identified with the self is it possible to claim for the liberal subject its notorious universality, a claim that depends on erasing markers of bodily difference, including sex, race, and ethnicity.[444]

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Hayles points out one of the major pitfalls of the branch of posthumanism as associated with cybertheory, techno-utopian body transcendence and digital embodiment: its adherence to "disembodied immortality" as a source of "unlimited power."[445] In a similar vein, Allison Muri argues that cybertheory of the 80s and 90s derives in part from a "specifically Christian literary tradition" in which, ironically, "the cyborg figure of the 'post-God era' functions to make implicit or explicit claims for Christian precepts of spiritual transcendence."[446] In all of these writings, themes of power and control dovetail with tropes of technological disembodiment. What does all of this mean for a definition of "posthuman dance"? Must posthuman dance leave the human body behind, or might the formulation of dance as (already) posthuman expand our notion of what a body is (or can be) while still attending to the complex nature of embodiment? What might a posthuman theory of dance teach us about digital embodiment?

There are connections between the fetishization of body transcendence in theory and art from the 80s and 90s, and the focus on a similar body transcendence in dance. The fascination with digital tools as means of extending the dancing body, or even extracting the dance from the body, ramps up around the same time, but in fact the practice of dance incarnates ideas of body-transcendence even before digital media presented the free flow of dematerialized information as a salient feature of its medium. This is an argument that I began in my first chapter, on Loïe Fuller, who was praised by Symbolists like Mallarmé for her ability to dance away her body, abstracting her female form under swathes of heavy, moving silk and flashing lights. The capacity for dance to evoke or enact body-transcendence of course intensifies in the digital era. Writers like Kroker, Ascott and Heim see the digital spirit as immortal: unencumbered by the weight of the body, it can roam freely through cyberspace. Likewise, digital dance movement—akin to a spirit, or soul—is also immortal and can travel between "bodies." Dance is no longer tethered to one material body or form. The aesthetics of intermedia dance can be mapped onto the aims of posthumanism; both practices acknowledge the power of emergent technology to produce new understandings of subjectivity and embodiment rooted in hybridity, extension and dispersed agency. Yet, as important as it is to expand ethics and politics beyond the human as a discrete entity (with intermedia arts acting as a useful platform for the exploration of new bodies and identities), in slotting "the human" into one category of sameness, this proposition does not acknowledge the multiplicities that already exist within this category.[447] Susan Bordo writes that

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in order to achieve "human freedom from bodily determination" we have metaphysically deconstructed the body in the digital age into an "ideology of limitless improvement and change [that defies] the historicity, the mortality and, indeed, the very materiality of the body" and proposes a "view from everywhere."[448] This fantasy of limitless multiple embodiments, Bordo argues, is just another kind of disembodiment: in her words, "the postmodern body is no body at all."[449] Similarly, I argue, the dance body is often thought of as "no body at all."

Posthuman dance necessarily moves away from the tradition of human exceptionalism as embodied in the individual performer whose dancing expresses their true interiority. Technological intervention or mediation certainly facilitates this move. Yet, in defining a posthuman theory of dance I also want to push back on some of the associations with the mediated dance body: the immaterial, abstract body idealized by modernists, for example, and the cybernetic or the "everywhere" body prized by postmodernists. For example, digital media—while it may seem ephemeral—is in fact both *material* and *active*/in motion. Much media theory from the end of the 20th century highlights the progressive dematerialization that attends technological development, where the impulse to associate digital media with immateriality is common. As Johanna Drucker has noted, a binary rhetoric emerged out of the 1990s, dividing "old" print media from "new" digital media: "In this binary opposition, theorists of hypertext and electronic writing saw their media as immaterial, and further, saw that immateriality as somehow superior."[450] Citing Matthew Kirschenbaum's re-configuration of digital media as *material* in her definition of "performative materiality," Drucker writes that while Kirschenbaum's distinction is excellent, "his description is grounded in ontology rather than performance, in a sense that the identity of material things resides in their properties and capacities, in *what they are* rather than *what they do.*"[451] Drucker shifts the focus to the performative elements of materiality, a performance that always happens within a framework that is cultural, systemic and machinic. Drucker's attention to non-human performance here informs my definition of a posthuman theory of dance, where I attempt to account for the performative, or dance-like, elements of non-human or extra-human bodies in order to track dancing traces through their various mediations (and relations).

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Dance Notation: Abstracting Embodiment

What is the relationship between dance and materiality? Embodiment is one answer, but it is not a very good one, since dance's place in the body is hard to see clearly. The common understanding of dance as ephemeral plays into the notion of immateriality, in which the dancing body passes through not only numerous emergent micro-gestures but infinite *unrealized* or potential gestures as well. As Stamatia Portanova writes, "all moving or dancing bodies, either digital or alive, either perceived or remembered, possess their own virtual twin, a sort of infinite extension with infinite possibilities that can only be thought as a concept and simultaneously felt as a sensation."[452] Perhaps it is not dance, but the infinitesimal nature of the body's gestural *potential* that seems to resist materialization. Maybe this "virtual twin" – the one with the myriad imaginable gestures—is virtual precisely because it is immaterial, and in a sense, impossible to realize. The sensation (or thought) of infinite gestures is corralled by the cultural technique of choreography, for one, which secures movement to certain gestures selected over others. Another (subsequent) cultural technique which attempts to inscribe or materialize dance's ephemeral quality is dance notation. Dance notation systems are numerous and include Beauchamp-Feuillet dance notation for Baroque dance (**Figure 45**), Rudolf Laban's signature Labanotation (**Figure 46**), and Sutton DanceWriting, designed to preserve classical ballet works (**Figure 47**).

These notation methods are used primarily for archival purposes, for preserving and remounting well-known dance works accurately, thus preserving their "legacy." The dancing body, represented through the cultural technique of dance notation, becomes increasingly abstract through these notations. The little shaded rectangles, half-circles, curved lines and directional squiggles are material abstractions of a body passing through movement, but the appearance of these symbols is often de-anthropomorphized. As dance materializes in a legible, repeatable system—one that holds the promise of movement in its stillness—it also traverses abstraction or a zone of dehumanization. The legible materiality of these scores therefore speaks to the category of the nonhuman (or posthuman). While some of the first notation systems—including Beauchamp-Feuillet, which was commissioned by Louis the 14th—came about during the Enlightenment and were associated with the highly formalized choreography of courtly dance, dance notation as a project of analyzing and recording movement, as well as a method of abstraction, can be tied epistemologically and aesthetically to modernism. The most well-known dance notation method is Labanotation, devised by Austro-Hungarian choreographer Rudolf

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Laban in 1928. Laban's studies in architecture influenced his interest in the spatial qualities of dance movement, and the symbols used in Labanotation correspond to the following categories: direction of movement, level of movement in space, the movement's duration, the part of the body doing the movement, and the dynamic quality. In the dynamic quality section, Laban distinguishes between space (direct/indirect movement), weight (strong/light movement), time (sudden/sustained movement) and flow (bounded/free movements). A vertical staff holds the symbols and a central line divides the right and left side of the symbolic body presented there (see **Fig. 46**).

Labanotation's diagrammatic approach to dance presents not only a modernist fascination with the quantifiable or modular body, but the designs themselves resemble the types of modern art often associated with the European avant-garde (**see Figure 48**). Carolyn Lanchner has observed that "notations for the dance can resemble the patterns of abstract painting,"[453] and Mark Franko writes that dance "notation itself is a visual abstraction of movement."[454] Art History scholar Flora L. Brandl has pointed out more specifically the resemblances between Laban's Kinetography and the geometric abstract artworks of Modernist artist Sophie Taeuber-Arp (who was a dance student of Laban's in Zurich in the summer of 1915) seen in **Figure 49**.[455] Importantly, Laban's model is anti-mimetic. As Brandl writes, "Laban's objective is to eliminate imitation from the ways dance is circulated […] Movement no longer travels from one body to another through the imprecise and uncontrollable act of copying the steps of the dance master," but instead, "the originality of a choreography is preserved in a script and can be activated at a later point only through a meticulous and professional hermeneutic effort."[456] This abstraction, away from the thinking, feeling body, and towards a series of formal shapes, is also a move towards a kind of "neutrality" of the body. Yet this process of dehumanized, abstract transfer nevertheless also facilitates a production of soul that transmits between bodies, via dance. Even though, as Brandl writes, Labanotation "does not have a complex grammar as other human languages, and speakers are not able to communicate a full range of thoughts or feelings through it," it still presents dance as a form of language which holds the techniques of feeling/soul even when confronted with body-erasure.[457] Dance notation becomes a cultural technique, not only for the preservation and re-mounting of classic dance works, but for the transmission and production of soul outside of the human body.

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The Grain of the Body

Notation erases nuance, subtle variation and surface texture in its representation of dance, in favour of the nucleus or "grain" of each dance movement, which, as seen in Laban's categories of "weight" and "flow," for example, is iterated in the score.[458] Yet notation also facilitates more varied *interpretations* of the score on the part of the dancer, especially in comparison with learning choreography from archival film footage, for example, which requires precise mimesis of other dancers' bodies on screen (but often mirrored and flipped). Roland Barthes' well-known essay "The Grain of the Voice," which acknowledges the material body of the performer within the performance (in this case, singing), informs my analysis of dance notation and facilitates connections between notation and extractive animation methods like rotoscoping and mocap. While it may seem that the idea of "grain" romanticizes the essence, core, or unique centre of an individual performer, I understand Barthes' approach to be more posthuman than this. Roland Barthes distinguishes between what he calls the pheno-song and the geno-song. The pheno-song, or what we might call the *cultural technique* of singing, encompassing the "rules of the genre," the "style of the [singer's] interpretation," and the "subjectivity" of the artist, as formulated through "expressivity."[459] On the other hand, the geno-song, Barthes argues, has "nothing to do with communication" or "representation (of feelings)," but more to do with the "materiality" of the singing voice.[460] This geno-song is also named by Barthes as the "grain of the voice": the "materiality of the body," the "body in the voice as it sings, the hand as it writes, the limb as it performs."[461] I want to use Barthes' concept, of the grain of the voice, to think about the residue of the dancing body that carries over to the animated form. By "residue" I do not mean to frame the human as the primary, exceptional body that imprints all others; as such I need to acknowledge that Barthes' "grain" speaks to a nucleus of the human that draws us inward towards the individual rather than outward, into posthuman relation. Yet, there is also something about this grain that configures the *materiality* of the human body as palpable in the dance. This interests me in term of dance as a technology of soul because it configures the soul as a product of embodied labour and as something that is at once both freely circulating and tethered in some material way to that labour.

Thinking about dance in the context of Barthes' "grain" can help elucidate dance's complicated relationship with ownership as well—a relationship that dance notation participates in. Laban's scores, for example, have been used to preserve dance heritage as well as in dance

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education, and "in 1952 a labanotation score was the first dance notation score to be accepted for copyright registration."[462] Laban's dream was that his notation system would facilitate the longevity of dance works through preservation and increased resources for their re-production. In his introduction to Ann Hutchinson's book *Labanotation or Kinetography Laban: The System of Analyzing and Recording Movement*[463], Laban echoes Benjamin's thesis in "the Work of Art" (1935) as he speaks to his notation's ability to distribute dance in a democratic fashion, writing: "The manifestations of human spirituality which has made dance a sister art of poetry and music can survive only if its products are written, printed and read by a large circle of laymen and performers."[464] Yet these democratic aspirations are at contrast with the specialized knowledge required to interpret Laban's scores. Digital tools of movement analysis, however, can make using dance notation much easier, and the compatibility between Labanotation and such digital tools is evident: both have as their goal the abstraction of information about body motion into "simple, repeatable geometric shapes."[465] LabanWriter, an early program developed by Lucy Venable in 1987, facilitated the creation and editing of scores on the Mac computer, and there are numerous recent studies that use Labanotation in combination with motion capture technology and data.[466] Some of these studies use machine learning algorithms to analyze motion-captured data from the dancing body and translate it into Labanotation. In an IEEE conference paper from 2017, Li et. al claim that their experiments, which utilize the Hidden Markov Model (HMM) and a trained multi-class classifier to analyze lower and upper limb movement, yielded an impressive accuracy rate of "92% for the generated notations."[467] It is unsurprising that these studies, most of which are done by scientists, emphasize accuracy, efficiency and improvement as their objectives. There is also a way in which these studies (and the tools they mobilize) seek to enhance the verisimilitude of dance in a digital body, or rather, use dance as a way of increasing a digital body's verisimilitude. Dance notation and extractive animation techniques like mocap can work together to engineer new forms of expressive life and make the proliferation of dance possible. By notating or scoring dance, dance is freed from the singular body towards a potential of multiple embodiments, and not just traditional, human embodiment.

This "freeing" of dance from the singular body is also an expansion into potential. If, as intermedia dance scholar Stamatia Portanova writes, every gesture is already a "multiplicity or swarm … an aggregate of microgestures," and dance is a kind of data with infinite combinatory

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potentials of coordinates, then notation also opens onto this expansive potential.[468] As Moritz Wedell writes, "the epistemic dynamics of notating […] are not limited to the interplay of storage and retrieval. Beyond its documentary function, every notational procedure displays an inherent potential for exploration."[469] He continues: "…acts of notating do not merely 'put' these movements 'into' a notational composition, or a choreography of things to make them re-accessible. Acts of notating detach these movements from the restrictions of the real world, and in doing so they allow researchers to explore movements in a virtual realm, a sphere only restricted by the rules of the notation."[470] Wedell writes that this "freedom to carry out movements in an abstract realm" is an important component of invention.[471] Again – the word freedom pops up here, and is set against the limitations of the human, material body.

What, then, is the relationship between dance notation (and other motion studies or modes of extraction that preserve a kind of "grain" of the body) and the animated body, an entity that in a sense fulfills the expansive potential of dance? If the cartoon—or the "extended special effect," as Patrick Bull calls it —"mock[s] photographic reality," by demonstrating the "artists' complete control over the physical laws of the animated world," then extracted dance is not only a grain, core, or nucleus for the artist to extend and distort, but it also brings with it its own liveliness, not conjured solely by the hand of the artist.[472] Yes, in animation, "plastic bodies, anthropomorphic characters, and impossible morphs question and challenge the received knowledges which govern the physical laws" and by extension "socio-cultural orthodoxies of the 'real worlds,'" putting forth "difference and otherness" in their place.[473] But these impossible worlds are often grounded in the verisimilitude of real moving bodies that have been traced, frame by frame, to preserve a kernel of their living motion in the plasticity of the animated form. Dance is the thing that navigates between reality and fantasy, the material world and the ephemeral, embodied labour and disembodied form.

Secret Dancers: Animating Life via Rotoscoping and Mocap

For the remainder of the chapter I will turn to two popular animation practices: rotoscoping and mocap, where, in the case of animated dance, gestural data is extracted from a dancer's body in order to enliven a cartoon character or digital avatar**.** Both these methods of animation rely on dance as a kind of life-force that can be drawn out of the individual human dancer, leaving the material organic dancing body behind. I'm interested in dance as a labour

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that is at once hyper visible and invisible. How does motion-captured dance both propose a fantasy of non-being and virtuosic abstraction *and* ground that fantasy in the material, embodied labour of the dancer? What is the relationship between animated dance and ontology? What is the relationship between dance and *Anima* (Latin for soul): a "mobile energy that is independent from the bodies it infuses."[474] If "kinesis is the […] core of animation" and of life,[475] I'm interested not only in the types of new "life" possible in this space, but the ways in which that "life" is contingent on the erasure of particular living breathing moving bodies who labour to produce it.

Rotoscoping is an early animation technique first patented by Max Fleischer in 1917. In rotoscoping, a film is projected onto a transparent easel where an artist traces live action bodies as surface images on paper as they move consecutively through space (**Figure 50**). Animation methods such as rotoscoping and some newer motion capture techniques seek to produce avatars or bodies in motion that look as realistic as possible. By extracting lifelike qualities of motion, these techniques not only mimic human movement but apply it to non- human entities, infusing them with a greater sense of vitality. While the original performer of the movement is often lost or forgotten in this process, their specific motions live on in the final animation. Paradoxically, this removal of the original body is also a process of authenticating the animated body. Rotoscoping is an erasure but it is also a conjuring; in tracing the outline of the little bodies that move across each frame, the animator disappears the surface appearance of the referent body and what remains are the lively edges, where dance is felt and perceived. Ryan Pierson notes that there is a difference between "rotoscoping by outline" (which has the tendency to verge more on the uncanny), and "rotoscoping by through-line" which was "developed over the middle of the twentieth century at Disney," where artists were looking for "underlying scaffolds of movement" in the filmed bodies and then animating figures "as invisible lines of force that run through and underneath the surfaces of their visible bodies." [476] However, both methods impart a sense that the movement is radiating out from a real, authentic, ensouled centre. It is the vitality of movement that bridges the gap between referent body and animated result, and between inner and outer, bringing together what is felt with what is seen. There is a weighty quality attained through rotoscoping that is valuable in producing lifelike animated figures. So that even as "dance frees the body from all social mimicry, from all gravity and conformity," animation also relies on dance to bring back a sense of the weighted body that produced the movement.[477]

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Panpan Yang writes about the "secret dancers" of early rotoscoping, many of whom animated cartoons using the motion of their own bodies.[478] These dancers were secret because they were rarely acknowledged in the film's final product yet they supplied something essential to its characters. It was their unique movements that breathed life into inanimate drawings. Marge Champion who, at fourteen years old provided dance footage for Disney's animated heroine Snow White, was never credited in the final film version and was asked by Disney to stay quiet about her involvement. By erasing Champion's embodied presence—which lent an essential quality to the character—Disney worked to imbue the animation itself with virtuosic realism, illustrating the common disregard for dance as labour (**Figure 51**). In exchange for her dancing, Champion was "paid ten dollars a day" and "for a brief but miserable time, she had to wear a football helmet so her head-to-body ratio would approximate her animated doppelganger."[479] African American Jazz bandleader Cab Calloway was another of these secret dancers. He provided his own highly recognisable movements to Koko the Clown, an animated character designed by Fleischer who danced in three episodes of the *Betty Boop* cartoon (**Figure 52**). The intimate, clandestine kinship between the dancer and their animated character is mediated by the hand of the rotoscoper. In rotoscoping, the hand that traces the body with care repeats that act of tracing until the body is intimately known. Like a puppet master or a magician, the rotoscoper uses their hands to replicate movement and engineer life.

Rotoscoping belongs to a history of motion capture techniques that includes the late nineteenth century work of English photographer Eadweard Muybridge and the French physiologist Étienne-Jules Marey, mentioned earlier in this dissertation. If rotoscoping is a technology of knowing and coming to understand the cinematic body via the intimacy of touch, however, it sits on the opposite end of the motion studies spectrum from practices of surveillance which enact, as Donna Haraway calls it, a "conquering gaze from nowhere."[480] While the work of Muybridge and Marey relied on the presumed objectivity of the camera to dissect human locomotion, the nebulous quality of body-shapes animated through rotoscoping reveals not a distinct trajectory or recognisable action so much as a perpetually nascent state as an end in itself. And it is this nascent state as end—a suitable definition for dance, in fact—that gives the animated figures their life-like quality. The nascent state of dance is almost like a substance, extracted from the live dancing body and implemented—or rematerialized—in the frames of an

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animated sequence to propel the cartoon body. Mark Langer and Tanine Allison observe in rotoscoped animation a "simultaneous presence of the drawn and the photo-indexical, in which the rotoscoped or Rotoshopped body is not so much fused with the human body as it is mapped over it."[481] Therefore, in rotoscoping, the performer's body remains a palpable spectre within the animation."[482] **Figures 51 and 52** above show Cab Calloway and Marge Champion spliced in next to the character they have animated with their dancing, demonstrating how rotoscoped dance enacts a duet across time and space. Cab Calloway dances *with* KoKo the Clown and his Ghost and Walrus manifestations. Marge Champion dances *with* Snow White. These are posthuman duets—or more-than-human assemblages that are additive in their incorporation of new agents—in which movement exists as an exchange and a mediation between bodies, each of which brings the other into a different kind of (phantasmatic) being.

Rotoscoping eventually fell out of popularity as an animation technique, save for its use in more artistic or indie films (Richard Linklater's 2006 movie *A Scanner Darkly* is one example), and was largely replaced by motion capture (mocap), a much more efficient method offering nearly real-time results. Mocap, which is used in military, sports and medical applications as well as in robotics, became an integral part of video game design in the 1990s. Filmmakers like James Cameron and Peter Jackson also used mocap to infuse the characters in *Avatar* and *Lord of the Rings* with human-like movement and liveliness. When an actor or dancer provides their gestural movements for a mocap animation, they often perform within a black box surrounded by cameras and wearing a mocap suit—a tight-fitting black leotard with sensors placed at specific points on the joints of the limbs, across the torso, and on the head. These sensors (which resemble tiny disco balls) are registered by the cameras as coordinates in space or data points, and these coordinates can then be mapped onto a digital avatar, making them move. The technique of motion capture is highly technical and requires patience and precision. My own experiments with mocap equipment have taught me that the process is full of restrictions and rules. In my first project using mocap (for Concordia's PERFORM centre), I stood motionless while the technicians measured my limbs and entered numbers into the computer—a post-visual, post-optic process. I was instructed to dance within the limits of the small squared floor space that was readable by the cameras, and because my ankles, hips, sternum, head and wrists were outfitted with sensors, I was acutely aware of these parts of my body while moving. The technicians were science students and did not really understand what I was trying to explore with

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dance. It was difficult to communicate with them that I was not interested in dance as restorative method or dance as cure, but in the aesthetics and politics of the translation of dance movement between my human body and the digital avatar. I resigned myself to the idea that I might not discover anything of note. But when I confronted my little digital avatar, my flat stick body, on the screen after I finished my solo, I was surprised to see that I could actually recognize myself when the little body moved. There was something in the particular quality of movement that felt familiar—my grain (or soul) was there and it was palpable, at least to me! In a later version of the video, the technicians used my dance data to animate a pirouetting cartoon bear. I could still see myself in there, enmeshed with the Other.

Dancing the Inanimate

Like rotoscoping, mocap facilitates a posthuman exchange between bodies wherein non-human entities are animated, giving them a sense of agency. Terry Notary, a dancer and gymnast who often provides his movements via mocap to enliven animated characters, explains that when he plays non-human characters like "apes, birds, dogs, the Hulk, goblins, [and] aliens," he tries to imagine how the character might want to move, even if the character is something inanimate like "crumpled tinfoil or a feather."[483] Even as mocap risks imposing a limiting notion of humanity onto our digital creations, it also engenders a posthuman network of human and non-human agency that is fundamentally relational. In her book *Closer*, Susan Kozel takes a phenomenological approach to studying mocap. She writes that "Motion capture is an unfortunate term because it implies that the motion is contained once it is captured, like a bee in a net, but this sophisticated and poetic slice of human-computer interaction is about flow, patterns and shapes of movement, about the way life can be breathed into that which seemed inanimate."[484] This process, Kozel argues, fosters an ethical and intersubjective relationship between the performer and the data their body generates. If we conceive of the data coordinates as an entity that is separate from the dancer's body, this entity is also productive: it is capable of generating infinite other dancing entities. Techniques like rotoscoping and mocap allow movement to spill over and beyond the bounds of moving bodies, and mocap in particular has a special relationship to plasticity. Drawn from data, mocap movement is not felt on the lively contours of the animated body but emanates from an unseen core, no matter what entity hosts the dance. Take, for example, the music video for Major Lazer's song "Light it Up" (2016) by

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Method Studios and House of Moves, in which animated bodies made of typically inanimate objects (ribbons, feathers, cotton candy) perform anthropomorphic dance sequences and then explode and fall to pieces (**See Figure 53**). The video begins with a series of shots of textured fabrics and materials in motion. As they ripple and pulsate, these shots, which take up the entire screen, illustrate the agency of non-human substances. When the first dancers appear on screen, it is not immediately clear whether they are humans wearing (digitally-enhanced) costumes or very high-quality animations. Although I have not yet attained confirmation about how the video was created, I believe mocap has almost certainly been used to animate the dancing animations, possibly with a combination of the MakeHuman program[485] and Blender, given the quality of movement, the combination of digital virtuosity and grounded gestures and the smooth transitions between whole dancing bodies and dissolving, erupting ones.[486] A posthuman aesthetics links destruction and animacy in this work of screendance, which displays dancing bodies made of what looks to be hair, elastic balloons, moving lizard-like scales, electric cables, marshmallows, melting chocolate and paper feathers (**Figure 54**). Each of these substances is digitally fabricated with great sophistication and impressive physics engines so that movement radiates out from the dancing body beneath. The dancers who likely supplied their motion for the video are not credited, as per usual, but the designers are.[487]

The Uncanny Valley of the Digital

The animation used for "Light it Up" is incredibly impressive, and gives the true impression of human bodies dancing with weight and gravity in space. Yet these figures are not quite human either. It is worth noting that videos like "Light it Up" have a relationship to the uncanny: a key film for illustrating the uncanny effects of mocap and CGI is Robert Zemeckis' *The Polar Express* (2004), whose visual effects and performance capture were done at Sony Pictures Imageworks. The film is listed in the 2006 Guinness World Records as the first all-digital capture film, but the critical response to the film was tepid, mostly due to the discomfort many viewers expressed upon seeing it—a discomfort Masahiro Mori describes as the effect of the "uncanny valley" (1970). Mori's influential essay describes the relationship between an entity's human likeness and our feelings of "affinity" for it. Mori writes that while a prosthetic hand, for example, may have a "degree of resemblance to the human form," when we realize the hand is in fact artificial—perhaps becoming alarmed after touching the hand or shaking it by its

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boneless quality or cold temperature—we "experience an eerie sensation."[488] When this happens, Mori writes, "we lose our sense of affinity, and the hand becomes uncanny." Mori explains that when movement is introduced—to the prosthetic hand or the robotic entity, for example—the relationship between likeness and affinity becomes exaggerated and what was previously unsettling could become familiar, or conversely, be catapulted into uncanny valley. Although Mori focuses on movement in his essay, and even references performance in his mention of Bunraku puppets and Noh (a kind of Japanese musical theatre involving masks and dating to the 14th century), few have extrapolated his work towards an analysis of dance and the uncanny valley. While the early Fleischer animations, made with rotoscoping, are wild and psychedelic, even verging on creepy, they lack the uncanny effect of mocap animations. A 2017 study, for example, demonstrates that audiences find characters animated with mocap more uncanny or disturbing than those animated with rotoscoping. Audiences reported finding CGI human characters (animated by mocap) as lacking social chemistry and emotional connection with one another.[489] One reason for this, the study explains, is the sometimes vacant expression in the eyes of the CGI characters, but this is unlikely, given that the uncanny is almost always configured as an excess—something that seems too alive, or even undead—rather than a lack. Perhaps the Major Lazer video ultimately manages to avoid the uncanny valley effect because the dancing avatars lack facial features (and the face is the locus of the uncanny).

The insufficient emotional connection between actors in early mocap productions may also be due to the fact that mocap performers perform in a studio set up for motion capture, often wearing cumbersome suits and without the interaction with real-world props or environments.[490] There is a lot of machinery involved. This is also true of rotoscoped animations –not those rotoscoped directly from live footage, but those in which the performance was done in a studio specifically intended for producing an animated output. Marge Champion describes the harsh lighting and stand-in props she experienced when providing her dancing for Disney's *Snow White*, and she had to wear a large football helmet to increase the size of her head in the animations (cartoons at this time often have heads that are much larger than their bodies). Distinguishing between the stage actor and the film actor, Walter Benjamin argues that the "shooting of a sound film offers a hitherto unimaginable spectacle" in which the "equipment not directly involved in the action being filmed—the camera, the lighting units, the technical crew" is really present but made virtually absent in the final film product.[491] He writes: "In the film

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studio the apparatus has penetrated so deeply into reality that a pure view of that reality, free of the foreign body of equipment, is the result of a special procedure—namely, the shooting by the specially adjusted photographic device and the assembly of that shot with others of the same kind."[492] Similarly, "Light it Up" erases any distraction or even proof of production from its final product. We do not see the mocap suit or the grid, the cameras that read the gesture as points in space, or the technician recording data. The non-optical machinery is excised and all we see is the spectacle of dancing forms.

Mocap makes so many different types and shapes of bodies possible in "Light it Up," and the music video also presents a world in which gender and race are technically nonexistent. What's fascinating here is the way the dance exists not only at the core of the entity dancing, but at the edges and throughout the material of the "body" as well. Dance is seen in the swooshing of fur, the swarm and dissolve of colourful particles, the lag of the floating streamers trailing behind the arm that strikes out or the knees that bend. There is a similarity between these dancing digital materials and the dancing of Loïe Fuller, whose movement was distributed across her body and her voluptuous silk costume. However, in the Major Lazer music video there is an unlimited plasticity to the "costumes" presented. And in fact, the costumes *are* the bodies: there is no difference between the two. As the video progresses, the bodies/costumes start to break down and fall apart, disappearing into nothingness. The video offers a posthuman vision in which inanimate objects display kinetic agency, and bodies that appear to be human end up exploding, dissolving and melting away.

Another recent example that plays with similar themes is the music video for American pop singer Ed Sheeran's 2019 single "Cross Me," featuring Chance the Rapper (**Figure 55**). This video displays its use of mocap upfront: it begins by showing professional dancer Courtney Scarr in a motion capture suit and then proceeds to display the many different bodies that can be animated using the gestural data mined from her dancing. These bodies include a swarm of gold mannequins, bodies made of glowing mesh and lively balls, and the bodies of Ed Sheeran and Chance the Rapper themselves. "Cross Me" presents a shape-shifting fantasy akin to the dream of 90s cyber theory, where bodies can transmogrify and differences of identity such as race and gender are made fluid and erasable. When Sheeran and Chance are infused with Scarr's dance data, they are also given superhuman capabilities—their (again, uncanny) animated bodies become elastic and they can do impressive flips and jumps. The mocap and animation produced

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for “Cross Me” is not nearly as sophisticated as for “Light it Up,” but in both cases, dance is portrayed as a fluid agentic force that transfers between bodies unseen except for as a symptom of this contagion.

Digital Dance Spectacle

The dancing body spectacularizes media. The link between spectacle and media is a notion already taken up by scholars of modernism such as Vanessa Schwartz and Ben Singer, but there is a posthuman thread between early modern experiments with the spectacle of dance (Fuller, Berkeley, Fleischer) and our current era. In digital screendance, like in modernist screendance, dancing bodies produce the spectacular energy of the “new” while also distributing agency between the dancing form and the media that produce/support it. It is precisely in the mediating process, where movement is transferred from the human body to the digital one, that liveliness is born. As mentioned earlier in this dissertation, Friedrich Kittler argues that it was the typewriter that initiated the transition from early modern subject to posthuman subject, largely because of the shift in inscriptive media technology: unlike writing produced with a pen or pencil, the typewriter’s output no longer bears the material-organic trace of the hand (though it does bear the ephemeral trace of the mind). Unlike Kittler’s shift from penmanship to typewritten text, my shift from optical technologies to mathematical ones indicate a shift away from the body as icon towards toward a more indexical conception that links back to the dancer’s position in space and time at the moment of its capture. Even more than modern technologies and techniques like rotoscoping, in which the artist’s hand is present in residue more than the dancing body, Mocap *does* bear the material-organic trace of the dancing body as mathematical coordinate in time and space. But conversely, digital screendance often uses the inscriptive media of mocap not to preserve an exceptional trace, but to *extrapolate* a general aesthetics of realistic liveliness in dance onto a posthuman network of bodies (broadly defined). In other words, just as an individual may be identified by their penmanship but not by their (posthuman) typewritten letter, this is also true for the trajectory of the dancer who, performing live on stage, is linked to their own, unique body, but who becomes anonymous when their individual dance movement generates a faceless energetic force in the digital realm, even though their specific mathematical coordinates are preserved. In digitally-produced screendance under advanced capitalism, more than ever before, “life” stems from mediation. While the positive posthuman

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politics of this trajectory do mark a shift away from exceptionalism, and toward a more de-anthropocentric notion of life, I also notice a trend that pertains to the kinds of bodies that most commonly get erased.

Racial Erasure

How does the spectacle of dance also propel forms of erasure? Unlike most special effects, which "revel in their visibility," Tanine Allison explains that motion capture "first involves an act of erasure, grounding itself in invisibility."[493] The 2006 film *Happy Feet,* directed by George Miller for Warner Bros*,* presents the various forms of hybridity and erasure that popular movie dance sequences animated with mocap can facilitate. The film follows a group of CGI Antarctic penguins who are known for their singing. One young penguin named Mumble cannot sing like the rest of the penguins, but he regularly expresses his emotions through little outbursts of dance, and eventually, his dancing becomes central to the movie because instead of "finding his voice," Mumble finds his *body* and contributes his dance to the chorus of Penguins. Mumble is voiced by Elijah Wood (famous for his role in *Lord of the Rings*), but his body movements and dance scenes are animated via Mocap by American tap dancer, Savion Glover. The movie poster shown above demonstrates the hierarchy of contributors to the project, as while Elijah Wood's name appears at the top of the poster, Savion Glover's is nowhere to be found (**Figure 56**). Neither is he acknowledged in the opening credits or the trailers for the film. Glover is "widely regarded as the best tap dancer of his generation" and he supplies a key component—some may even say the most important component—of Mumble's identity; after all, this is a story about a Penguin who finds his identity through dance.[494] In her essay, titled "Black Face, Happy Feet: The Politics of Race in Motion Capture and Animation," Tanine Allison writes about this phenomenon in this particular film: "on the one hand, motion capture acts as a medium through which African American performance can be detached from black bodies and applied to white ones, making it akin to digital blackface. […] On the other hand, by severing performance from bodies with particular racial, ethnic and gender identifications, motion capture might hold open the promise of a truly post-racial form of representation."[495] Yet there is the sense that Glover's dance moves are essential to the film in that they lend a sense of what Joanna Bouldin calls "racial authenticity" to the Penguin's body.[496] Here we have the posthuman potential for dance to jump from human body to digital (animal)

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body, yet the spectre of race (or the grain of the body) remains as an authenticating (and ensouling) component of the resulting hybrid form.

I will return briefly to my earlier discussion of Cab Calloway, who provided dance movement for Koko the Clown in three Betty Boop cartoons: *Minnie the Moocher* (1932), *Snow White* (1933) and *The Old Man of the Mountain* (1933). In these cartoons it seems that whenever Betty finds her way into dangerous situations, Koko appears, morphing into a ghost, a dancing walrus and an old hermit, each time singing songs about gambling, drug use and crime in scenes that are full of dark imagery, all the while performing Calloway's signature dance moves—most notably a slow, backwards dragging step he called "the buzz," and which is echoed later in Michael Jackson's 1985 performance of the moonwalk (**see Fig. 57**). Christopher P. Lehman writes that "African American performers and the surreal dwellings of their caricatures in the Betty Boop series represent an "other" that provides an appealing sense of liberation for whites but contains a threat of miscegenation via Betty's presence in their part of town"[497] However, in these rotoscoped cartoons, which often begin with clips of Calloway's live performance, Calloway's singing voice is joined to his dancing movement in the body of these various cartoons. In this way, Calloway remains a more intact entity than the assemblage of Mumble the Penguin, whose voice, appearance and movements are all provided by different sources. And yet Calloway's various characters (KoKo the clown, the walrus) all display a plasticity that goes beyond the typical squash and stretch of animation, causing them to shape-shift and transform, disperse and come back together into a whole.

As he dances, Koko the clown (in ghost form) keeps losing his pants, which slip down off his thin and very long legs. The repetitive slow slide of the clothing matches Calloway's slow, sliding dance moves in the scene, giving Koko's pants a posthuman dance-like quality. At one point, Koko shifts into a handstand and his legs extend beyond their previous physical capacity, winding themselves into a looped formation so that they look like the chain of a necklace and his head becomes the hanging pendant (**Figure 58**). His body continues to stretch and loop and swing in physically-impossible ways, and yet at the end of the number, he comes back together, his body intact. Douglas Rosenberg's work on screendance explores the dance film's ability to produce bodies that dissolve into fragments without threat of death. He argues that the editing process is key to the genre of screendance and puts forward "recorporealization" as a term that describes the filmed body "as a kind of Frankenstein, temporally dislocated and awaiting

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authorial reanimation" through editing techniques and projection.[498] Of course, I have been arguing that dance reveals *all* bodies to be assemblaged and posthuman, even before their technological mediation, but when recorporealization is applied to the dancing filmic body, as is the case in screendance, Rosenberg argues that what results is an "impossible body, unencumbered by gravity, technique, time or death."[499] What does it mean to fantasize about being able to come to pieces and not die?[500] Darren Wershler writes that "imaginary media" in film and fiction mobilize impossibility as a space of imaginative fantasy that embodies "deep ideological convictions about how we'd like the universe to work […] rather than how it actually works."[501] Rosenberg posits "impossible bodies" as an exercise in fantasies of freedom from the realities of what it means to live in a body. His theory of recorporealization betrays a common posthuman ideology: that of flight from the body. This flight seems especially fraught when it is configured as an escape from the racialized body (as is the case in *Happy Feet* and Calloway's rotoscoped dances) towards a fantasy of inhuman, elastic animations.

Fugitivity in *Ghostcatching*

Now I will turn to an earlier work that actively engages with some of the themes (abstraction, erasure of embodied labour, motion capture and mediated bodies, etc.) that I have set up in this chapter. In 1999, African-American dancer Bill T. Jones used motion capture technology to explore "freedom of abstracted motion" in his 1999 project *Ghostcatching*, a collaboration with media artists Paul Kaiser and Shelley Eshkar for the OpenEndedGroup. With *Ghostcatching*, a digital artwork that fused dance and live computerized drawing using motion capture technology, Jones critiqued the association between abstraction and purity; he was skeptical of being reduced to, as he says, a "disembodied, denatured, de-gendered series of lines moving in a void."[502] Danielle Goldman has written at length on Jones' work in her book *I Want to Be Ready*, where she challenges the links between fantasies of freedom and histories of improvisation in American postmodern dance (in the Judson Church dance collective and beyond).[503] In her chapter on *Ghostcatching*, she focuses on the affordances and limitations of mocap in Jones' live performance and video work, especially in relation to race.

Before his collaboration with Kaiser and Eshkar, Jones was known for using improvisation to make work that was deeply informed by his own personal lived experience of embodiment, history, race, sexuality and memory. Jones created his 1978 improvisational piece

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Floating the Tongue to "dispel the notion that dancers don't think while dancing."[504] The four-part improvisation began with subtle movement and then, in the second phase, as his dancing picked up speed, Jones added spoken description of the movements he was doing, as he was doing them. The result revealed the excess of movement in every moment while dancing—and the impossibility of words to encompass/account for all that movement. As the piece progressed, Jones would start uttering more emotionally-fraught phrases, some degrading to the Black identity, culminating in ramped up vocal volume and body energy by the end of the piece. Goldman writes that *Floating the Tongue* did more than confirm that yes, dancers do think while dancing; it allowed Jones to access "layers of history as well as deep levels of meaning that exist within movement."[505] After Jones' partner dancer Arnie Zane died of AIDS in 1988, Jones committed himself to "making work that dealt explicitly with his identity" and what he called his "black rage" in pieces such as *Last Supper at Uncle Tom's Cabin/The Promised Land* (1990) and *Still/Here*.

Some white critics were confused and discomforted by the personal and confrontational nature of these pieces, and Goldman notes that *New Yorker* critic Arlene Croce denounced Jones' work, calling it "victim art."[506] In a particularly racist excerpt, Croce wrote that she dislikes being forced to feel sorry for a performer due to their presentation of themselves as a "dissed black," for example: "I can't review someone I feel sorry for or hopeless about."[507] It seems Croce would have preferred to see a more "neutral" (read: white) performance, yet for Jones, dance was always political and rooted in lived experience. The early 1990s brought about the increased use of technologies in dance creation, as well as the proclivity for formal purity, inaugurated by the work of Merce Cunningham and Trisha Brown—both choreographers who Jones loved and respected—in the New York dance scene of the early 90s.[508] Yet, as Goldman explains, Jones was skeptical about this fetishized "purity," especially in combination with digital media: "As a black man dancing in a time and place where whiteness is largely invisible and so-called formal purity looks suspiciously like traditionally white aesthetics, Jones understands the naiveté, the exclusivity of imagining a formal realm free of politics."[509] *Ghostcatching* emerged from this frustration. When Kaiser and Eshkar gave Jones the opportunity to experiment with dance and mocap, he took as his starting point the suspicion that mocap technology could not "actually capture" what he did.[510]

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In *Ghostcatching*, Jones' improvised movements were recorded using mocap technology, and then rendered on a screen as a sketch of his body in expressive, painterly outlines (**Figure 59**). In this way, his "improvisations became virtual, moving in a sense *beyond* the body," but the resulting images are not cold and overly abstract; the soft curved and multi-coloured lines of Jones' animated body give off a warmth, resembling something closer to a painting than a collection of clinical, computerized data.[511] Eshkar and Kaiser also chose to let traces of Jones' movements linger as markings in the frame, meaning that his motion hangs in the air and in the space, again giving an increased feeling of materiality and permanence to the work. These gestures, which remain present in layers and build up until Jones appears to be dancing within a constrictive web of his own motion, are sometimes accompanied by a sound effect, added in post-production, that resembles a shovel scraping ice or a solid object being pushed across a hard surface. There is a sense of heaviness here at tension with the always-somewhat-weightless feeling of the digitally-animated body. At times the animation freezes Jones' animated body in certain poses while also allowing his avatar to move forward with the motion. The result, as seen in **Figure 59**, is one of doubling or copying and imprinting the body on the space, so that Jones' many, multiple bodies move or pose together all at once. The effect also calls to mind the motion studies of Muybridge and Marey, and in this way, the "ghost" referred to by the title of the work might be not only Jones' live performance, captured, extracted and re-enlivened through animation, but also the many ghost-selves that a dancer passes through as they perform the successive instants of a movement sequence—the many poses left behind or slipped past in motion. *Ghostcatching* certainly attempts to resist the ephemerality classically associated with both dance and digital media, but despite the solid, haptic, embodied quality of the animations, the work still enacts erasure: of skin, sweat, facial features, hair, and Jones' palpable, working body.

Marcia Siegel writes of dance that "no other art is so hard to catch," [or] "so impossible to hold."[512] *Ghostcatching* plays with the ephemerality of dance *and* the perceived immateriality of the digital medium. It asks us to consider the place—and the agency—of the body (Jones' body) in dance and in data. I end my chapter and my dissertation with this example because it brings together the many questions a posthuman theory of dance necessitates, and also introduces race as an important consideration that has been ignored (or even erased) by many theorists, artists and thinkers of the posthuman. In *Ghostcatching*, Jones' identity as a Black man informs

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his approach to these posthuman questions, and evokes questions about what aspects of the dancing body are extracted through mocap. What is the "grain" of the body, here? How does it signify? (**Figure 60**). American critical race theorist Fred Moten often refers to what he calls "fugitivity," a category in which freedom and "unfreedom" co-exist as a result of a refusal to be reduced by objectification. For Moten, Blackness and fugitivity are particularly linked, and the concept is bound up in histories of slavery, and the weight of that history (for Black Americans in particular) as a personal history. He writes: "The moment in which you enter into the knowledge of slavery, of yourself as a slave, is the moment you begin to think about freedom" and its "overdetermined" structures.[513] This, Moten clarifies, is also the "moment at which you become a fugitive."[514] Fugitivity, for Moten, is a mode of resistance or rebellion, "a desire for and a spirit of escape and transgression of the proper and the proposed. It's a desire for the outside, for a playing or being outside, an outlaw edge proper to the now always already improper voice or instrument."[515] There is a musical or dance-like quality to Moten's concept of fugitivity that relates to Jones' work. *Ghostcatching* facilitates Jones' experimental transgression of what dance is supposed to look like, and it also allows him an "outside" or escape, not *from* that "shameful" body or "improper instrument," but by means of it. Yet *Ghostcatching* also plays with images of imprisonment, entrapment and capture—images that also reflect the process of capture associated with mocap, the technology used to produce the screendance.

In his live performances of a work called *The Breathing Show* (1999), Jones screened portions of *Ghostcatching* and he interacted with the screen on which the animation was projected, periodically stepping out from behind it (and using sound—like humming and singing—while unseen) in order to make explicit the tension between his live and mediated bodies. Jones reportedly once asked his spectators at the end of the show, "Can you see with two sets of eyes? Can you see the identity, and also the form?"[516] Described by OpenEndedGroup as a "meditation on the act of being captured and breaking free," the spectres of racialized violence, imprisonment, labour, and persecution are very much palpable in the work, prompting Goldman to ask, "Can politics transpire in a virtual dance that allows neither sweat nor skin, primary markers of labour and race, to appear on stage? […] is pure form escape or constraint?"[517] These were questions that were circulating in the North American cultural consciousness at the time as well. In his controversial book *Against Race: Political Imagining Beyond the Color Line*, published one year after *Ghostcatching* premiered, Paul Gilroy argues that the development of

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new digital imaging and visual medical technologies ushered in a post-racial discourse, where "skin is no longer privileged as the threshold of either identity or particularity" allowing us to let "old visual signatures of 'race' go"[518] But what about the non-visual signatures of race? What of the more overlooked aspects of racial identity/labour—what about dance as a "grain" of the body that is extractable and morphable, but still harbours traces of the particular body that produced it?

Ghostcatching layers sound effects with recordings of Jones' improvised monologues, including songs that have a gospel lilt, low humming and personal stories about his childhood. The piece employs Jones' vocal performance strategically, as a reminder of his particular subject position as a Black American. Yet sound is not the only way that Jones' identity is established in the work. At the end of my last chapter I cited Weheliye, Barret and Eshun on the invocation of Blackness as an appeal to authenticity, embodiment and the natural. These Afrofuturist writers are mainly focused on music—they argue that the Black singing voice is often used in the R&B, pop and rap genres as an authenticating force that can be extracted, sampled and remixed. They do not write about dance. But I see a similar strategy that mobilizes Black social dance and Black gesture—like voice—as a signifier, not necessarily of specific identity, but of interiority. Tiffany E. Barber writes of *Ghostcatching* that "Jones was struck by the [mocap] technology's ability to render a faithful image that arguably would capture his liveness but not his likeness, producing another being that was not intrinsically or essentially, him."[519] Yet there is also a way in which *Ghostcatching* and the other works I refer to in this chapter—Fleisher's rotoscoped animations of Cab Calloway, *Happy Feet's* Mumble, and the video for Major Lazer's "Light it Up"—call up questions about essentialism, indexicality and the "grain" of the body. Cab Calloway's presence infuses Koko the Clown with his particular talent and energy, and that energy is held in tension with Koko's body, which morphs into a ghost with long, looping legs and multiple limbs, and a gold coin on a snaking chain. The plasticity of Koko may be posthuman, but it is not post-race. Throughout his various transformations, Koko's movements remain tethered to the kernel of Calloway's signature movement, his technique, born of repetition and Black social formation.[520] The 'soul,' and "by extension 'humanity,' of black subjects, therefore, is often," as Alexander Weheliye argues, "imbricated in white mainstream culture,"[521] but this is a fraught imbrication. Afrofuturists like Weheliye critique posthumanism and cybertheory as schools of thought that re-inscribe whiteness as the gateway to posthuman subjectivity. Even though these theories denaturalize the "human" as a universal formation or origin-point, the lack of racially-diverse

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contributors to the body of writing that comprises posthumanism, combined with a perverse fascination with "neutrality" or abstract bodies, contributes to the erasure of material, embodied difference. And yet, racial difference continues to structure such discourses, even in such processes of erasure. As critic Alondra Nelson explains in her essay "Future Texts," Afrofuturism "challenges the post-human ideology of an imagined raceless future. It recognizes that blackness still has meaning in the virtual age, and it still implies that which is primitive and antithetical to technological progress" (8). The grain of the Black dancing body has tangible capital, even in its presumed contrast with technological embodiment.

Conclusion

Lev Manovich has argued that animation and film occupy opposite ends of the spectrum in relation to index, where film's connection with photography associates it with realism and the temporal archive, and animation is the "art of imagination."[522] However, Tom Gunning points out the "secret symmetry between animation and photography," given that animation is haunted by a history of photography as a means of mechanical reproduction, and given the "technical nature" of both cinema and animation, where continual motion is produced from discontinuous instants—or frames—exhibiting a "control of time".[523] Yet animation also offers the ability to experiment with time in metamorphic ways. To animate something is to endow it with life, and to play with that life—to test the limits of its capacity for movement and to inspire wonder and curiosity at the sometimes-virtuosic quality of such movement. This is also what Eisenstein observed as the "plasmaticness" of animated bodies in motion: a "rejection of once-and-forever allotted form, freedom from ossification, the ability to dynamically assume any form."[524] The animated body's ability to move in un-real ways is its posthuman quality; the type of life proposed by animation is posthuman. The definitive links between dance and animation here are clear, and especially overlap when dance is used explicitly in the process of animation, as in the case studies I explore in this chapter.

But is the animated dancer's "plasmaticness" a sign of its power or its precarious vulnerability? Sianne Ngai writes that while the animated body, with its "excessive energy and metamorphic potential" can be seen as a "subversive or powerful body," the same elastic and pliant qualities that seem "liberatory" are also "readable as signs of the body's utter subjection to power, […] external manipulation and control."[525] Ngai notes that this ambivalence about

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animation takes on "special weight in the case of racialized subjects, for whom objectification, exaggerated corporeality or physical pliancy, and the body-made spectacle remain doubly freighted issues."[526]

In her work on screendance, Alanna Thain writes that animation is "neither representational nor simply indexical in nature" – it is "fundamentally the art of the in-between" in that it "activates in its relation to other art forms ... a vivid sense of their potential", in particular, the "body's potential for relation."[527] Following Thain's focus on relational potential (palpable in both animation and dance), I appeal to a theory of posthumanism which continues to de-center the Eurocentric notion of the singular and exceptional soul, and which rejects fantasies of a post-racial world, while also attending to the role of race in the production of soul in the technologized space of today's animations. Dancing avatars or animations are posthuman in that they imply a shift away from privileging hierarchies of organic bodies and "natural" origins—but they also hold within them a posthuman assemblage of relation, a genealogy of many other dancing bodies (including their own) that move in response to one another. In addition, digital animations under advanced capitalism are generative of other dancing entities, thanks to their existence as data and their non-visual relationship to time-axis manipulation. I began this chapter by suggesting that dance can be framed as an escape *from the body itself.* I went on to show how certain animation techniques further facilitate this idea of something lifted off the body. But dance is not just about dispossession; it is also a turning inward, toward the many relations that exist within the dancing body and its gestures, which are made legible through techniques of mo-cap and rotoscoping.

What—if not the body—is extracted or escapes in these processes? It is dance? Is it soul? What, exactly, is the fugitive element here? Unlike transcendence, fugitivity is driven by pursuit—it is a type of fleeing, a secret flight. The verb "secrete" has two meanings: to produce and to conceal. Dance can be thought of as a secretion of the body and which, in the case of extractive animation methods, makes secret (or conceals) its source. It is the *relation* between secretion and concealment, dance and body, capture and plasticity that drives the discourse of posthuman dance. There is a grain *and* a fugitivity to dance, and this is what makes it posthuman.

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CONCLUSION:

Virality / TikTok / Pandemic

In the summer of 1518, a "dancing plague" spread through the streets of Strasbourg. It started with a lone woman, hopping and swaying on the dirt road. The townspeople watched from their windows as she began to move "uncontrollably" and without stopping.[528] Soon, other dancers, most of them women, were compelled to join her by some external force or trance-like state, medical or divine. This strange scene, in which the dancers seemed to attain "extraordinary levels of endurance," enabling them to move for hours, might seem unlikely to us today but in the post-medieval context, John Waller notes, "Compulsive dancing joined that litany of natural and human disasters to be explained in terms of celestial or supernatural forces."[529] The phenomenon of a dance without end is also, significantly, the topic of the Hans Christian Anderson fairy tale, "The Red Shoes" (1845), a story about a dancer whose enchanted red shoes compel her to dance constantly.[530] In Anderson's tale, the suffering dancer asks an executioner to chop off her feet, but the shoes continue to dance with her amputated feet inside them. Detached from the human dancer, the shoes continue to dance on their own with a posthuman drive. Anderson's fairy tale was adapted in a 1948 film of the same name,[531] and, in a full circle moment for this dissertation that brings us back to the posthuman dance project of my Introduction, "The Red Shoes" is also the title of Kate Bush's seventh studio album (**Figure 61**).[532] That Bush should haunt this conclusion with a pair of unstoppable red dancing shoes, which themselves are a non-human dancing entity and a viral echo across multiple bodies, is apropos for a posthuman theory of dance in which gesture travels by contagion.

The Strasbourg dancing plague mentioned above is just one of many similar epidemics that took place across Germany, Holland, Italy and France between 1300 and the mid-1600s.[533] Researchers note that there are links also between the dancing plague and various similar conditions including "Tarantism in Italy, Tigretier in Abyssinia, and Imanenjana in Madagascar…" as well as the "Leaping Ague in Scotland," many of which have also been classified as "St. Vitus's disease."[534] Those who have written about these dancing plagues are often quite singularly focused on their cause, postulating epilepsy or demonic possession among various catalysts. One theory is that the dancers had ingested contaminated flour harvested from mouldy stalks of rye, also called ergot, which infected their brains, causing them to move erratically.[535] Another belief was that the dancing plague may have been caused by the bite of a

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tarantula. The heat of summer was thought to activate the venom coursing through the victim's body, causing convulsion and spasms that looked like dance. Rather than speculate about its origins, however, I find it more interesting to consider the symptoms of the dancing plague as phenomena that speak to the already uncertain relationship between dance and embodied agency. Here, ergot and tarantula venom (or *rumours* about them) act as agents in the production of posthuman dance, thereby decentering agency from the human dancing subject and dispersing it onto a network of human and non-human relations.

Since the 1518 dancing plague, there have been numerous instances of epidemics that manifest in infectious body gesture. A 2012 *New York Times* article, "The Mystery of 18 Twitching Teenagers in Le Roy," details a comparable phenomenon where a group of high school cheerleaders in small-town New York contracted contagious body spasms and were diagnosed as suffering from "mass psychogenic illness," or "mass hysteria" (Dominus). American director Anna Rose Holmer's 2015 debut feature film *The Fits* tells a similar story. The film features an all-girl drill dance team who are struck by an inexplicable outbreak of seizure-like attacks that spread from dancer to dancer. These "fits," which erupt in the bodies of the girls as their friends look on, often capturing the spectacle on their camera phones, have a performative, kinetic quality. And Jonathan Glazer's dance film *Strasbourg 1518*, which takes inspiration from the dancing plague, was filmed during the COVID-19 lockdown and released in September 2020. Questions of dance virality and contagion, which I introduced innocently at the start of my writing process, quickly took on more fraught significations in the context of the institutional, medical and media apparatuses that worked to curb the viral contagion and spread of the virus we have all lived alongside for the past two years.

Isolation

I wrote this dissertation through two huge shifts in my life (one personal and one planetary): becoming a mother and the global pandemic. I gave birth to my daughter in December 2019, just three months before the world locked down due to COVID19. In combination with new motherhood, the lockdowns—and in particular the Montréal laws that regulated the population with an enforced 8pm curfew—drove me to become, perhaps as a coping mechanism, more and more deeply cocooned in the repeated gestures and tasks I performed daily: swaddling my baby daughter; changing her diaper; bathing her carefully in the

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kitchen sink. These mundane chores, or chains of operations that are part of the technique of infant care, became a choreography for the new life in which I found myself. Like Foucault's description of the orders given during a 17th century plague— "First, a strict spatial partitioning: the closing of the town and its outlying districts"—my world closed in around me like a small box in which I had to merely repeat my comforting patterns. Perhaps because I am a dancer, I tend to see dance everywhere. This seemed to intensify during the pandemic, when suddenly bodies were organized spatially both by a common sense of morality and duty (giving passersby a wide berth on the street, for instance) or by a set of—often seemingly random—institutionalized structures (the markings on the ground in the grocery store, indicating where to stand for proper social distancing, for example) (**Figure 62**). I saw dance everywhere—in the growing and ritualized space between bodies; in the lone runner who, curfew briefly forgotten, was sprinting to make it home; in the overflowing hospitals; in the order of my students, in their stacked grid of videos on Zoom; in the disorder of the protests—and yet I missed dancing so very much. I ached to brush up against the bodies of strangers and to move with abandon at a loud nightclub.

There has already been too much written about the pandemic, and *New York Times* headlines like "Will Social Distancing Bring Us Back to Our Bodies?", "How We Use Our Bodies to Navigate a Pandemic," and Carina del Valle Schorske's "Dancing Through New York in a Summer of Joy and Grief" show us that thinking about coronavirus through dance is not a new idea. I'm sure every graduating PhD student this year is attempting to make sense of their research and the pandemic (or pando, as my friend Jeff calls it) by bringing the two together, and *yet* I can't help but feel there is a connection that is begging to be made between the content of my dissertation and the world historical event during which it was produced. The posthuman quality of the pandemic—as seen in the shift from individual concerns to those of the group, the lack of control we humans have while the virus runs wild and undetected with an abundance of non-human agency, and the newly-realized porousness of our bodies (their posthuman relation) to one another—is just one aspect of this overlap. Throughout my dissertation, from the first chapter on Loïe Fuller to the fourth chapter on the transfer of dance between bodies (organic and virtual), I have been arguing that a posthuman dance is one with a slippery relationship to ownership that has a contagious or viral quality, and which is produced as a result of various

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assemblages that articulate the dancing body to media, screens and power as well as to processes of erasure or dispossession.

Another kind of contagion we see today is in the viral dances shared to video-based social media, especially TikTok. TikTok's popularity soared during the pandemic, with the app rising to 53.5 million weekly average users in September 2020, up 75% from before the pandemic hit, and becoming "the number one top grossing app on iOS App store globally in the second quarter of 2020."[536] Using a format that's been called "supremely addictive," TikTok requires "no network, no searching, nor even any login: its algorithm plucks videos from its vast archives and learns what the viewer likes."[537] The app will bring in twelve billion this year, nearly all from advertising, and should double that next year. Because people use TikTok for video creation and sharing, much of the content produced is in the form of short sketches, gestural memes, and especially dances. These dances are often attached to particular songs, or audio clips available through the app, and have become a respite for teenagers during the pandemic's period of self-isolation, when they finally have time to learn all the most popular TikTok dances. As Insider.com puts it: "Dancing, after all, is a simple way to lighten the mood and blow off steam while trapped indoors."[538] Researchers are just beginning to write about dance on TikTok, but the scholarship is new. A recent study set out to describe the parameters and contexts common to TikTok dance videos, using videos tagged with #distancedance, a dance challenge started in 2020 as a COVID-19 fundraising campaign by the most-followed creator on TikTok, Charli D'Amelio. This phenomenon, like the pandemic, is global; a similar viral TikTok dance challenge—called the #GhenCoVyChallenge—was started in Vietnam. Created by choreographer Quang Dang in partnership with the National Institute of Occupational and Environmental Health, the dance "acts out the most important precautions the public can take against infection, including washing your hands, not touching your face, and avoiding crowded places. It's even set to a coronavirus-specific version of Vietnamese pop hit 'Ghen.'"[539]

Dance on TikTok is posthuman dance in that it is born out of a need to move, express, connect and *relate* in the face of forced isolation from other bodies, yet it often feels the opposite of relational, mostly because the conditions of the platform actively produce TikTok dancing and the parameters within which it is shared. Yes, viral dances on TikTok are citational and in conversation with one another—the idea is that each content creator uploads their own version of the dance of the moment—but these dances are very goal or success-based, rather than being

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experimental or about creative expression in itself. Like the MMD avatar dancers I analyzed in my introduction, on TikTok, synchronicity with the music is key, and the visual emphasis on the front-facing dancer, performing for a small screen, means that the dancer's body on TikTok is almost always flat to the front and contained within the frame. Often the videos feature a singular dancer but sometimes there are two or even three dancers, almost always arranged in formation facing the camera. The idea is to be the best (or most-watched) performer of the dance. In this way, *the metrics of success for dance on TikTok is the ability of the dancer to perform mimesis* – or mimic a dance trend.

Virality

The bodies of the TikTok dancers are standardized and shaped by the affordances of the platform (small screen, short video length), as well as by TikTok dancing as a cultural technique that dictates the vocabulary, style and tone of the choreography and performance. Individuals devote a lot of time to learning the popular Tik Tok dances, repeating them over and over, often for the camera in test trials before they produce the final version of their dance video. These dances are often timed perfectly to the songs accompanying, and the dancers' movement is minimal and punchy, often incorporating complex hand and arm gestures more than jumps or turns. The result is a kind of machinic feel, where the dancers seem to have been mechanized or made robotic by the dance TikTok wants them to do. However, the interesting thing about watching the same dance danced by different dancers, over and over, is that as it passes across bodies, this dance is inflected (or infected?!) by the different collections of techniques (habitus) of each dancer. Notably, many of these dances pass from black and brown bodies to white bodies, becoming more machinic, staccato and minimal as they do. The #distancedance study found that "challenge videos are mostly done by white female teenagers in casual outfits filmed in a bedroom as sequence shot without video effects or text elements."[540] The 'origins" of these dances are often erased in the process of virality because they are always elements in a series, designed to be scrolled.

One example of this is the "Renegade" dance, made popular by Charli D'Amelio but originally created by fourteen-year-old Atlanta dancer, Jaliah Harmon. The challenging but brief choreography for "Renegade" involves popular Black social dance moves such as "the wave," "the woah," and "the dab." When D'Amelio's version of the "Renegade" dance went viral—and

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in this context going viral doesn't just mean the dance circulated TikTok, but rather that it was happening off-screen, in high schools, backyards and at sports games, as well—it became so popular that celebrities like Lizzo and Kourtney Kardashian performed it for their own videos.[541] Harmon, a trained dance competitor who created "Renegade" eventually got press attention, but only after asking other TikTokkers for credit and posting videos demonstrating her connection to the dance. In a public acknowledgement of her role as creator of the dance, Harmon was eventually asked to perform at the NBA All-Star game and "Epic Games created a Renegade emote for Fortnite that accords her full credit."[542] By the time Harmon was acknowledged, though, the fad was over and "Renegade" was no longer the hot TikTok dance of the minute. Harmon's statement to *The Times*—"I think I could have gotten money for it, promos for it, I could have gotten famous off it, get noticed…I don't think any of that stuff has happened for me because no one knows I made the dance"—demonstrates that the bid for ownership in dance is still fraught, just as it was for Loïe Fuller, who fought her "imitators" at the turn of the century.[543] In a way, the phenomenon of viral dance on TikTok, and the fight for recognition as originator, can be seen as a similar modernist bid for genius to the one displayed by Fuller's lawsuits. In both cases, individuals must fight to be acknowledged as the original creator of an artform that is notoriously unownable. However, today it is not just the artform, but the *platform* (in combination with the conditions of celebrity in advanced capitalism, which are identifiably different from those of modern celebrity) that is unownable. The stakes are different for digital creators, as well, in that the proliferation of imitated TikTok dances is intense and lighting fast.

The issue of appropriation has also become increasingly urgent. Ali Johnson notes that "during the summer of 2021, many Black creatives refused to create TikTok dance routines for "Thot Shit," the chart-topping summer single from recording artist Megan Thee Stallion, as a symbolic protest against the cycle of appropriation that has become so rampant on the application.[544] The labour strike of Black content creators is a significant move on a platform that only pays you if you're visible as per the algorithm, and there have been articles (in *Forbes*, *NBC* and *Times Magazine*, among other publications) about the potential racism of TikTok's algorithm.[545] TikTok's facilitation of this type of erasure should not surprise us, given the common historical occurrence of cultural appropriation, especially appropriation of Black creativity in the United States (Anthea Kraut's 2015 book, *Choreography Copyright: Race, Gender and Intellectual Property Rights in American Dance* presents a thorough overview of

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such appropriation). Because TikTok users sign an agreement granting TikTok and its "affiliates, agents, services providers, partners and other connected third parties" an "unconditional irrevocable, non-exclusive, royalty-free, perpetual worldwide licen[s]e to use, modify, adapt, reproduce, make derivative works of, download, publish and/or transmit, and/or distribute . . . User Content in any format and on any platform," TikTok certainly plays a large role in assigning value to content.[546] This is an infrastructural difference from the ones governing dancers under modernism in that even as they bemoan their lack of ownership over their choreography, today's TikTok dancers are already freely giving away rights to their dances.

Furthermore, because TikTok dances are "social dances" (similar to folk, line or square dances), composed of modular dance moves and individual movements, they are the "building blocks" of choreographic expression and therefore arguably exempt from copyright.[547]This modifiable quality, combined with the viewing practice of TikTok, which shows you endless short videos back-to-back, means that you may see the same dance gestures echoed multiple times across bodies and spaces, albeit in different arrangements. The visual effect is one of overwhelm—a dance spectacle of synchronicity and too-shortness (many of the videos feel cut-off prematurely given the length limit) that always leaves you wanting more yet is always feeding you more at the same time. Bodies become interchangeable and mundane. The dances wash over you like water because they do not need you to participate in the "endless scroll" of Instagram and Facebook, which require the user to physically manipulate the linear feed with their finger. The TikTok dance videos, no matter how spectacular, are also often set against an intimate backdrop: the messy teenager's bedroom. The dancers are frequently made up and dressed up, with their hair done, but their dirty laundry languishes in piles behind them. The contrast between the two feels less jarring in the context of the pandemic, during which everyone was invited into each other's private homes via the screen.

Being Moved

Throughout this dissertation I have moved through a large number of screendance case studies, from the late 18th Century to the current day, in order to start defining a posthuman theory of dance. One of my arguments is that dance has always been posthuman, and that there is something about conceiving dance as posthuman that allows us to see more clearly the posthuman qualities of dance happening across the historical continuum, from modernism to

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postmodernism to advanced capitalism. I move from discussion of Loïe Fuller, a real, flesh-and-blood posthuman dancer in chapter one, to an analysis of the objectified female dancing machine (Olympia, Maria, Kyoko and Miquela) in chapter two, to the de-gendered, de-raced dancing robots/soldiers in chapter three, and the extracted/abstracted dancers in chapter four. The assemblage that comprises "posthuman dance" changes in each chapter, with the development of new technologies and platforms for the creation and dissemination of dance, and yet several important components persist: the relation of dance to the production of soul, the particular body-erasure that results from dance as spectacle, and the slippery relationship between dance and ownership. Like Sylva Wynter, who views the human as praxis, not noun, I argue that human subjects are made up of practices (sometimes understood as cultural techniques) which they watch, participate in, critique, move through, are the subject of… and dance is a generative way through which to think this notion of the human.[548]

The Strasbourg dancing plague mentioned at the start of this conclusion could be seen as a complementary inverse to our current COVID-19 pandemic, which circulates invisibly, in that the symptoms of the 1518 plague were hyper visible in the bodies of those affected in the form of jerks and spasms qualified as a kind of "dance." In a sense, the onlookers peering down from the windows onto a street full of women dancing in 1518 Strasbourg constituted a particular kind of audience: one horrified by the sight of the writhing figures and fearful that they, too would fall prey to the symptoms of the dancing plague. Hyper aware of their bodies as vulnerable entities, the townspeople were nonetheless lured to watch the display that played out in front of them "in the public market, in alleys and streets."[549] Perhaps watching from a distance gave them the illusion of separation or control. This presents an interesting iteration of the dance audience, which Thomas DeFrantz writes, displays a kind of watching, "like surveillance, that must be manipulated to be endured," or re-channeled "from scrutiny into wonder." [550] In contrast with the watchers of the plague victims in the street described above, there may actually be something in the watching of dance alone that opens the body up to contagion rather than protects against it. John Martin calls this "metakinesis" or the "inherent contagion of bodily movement, which makes the onlooker feel sympathetically in his own musculature."[551] This describes the unintentional knee jerk or body sway audience members experience while watching a dance piece they are particularly absorbed in. This is not a phenomenon limited to live dance, or muted by the screen. Even though TikTok dance videos tend to paralyze the viewer, who might be

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sitting slumped in their chair while the dancers on screen move endlessly, I have also experienced inadvertent body movements initiated by the dancing bodies on the TikTok screen. I end with this example to demonstrate that posthuman dance, despite its broadness, can also be a miniature or even microcosmic notion, in that even an audience member's sympathetic body spasm could be qualified as an example of the term. *Thinking about dance as posthuman introduces an embodied theory of posthumanism which is also, necessarily, a movement theory of posthumanism*: both in the sense of moving bodies and in the sense of *being moved* (emotionally and kinetically). The stakes of posthuman dance are multi-scalar and can be thought in term of larger assemblages that unmoor the sovereign body (of the dancer or the watcher), and in terms of the minutiae of everyday life—where minor engagements across social, technological, affective, commodified and screenic realms reveal that we are not completely in command. Dance, as a model of these ideas as well as their product, is the excess that spills over the body already not in control.

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Figures

Introduction: Animating the Kinetic Trace: From Kate Bush to Hatsune Miku

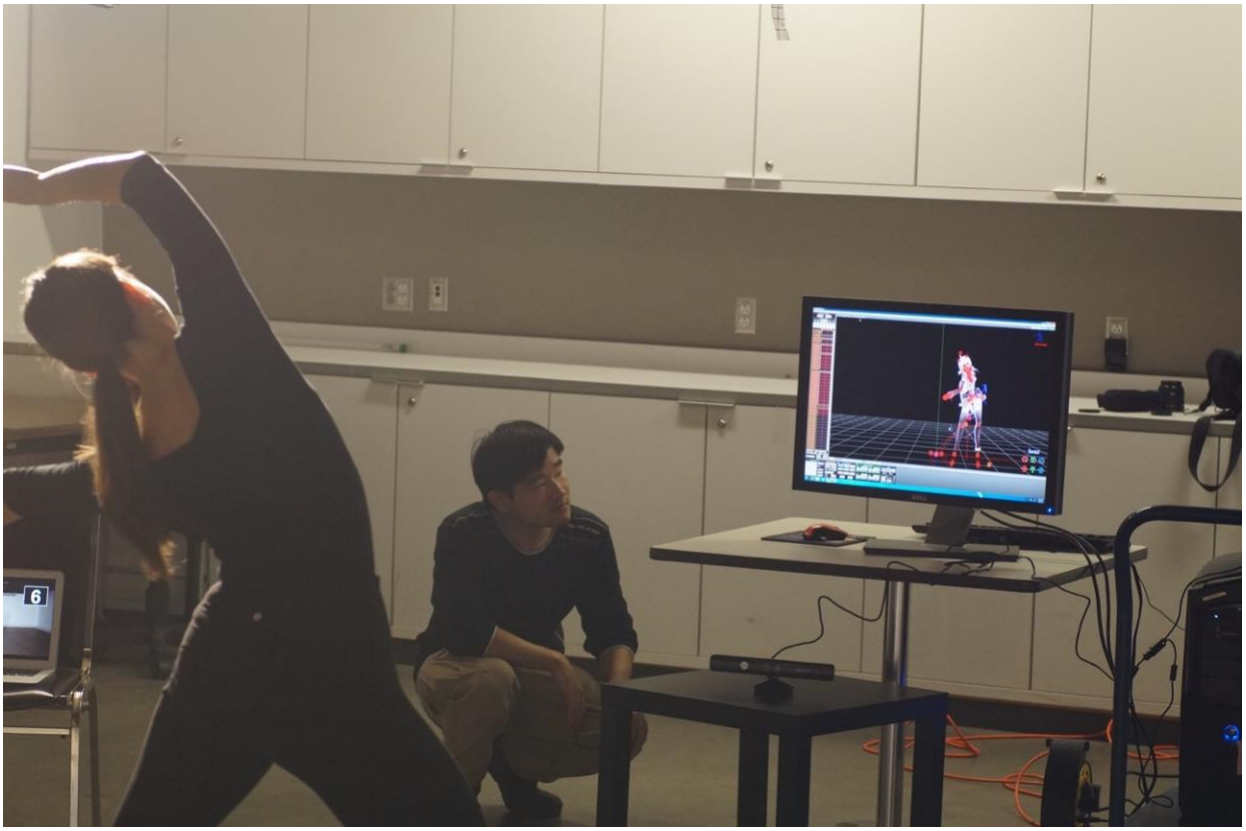

Figure 13: I dance the choreography for Kate Bush's "Wuthering Heights," facing the Alienware computer, the Microsoft Xbox 360 Kinect, and the YouTube tutorial video. Technician Michael Li watches. Photo by Darren Wershler, Concordia University, 2016.

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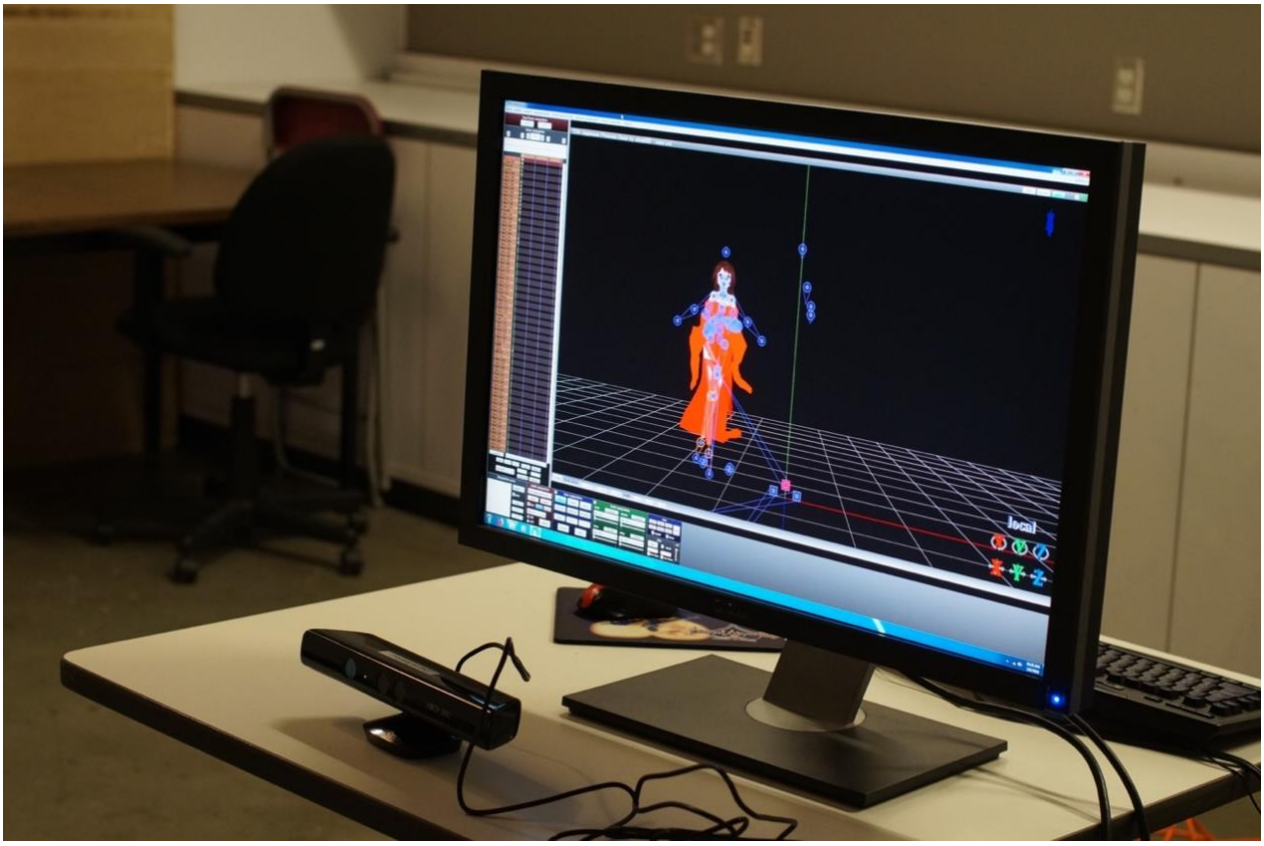

Figure 2: The computer monitor displays the software for MikuMikuDance (MMD), with Miku's avatar on the grid in her red kimono. The Kinect sits on the table in front. Photo by Darren Wershler, Concordia University, 2016.

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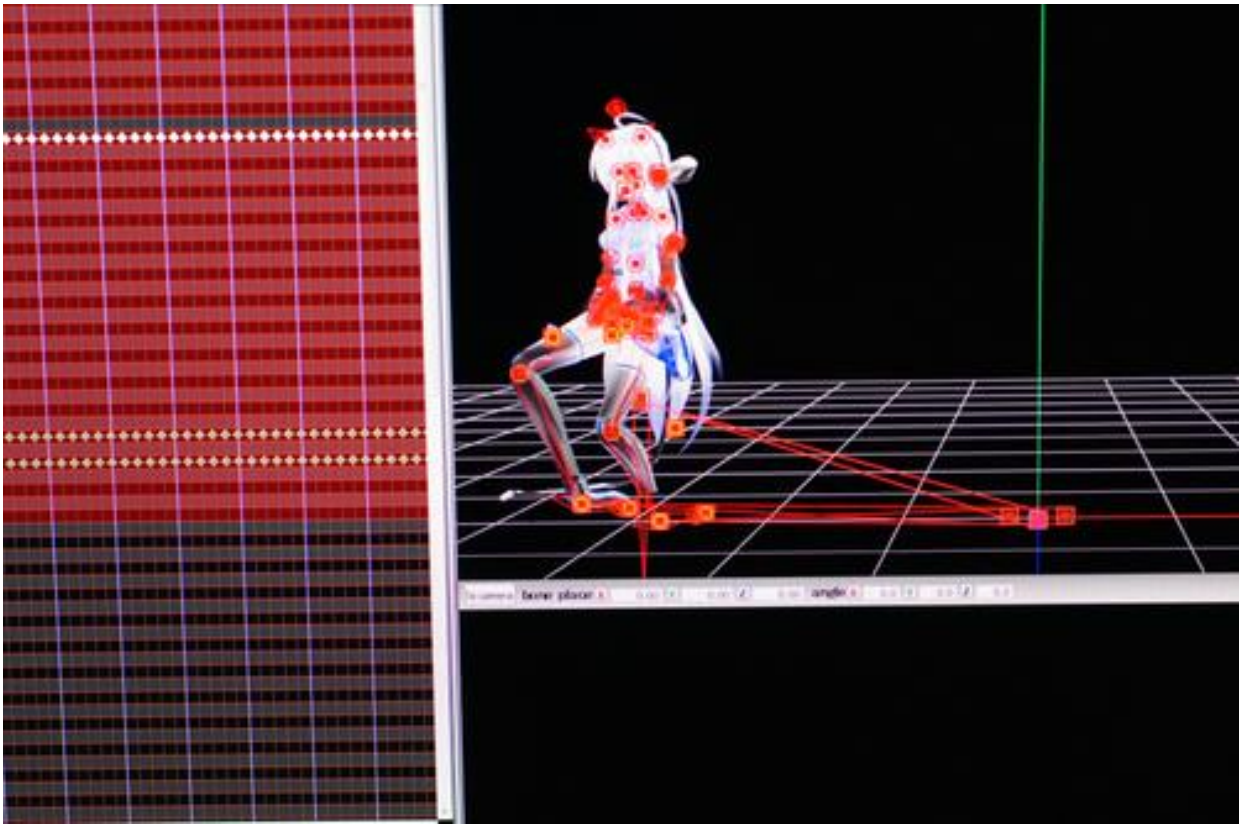

Figure 3: MMD interface with avatar attempting to read motion from data drawn from the Microsoft Kinect. Photo by Hilary Bergen, TAG (Technoculture, Arts and Games Lab), Milieux Institute, Concordia University, 2016.

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Figure 4: Hatsune Miku live in concert, HATSUNE MIKU EXPO 2016: Japan Tour. Photo by Crypton Future Media, INC.

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Figure 5: A large crowd watches Miku perform on stage, participating in the spectacle by waving their glowsticks. Hatsune Miku live in concert, HATSUNE MIKU EXPO 2016: Japan Tour. Photo by Crypton Future Media, INC.

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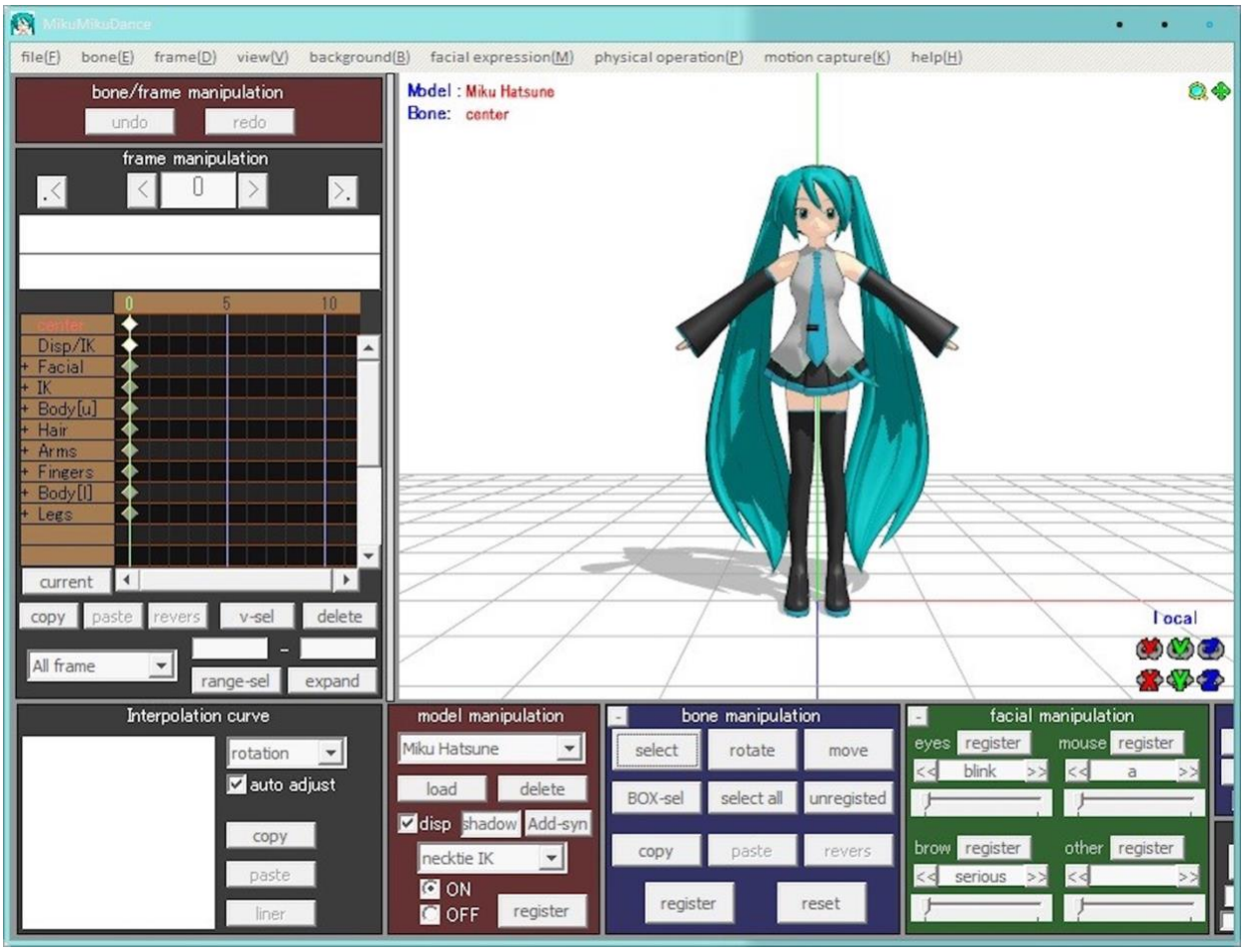

Figure 6: MMD spreadsheet interface, used to "manipulate" and choreograph digital models as seen above. Photo by Hilary Bergen, TAG (Technoculture, Arts and Games Lab), Milieux Institute, Concordia University, 2016.

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Figures 6 and 7: Participants in Melbourne's "Most Wuthering Heights Day Ever" dance together in a field in 2016. (Photos by *Luxembourg Times*, 16 July 2016).

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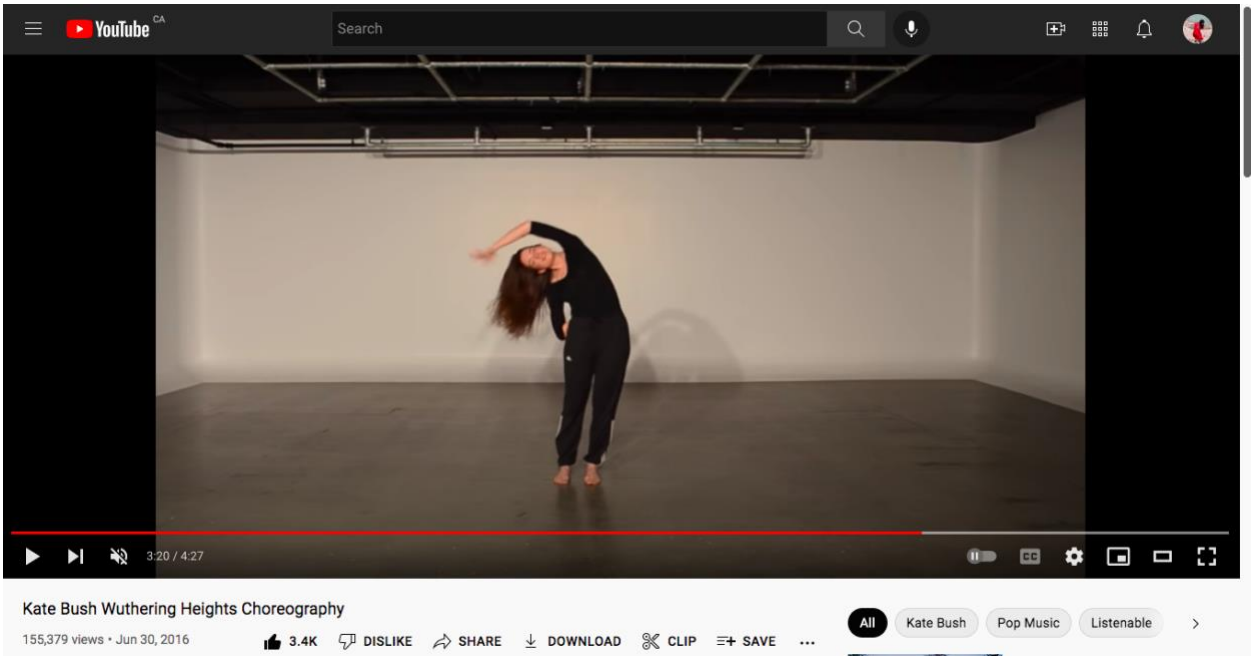

Figure 8: YouTube still from the video tutorial for Kate Bush's Wuthering Heights choreography (30 June 2016). Dancer: Hilary Bergen. Videographer: Emilie St. Hilaire. https://www.youtube.com/watch?v=IziOMwBu7ws

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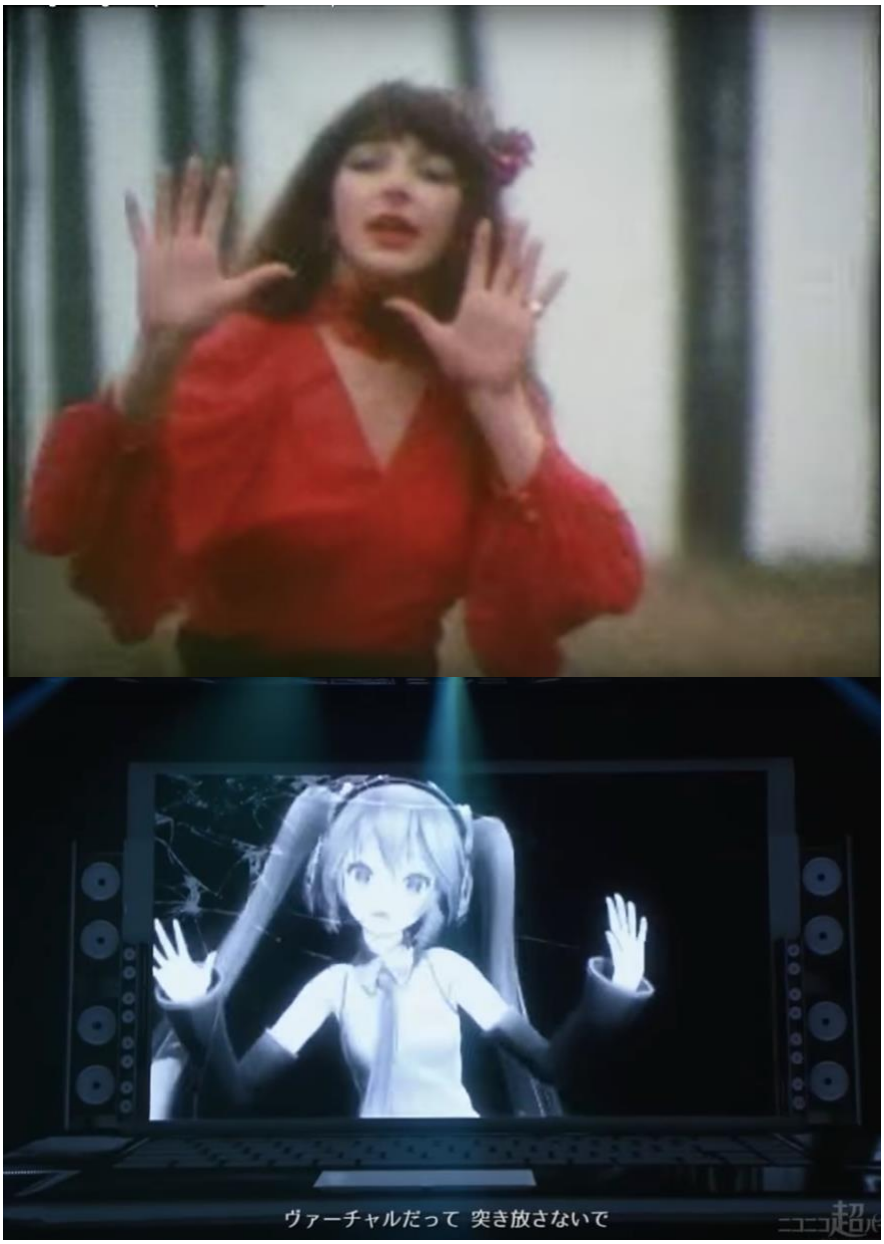

Figure 9: Bush presses her palms up to the symbolic pane of glass, singing "let me in through your window." (YouTube Still from the "Red Dress" version of Kate Bush's music video for "Wuthering Heights." Uploaded by user KateBushMusic, titled "Kate Bush - Wuthering Heights - Official Music Video - Version 2." https://www.youtube.com/watch?v=Fk-4lXLM34g)

Figure 10: Miku presses her palms against the glass of the screen, desiring to break through and become 3D. (YouTube still from a recording of Miku's live show featuring her opening performance: a mashup of VOCALOID singer Gumi's "Echo" and Miku's "Hibikase." 12 September 2016. https://www.youtube.com/watch?v=9kl6S4sx42g)

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Figure 11: Still from a music video for "Echo," created by Natto Cheez / 納豆チーズ using MMD. 3 May 2015. https://www.youtube.com/watch?v=jPzZnOc9iVs&t=63s

Figure 12: Still from the final product of my MMD dance translation project, "Let Me in at Your Window" (2016).

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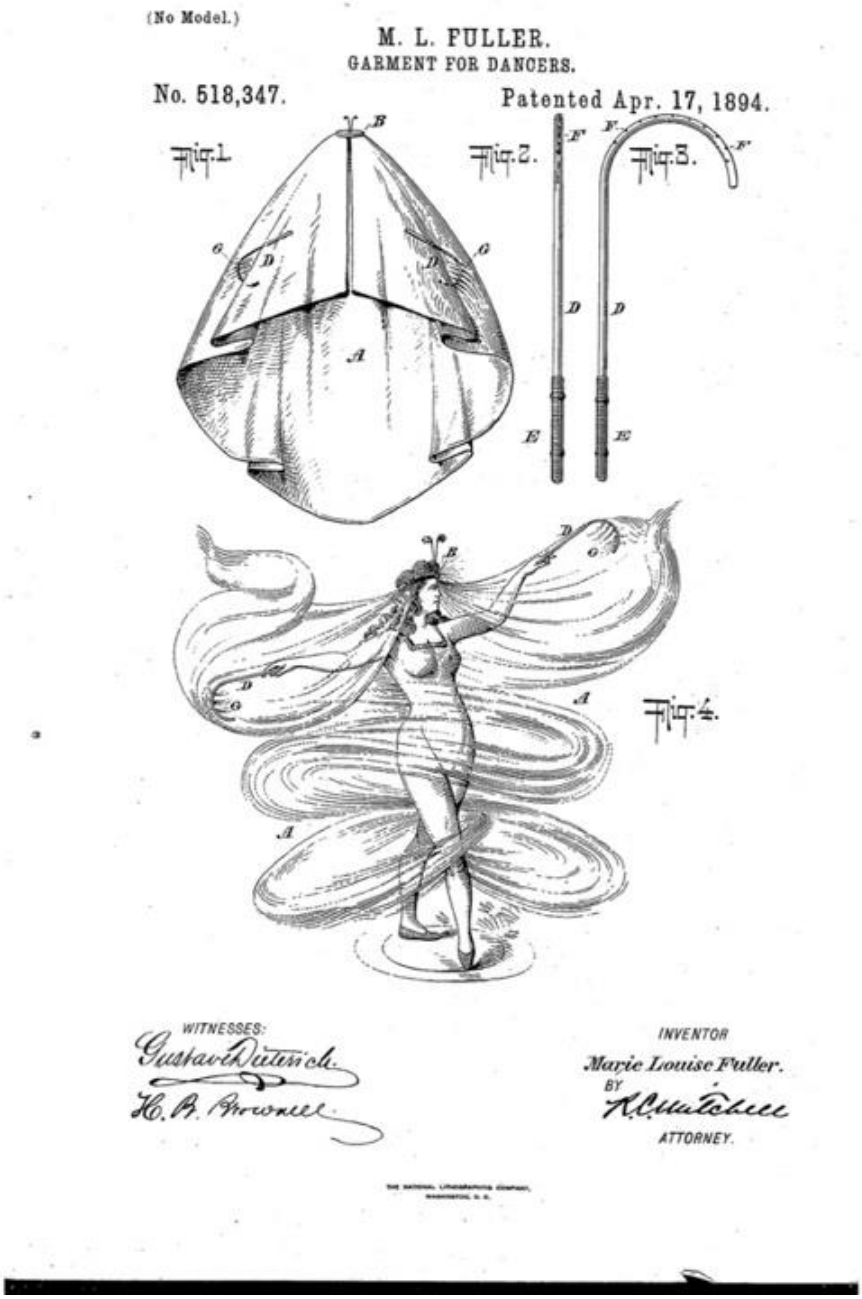
Chapter 1: *La* Loïe and the Multiple Body of the Serpentine Dance


(No Model.)

M. L. FULLER.

GARMENT FOR DANCERS.

No. 518,347. Patented Apr. 17, 1894.

Fig. 1. Fig. 2. Fig. 3.

Fig. 4.

WITNESSES:
Gustave Detzsch.
H. B. Brownell

INVENTOR
Marie Louise Fuller.
BY
H. C. Mitchell
ATTORNEY.

Figure 13. Marie Louise Fuller. GARMENT FOR DANCERS. No. 518347. Patented Apr. 17, 1894, United States Patent Office.

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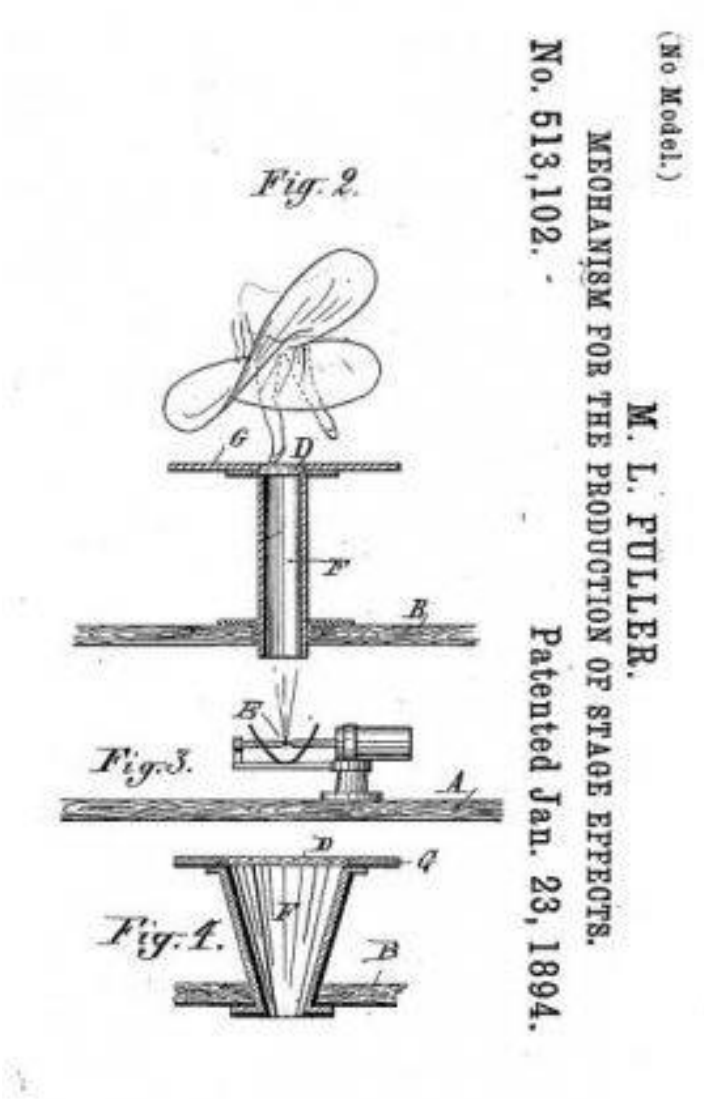

Figure 14. Marie Louise Fuller. MECHANISM FOR THE PRODUCTION OF STAGE EFFECTS. No. 513102. Patented Jan. 23, 1894, United States Patent Office.

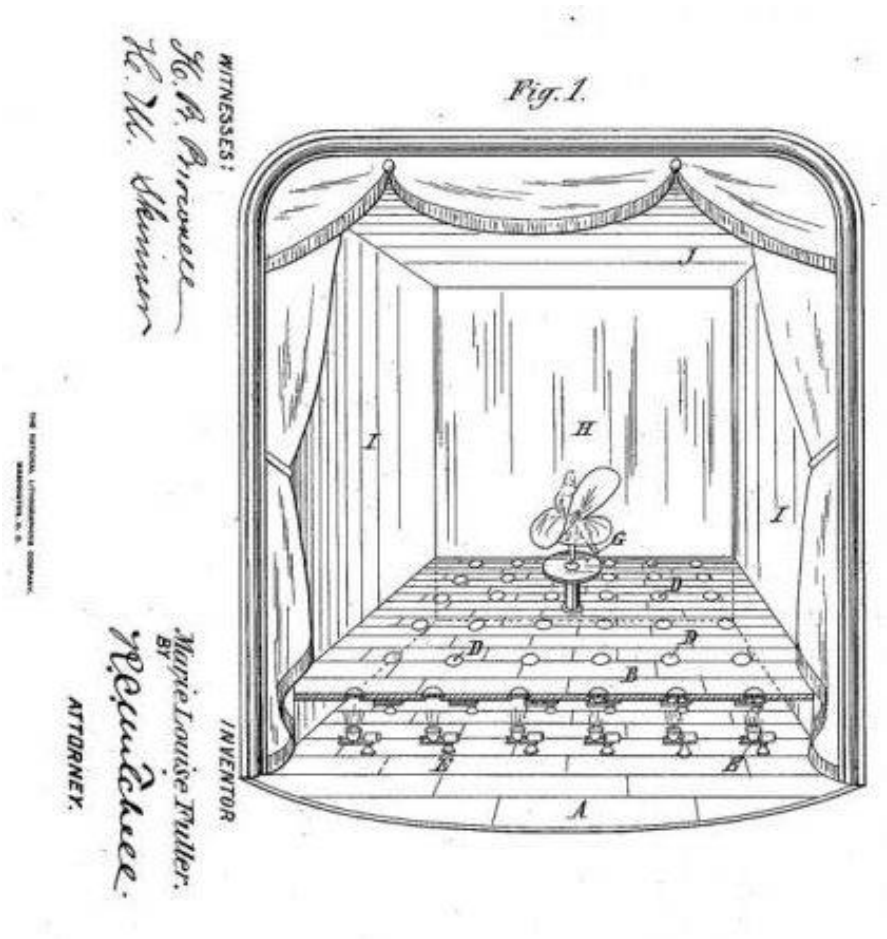

Figure 15. Marie Louise Fuller. MECHANISM FOR THE PRODUCTION OF STAGE EFFECTS. No. 513102. Patented Jan. 23, 1894, United States Patent Office.

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Figure 16. *Folies Berger: La Loïe Fuller*, 1893, poster by Jules Chéret.

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Figure 17: *Poster for Loïe Fuller at the Folies Bergère,* 1897, Poster by Jean de Paleologu.

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Figure 18: Still from YouTube of a video claiming to feature Fuller. "Loïe Fuller (1905)," Dir. Segundo de Chomón, 1902, in *Fairy Tales: Early Colour Stencil Films from Pathé.* Uploaded to YouTube by Social Deception, 27 December 2014. https://www.youtube.com/watch?v=Dda-BXNvVkQ

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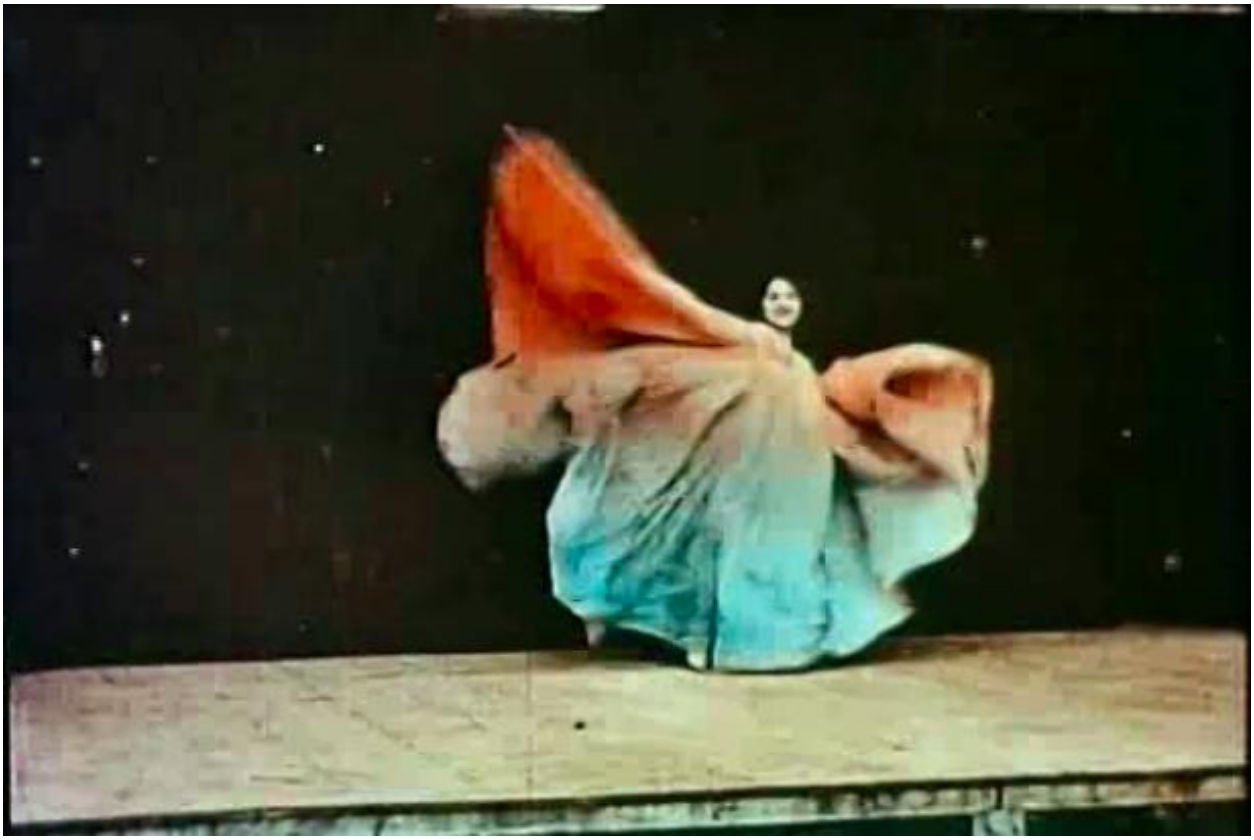

Figure 19: Still from a video featuring an unnamed Loïe Fuller imitator. From *Danse Serpentine* (1896), filmmaker Auguste Lumière (1862-1954), UbuWeb Film, https://ubu.com/film/lumieres_danse-serpentine.html

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Chapter 2:
Dance as a Cultural Technique of the Soul: from Automation to Animation

Figure 20: Theatrical release poster for Fritz Lang's *Metropolis* (1927), designed by Heinz Schulz-Neudamm. The poster features an image of the *Maschinenmensch* character.

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Figure 141: The *Maschinenmensch* (False-Maria) dances for an all-male audience. YouTube still from *Metropolis*, dir. Fritz Lang (1927).

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Figure 22: The audience of False-Maria's dance performance deteriorates into a surrealist collage of eyes. YouTube still from Metropolis, dir. Fritz Lang (1927).

Figure 23: The men are held captive by False-Maria's dance; their faces contort and they cannot look away. YouTube still from *Metropolis*, dir. Fritz Lang (1927).

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Figure 24: Kyoko, the dancing fembot, performs synchronized choreography with her boss and creator, Nathan Bateman. YouTube still from *Ex Machina*, dir. Alex Garland, 2014.

Figure 25: In another kind of strip-tease (she has already removed her clothes), Kyoko (Sonoya Mizuno) peels off her skin to expose her metallic interior, revealing that she has been a robot all along. YouTube still from *Ex Machina,* dir. Alex Garland, 2014.

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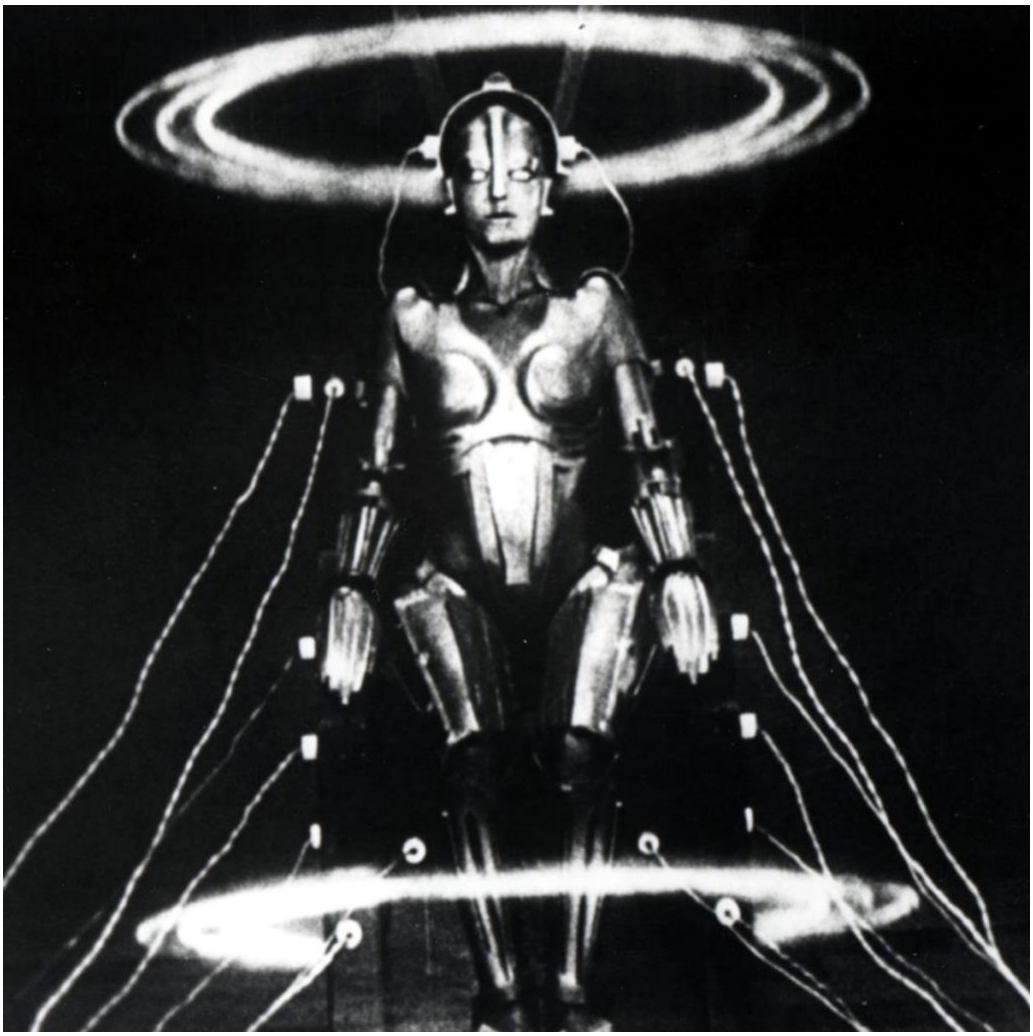

Figure 26: Metropolis's well-known "transformation" scene in which Maria's likeness is transposed onto the *Maschinenmensch* via a complex system of electrical wires, vials and bubbling potions. YouTube still from *Metropolis*, dir. Fritz Lang (1927).

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Figure 27: CGI social media influencer Lil Miquela stands in line with a row of human dancers and turns her head slowly to camera. Still from *Baauer & Miquela - Hate Me (Official Video)*, 2 October 2018, YouTube. https://www.youtube.com/watch?v=hYRD0OYSL3w

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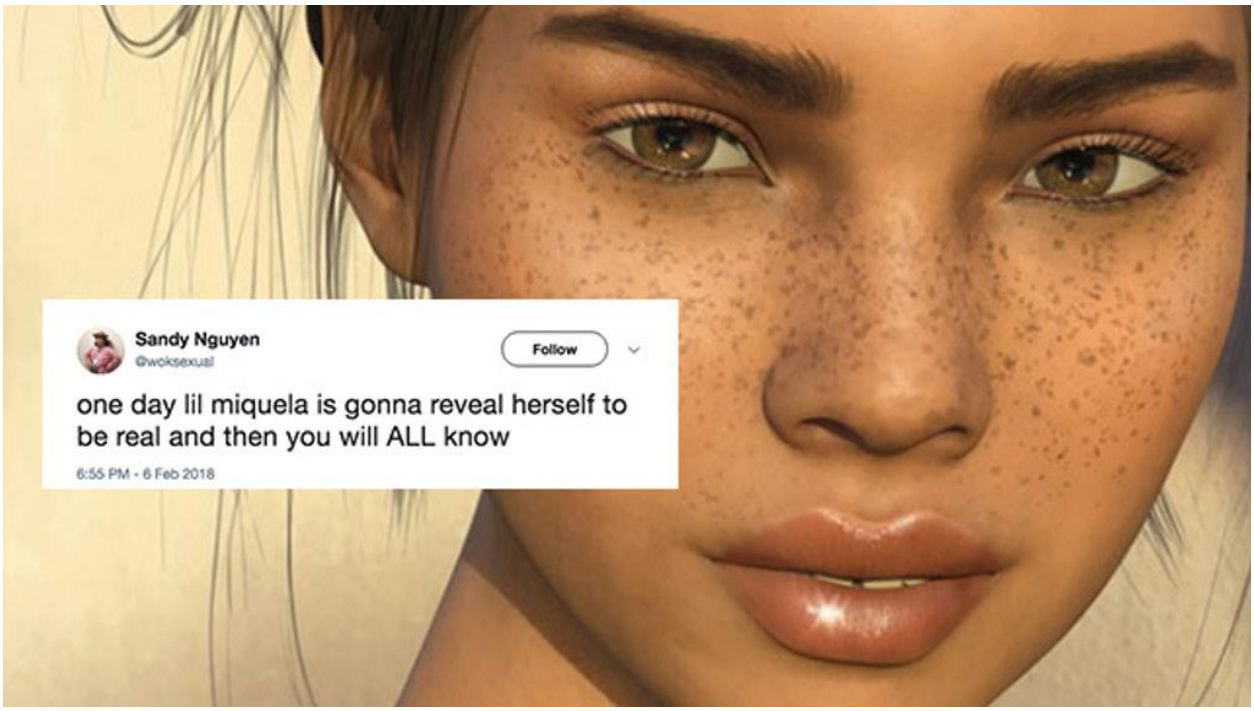

Figure 28: The face of Lil Miquela, and a comment speaking to her "realness." Screengrab from Instagram, @lilmiquela.

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Figure 29: Still from the music video for Miquela's song, "Hard Feelings" (2020). Screen grab from Instagram, 3 August 2020, @lilmiquela.

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Chapter 3:
"Dancers Make Good Workers": Military Technology, Choreographed Labour and the Machinic Gaze

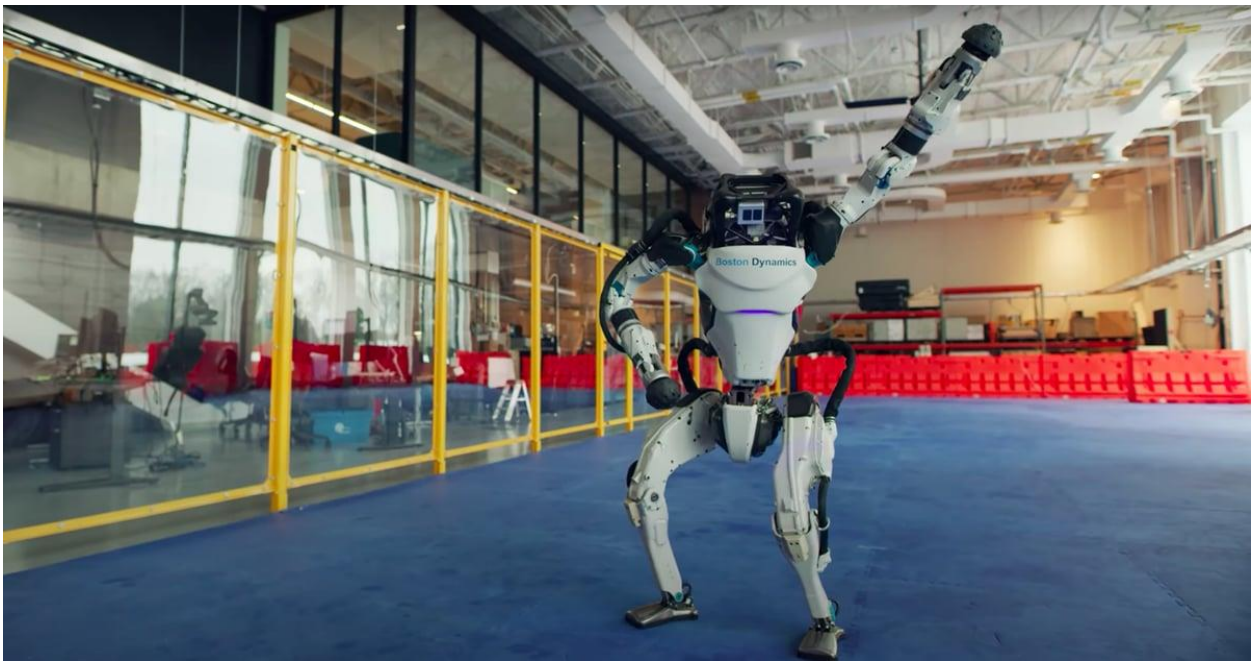

Figure 30: Boston Dynamics' Robot "Atlas" in performance. Still from YouTube video: "Do You Love Me?" Uploaded by Boston Dynamics, Dec. 29, 2020.

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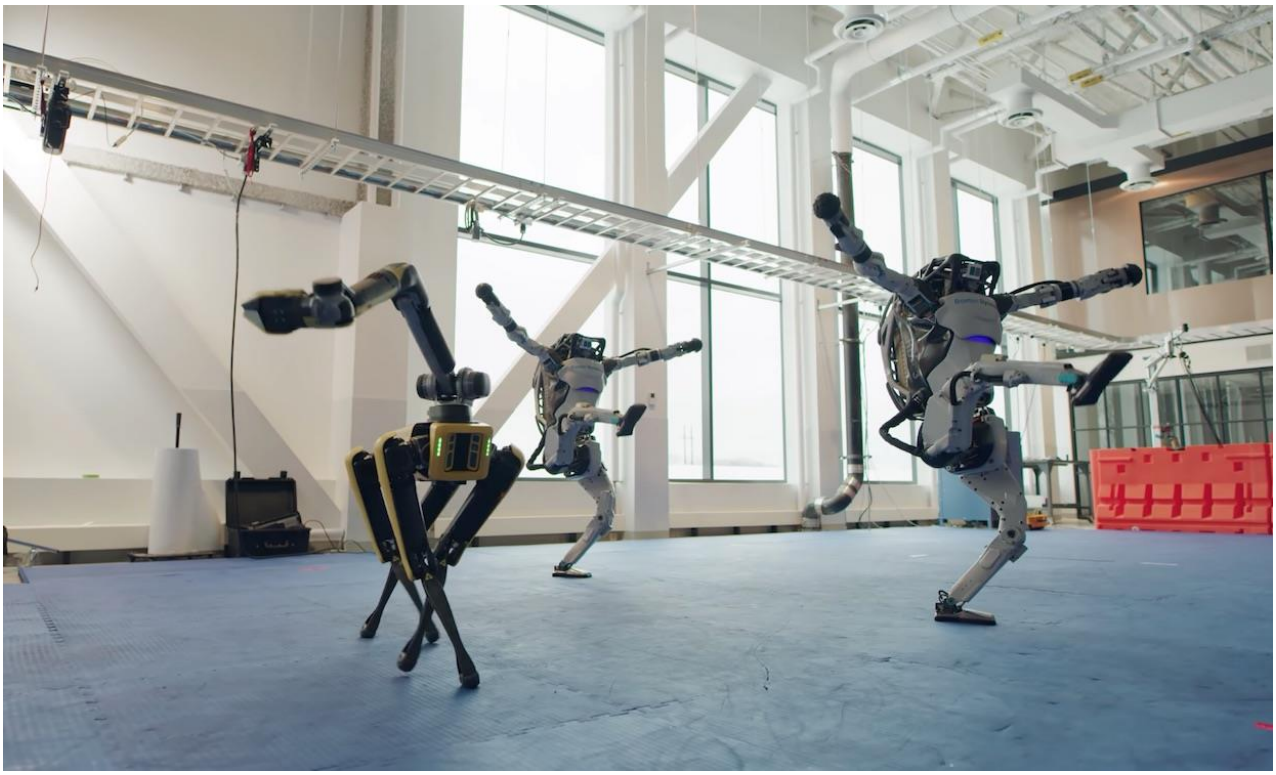

Figure 31: Boston Dynamics' Robots "Atlas" and "Spot" in performance. Still from YouTube video: "Do You Love Me?" Uploaded by Boston Dynamics, Dec. 29, 2020.

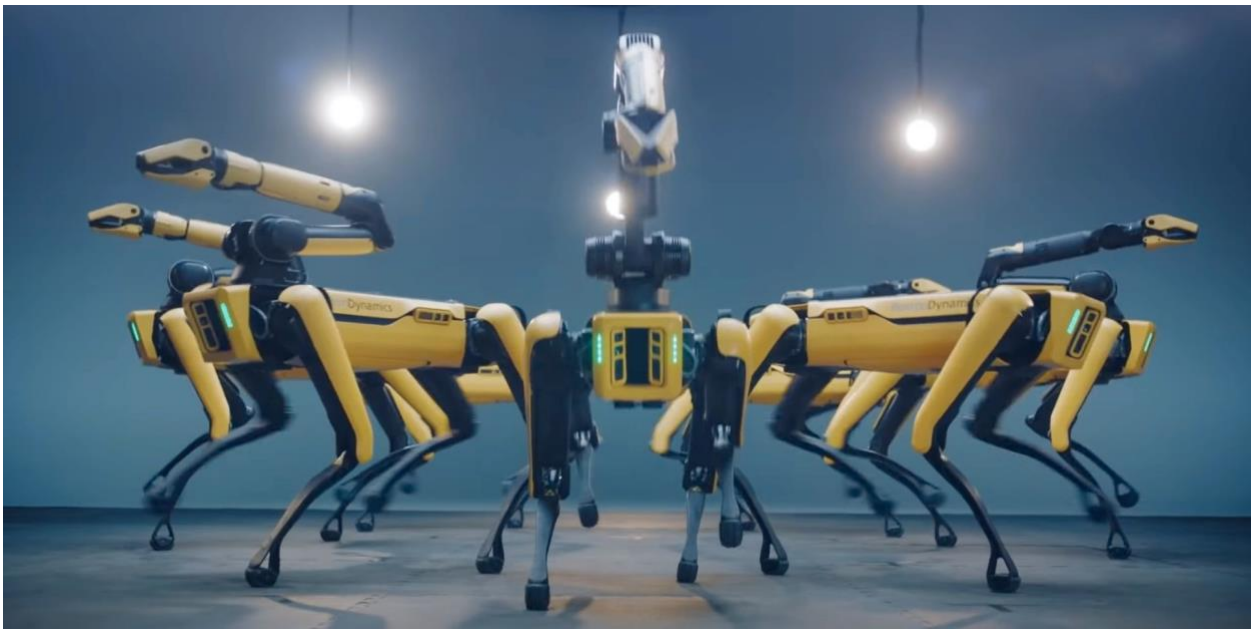

Figure 32: Five Boston Dynamics Spot models dance in formation. Stills from "Spot's On It," a performance video posted to YouTube. Boston Dynamics, 29 June 2021. https://www.youtube.com/watch?v=7atZfX85nd4

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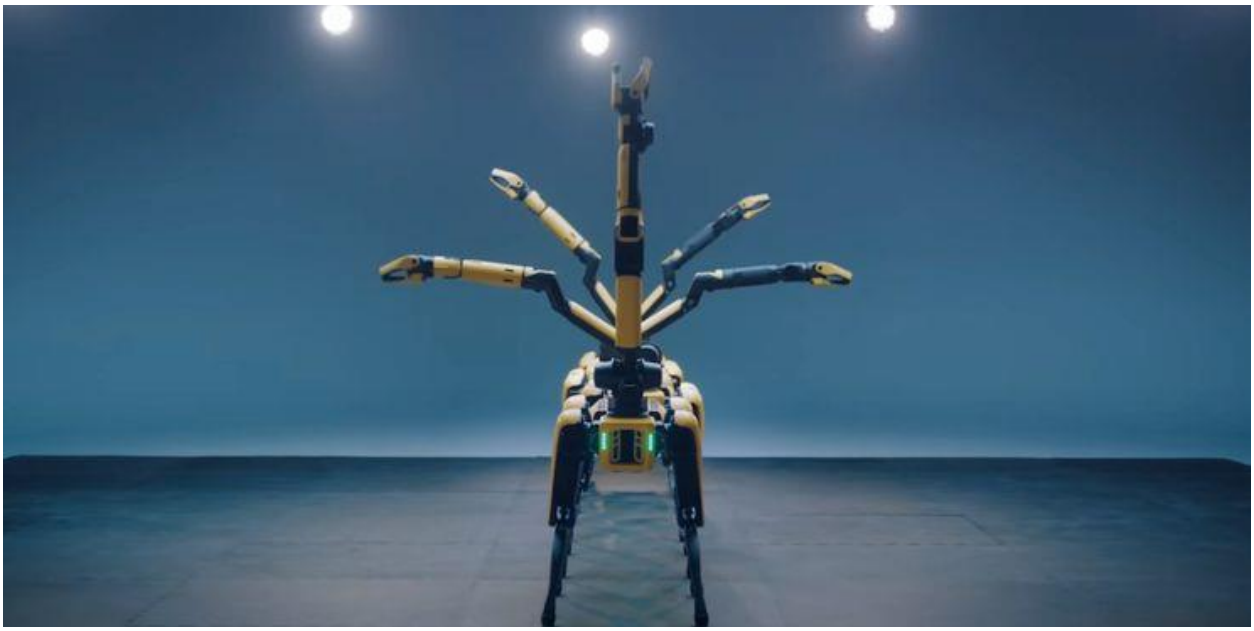

Figure 33: Five Boston Dynamics Spot models dance in formation. Stills from "Spot's On It," a performance video posted to YouTube. Boston Dynamics, 29 June 2021. https://www.youtube.com/watch?v=7atZfX85nd4

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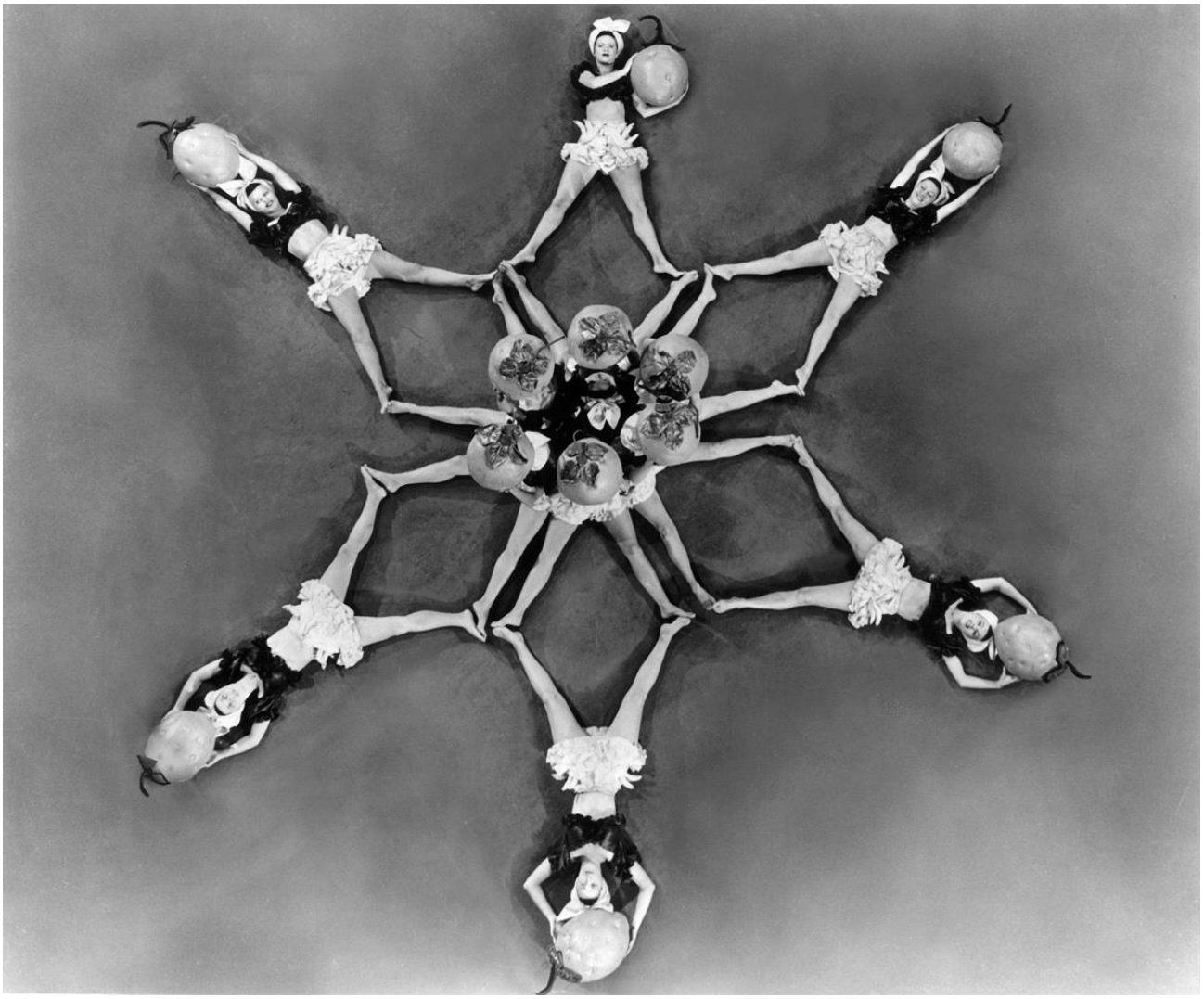

Figure 315: Still from *Footlight Parade* (1933), directed by Lloyd Bacon and choreographed by Busby Berkeley. Dancers are shot from above in a kaleidoscopic formation.

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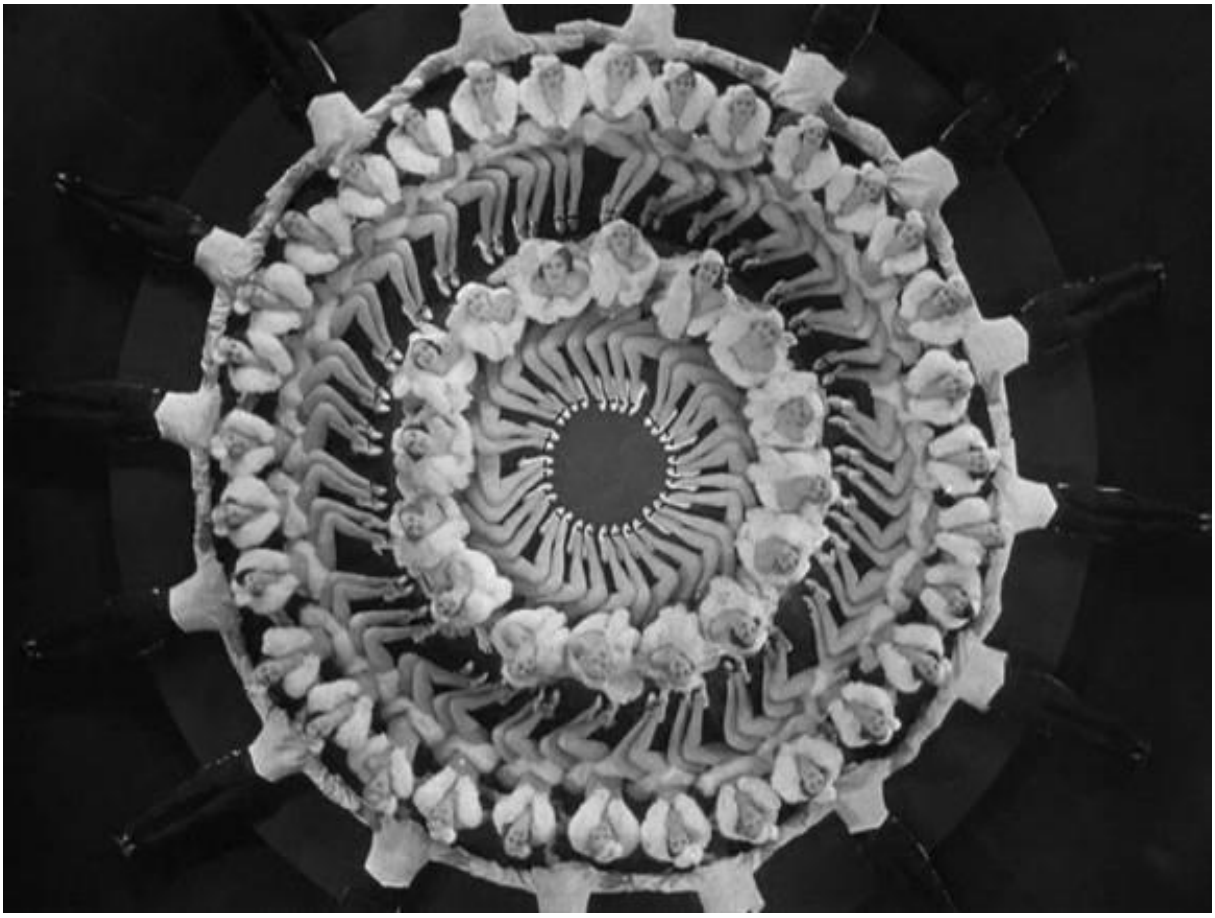

Figure 35: Still from *42nd Street* (1933), Directed by Lloyd Bacon and Choreographed by Busby Berkeley.

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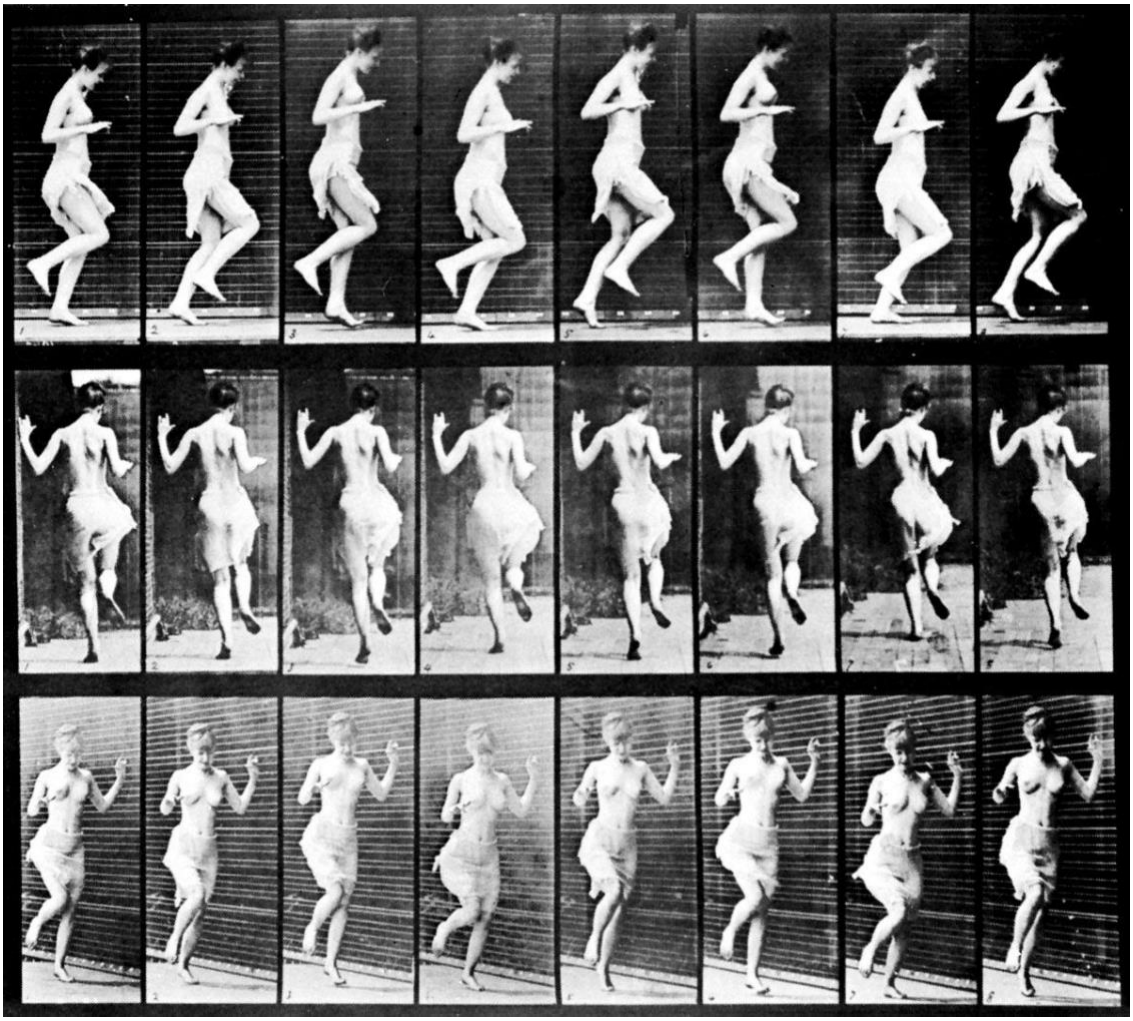

Figure 316: Eadweard Muybridge: “Figure Hopping.” 1887; from the Cooper-Hewitt, National Design Museum, Smithsonian Institution, New York City.

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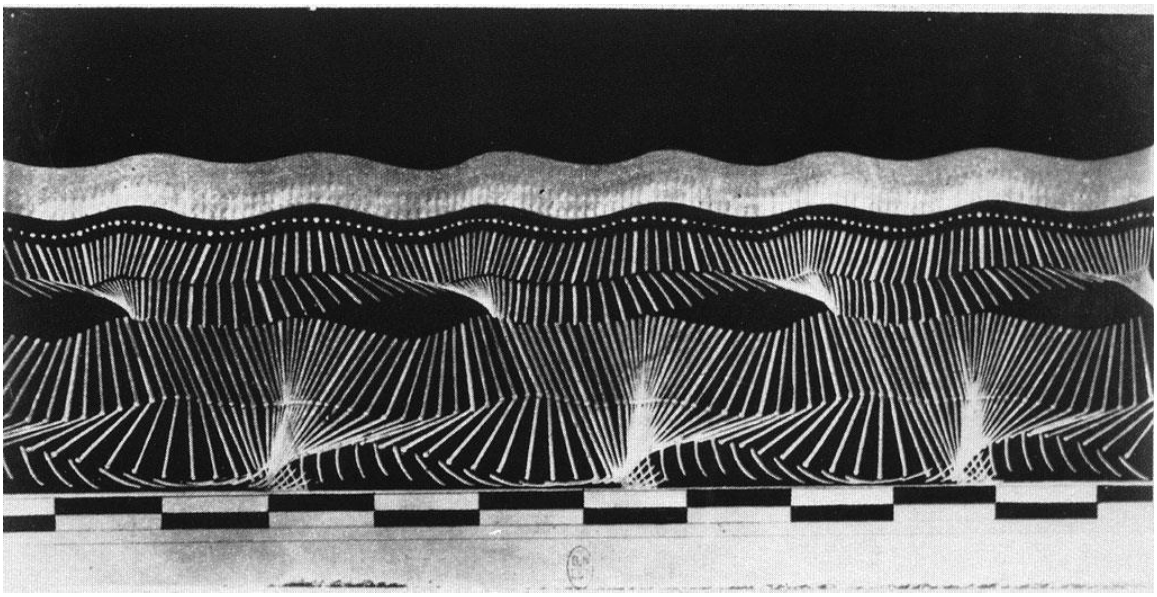

Figure 317: Jules Etienne Marey, Joinville Soldier Walking, 1883, geometric chronophotograph (Paris College de France).

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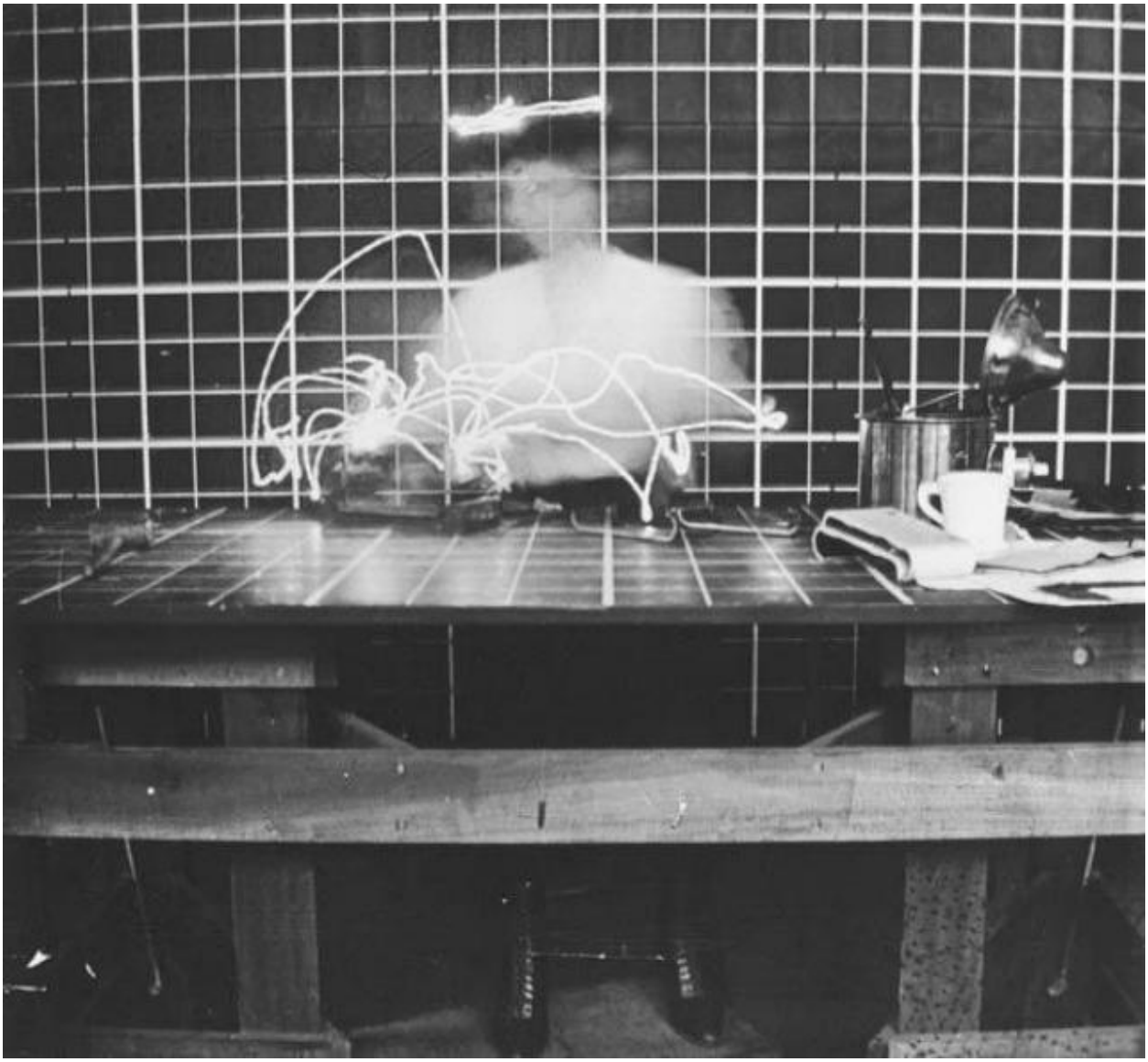

Figure 318: Motion efficiency study by Frank Gilbreth, c. 1914. Collection: National Museum of American History.

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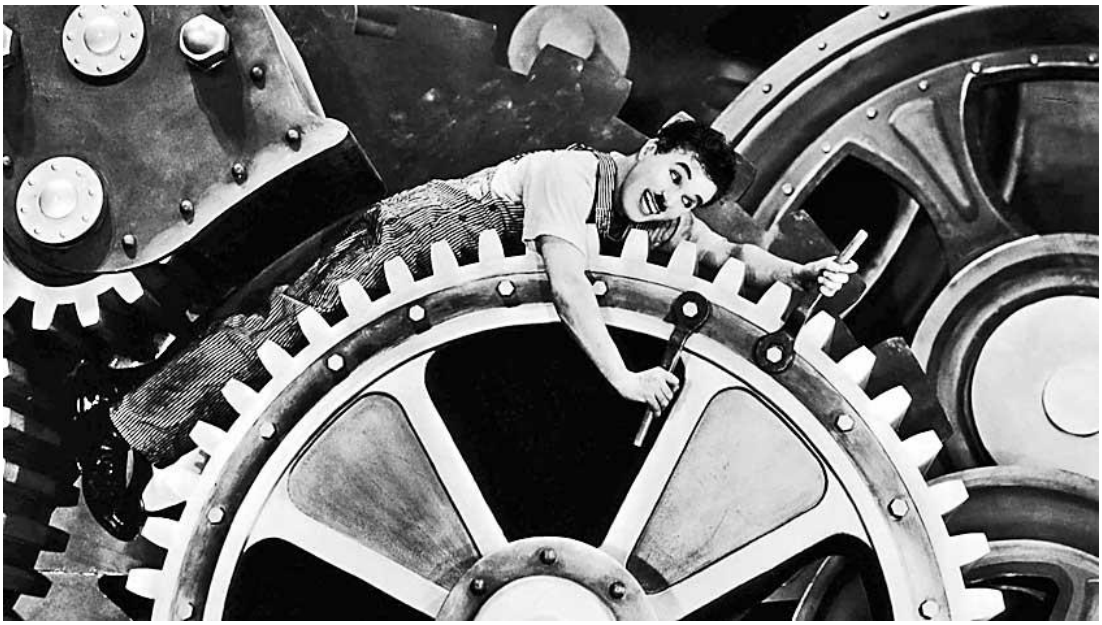

Figure 319: Film still from Charlie Chaplin's *Modern Times* (1936). Chaplin's "Tramp" character is so mechanized by the repetitive work of the assembly line, that he becomes one with the machine and is consumed by the conveyer belt. YouTube.

Figure 20: Still from "Job Switching," season 2, episode 1 of *I Love Lucy* (1952). Lucy (Lucille Ball) fills her mouth with chocolates in order to keep up with the increasing speed of the conveyer belt.

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Figure 21: Boston Dynamics' "Spot" model, in training for reconnaissance missions with the French army. Image from École Spéciale Militaire de Saint-Cyr Coëtquidan, *The Verge*. https://www.theverge.com/2021/4/7/22371590/boston-dynamics-spot-robot-military-exercises-french-army

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Figure 22: Still from *Ora* ©2011 National Film Board of Canada. All rights reserved. Used with permission from NFB.

Figure 23: Still from *Ora* ©2011 National Film Board of Canada. All rights reserved. Used with permission from NFB.

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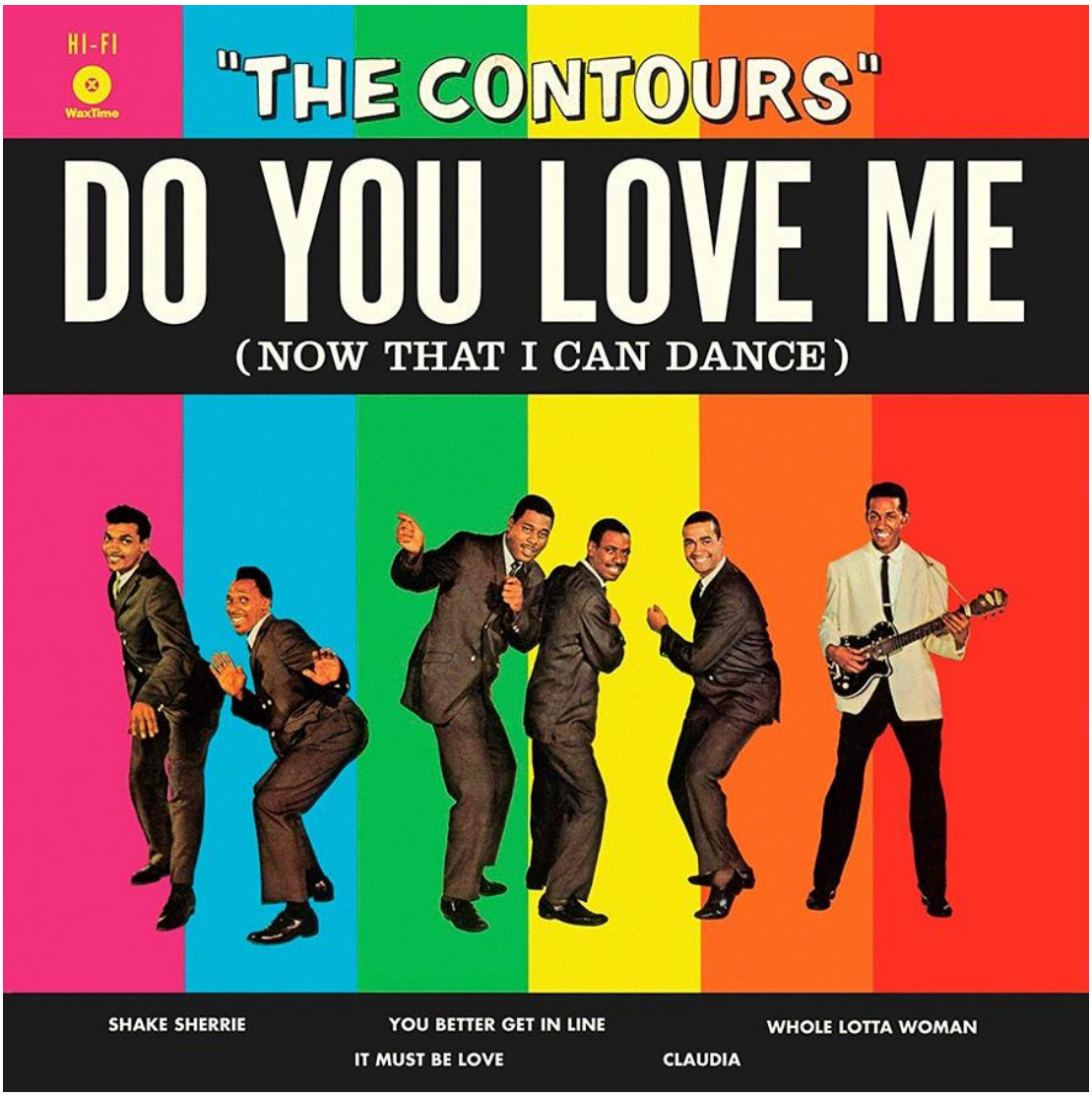

Figure 24: Cover for The Contours' 1962 Motown LP "Do You Love Me?" released with the label Waxtime.

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Chapter 4:
The Grain of the Body and the An-Ontology of Digital Dance

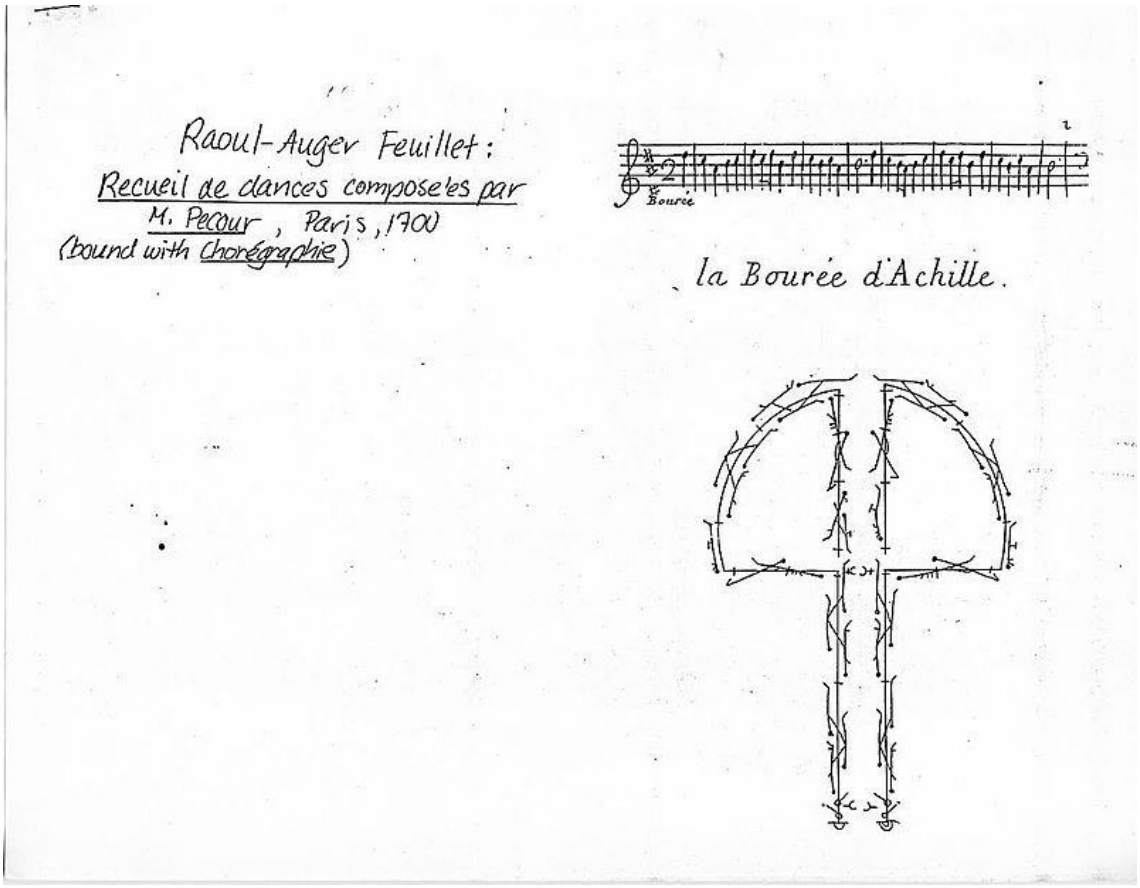

Figure 45: Eight bars of a dance composed in Beauchamp-Feuillet dance notation, developed in the 1680s by Pierre Beauchamp-Feuillet dance notation for Baroque dance. This page shows the first eight bars, of the dance "la Bouree d'Achille", from *Recueil de dances*, composes par M. Pecour, published by Raoul Auger Feuillet. This is a Bouree dance for a man and a woman. The notation shows the tract of the dance and the details of each step, aligned to the music. Paris, 1700.

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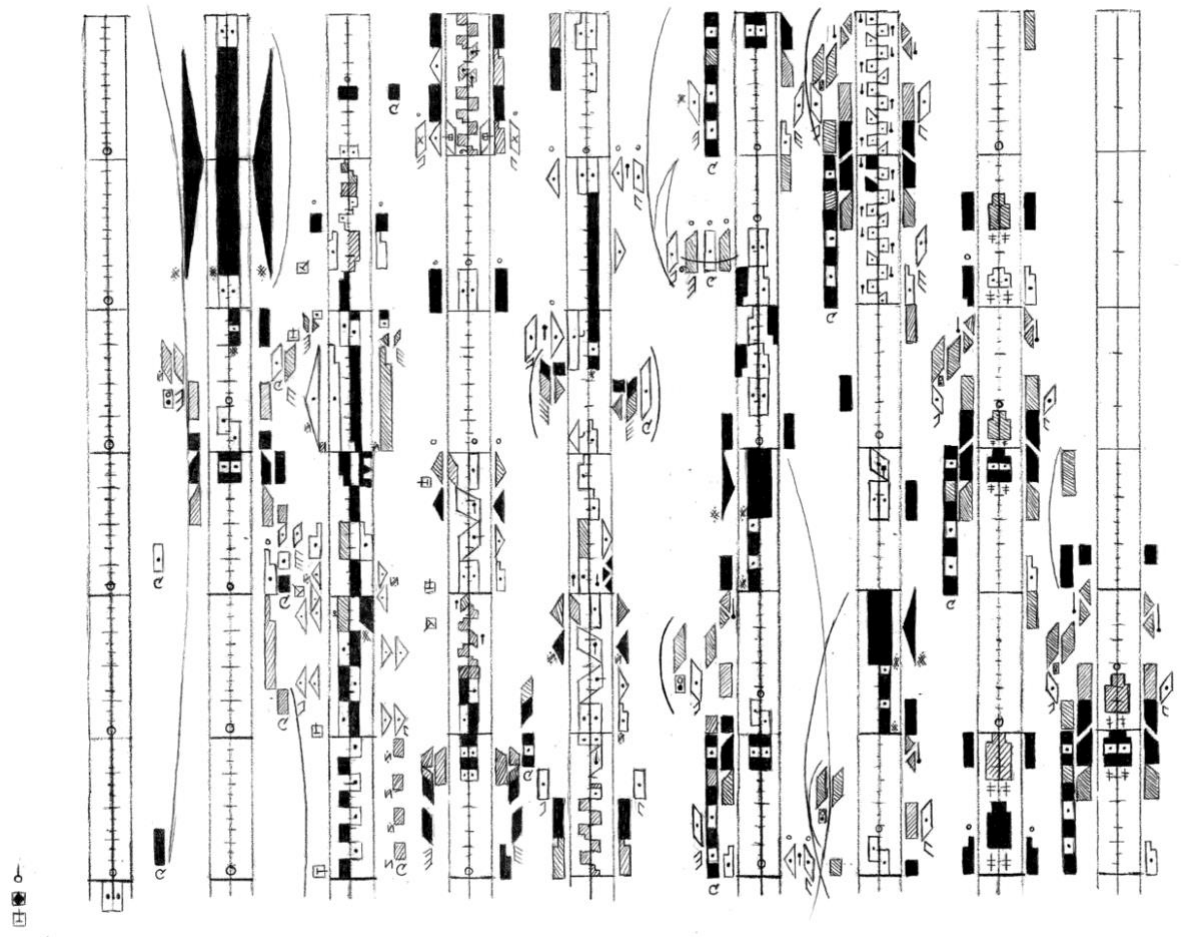

Figure 46: Labanotation, developed by Rudolf Laban, 1928.

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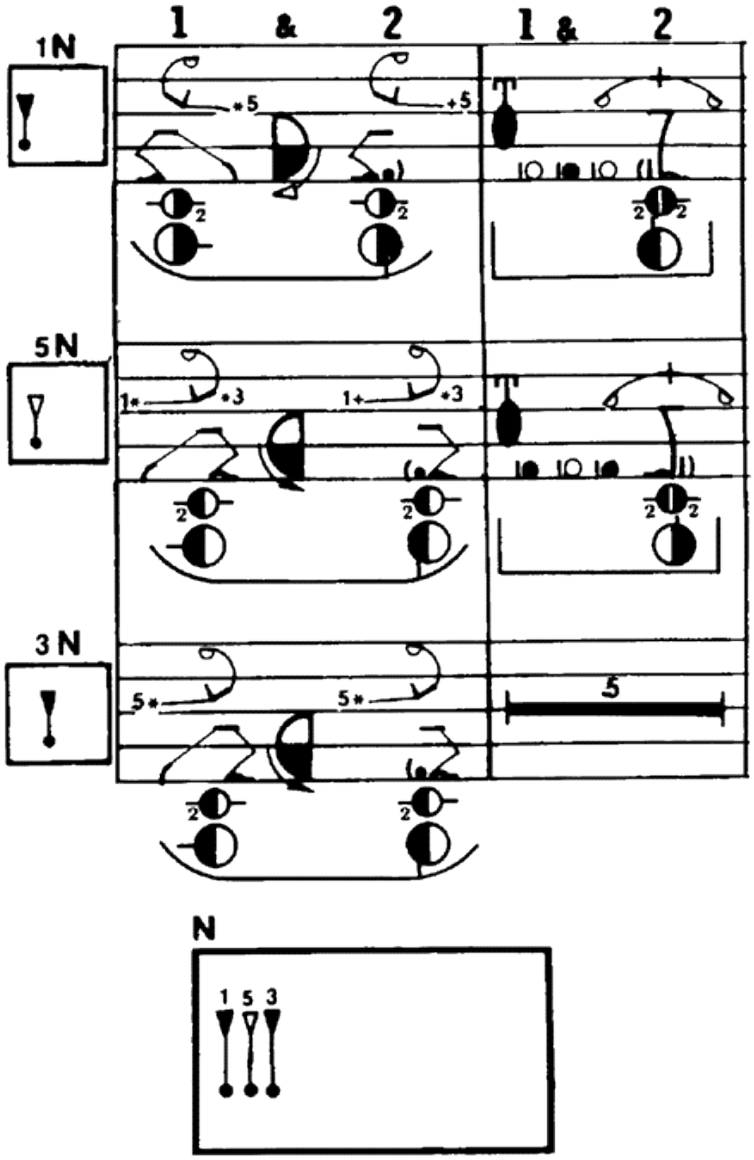

Figure 47: Sutton DanceWriting, developed in 1966 by Valerie Sutton.

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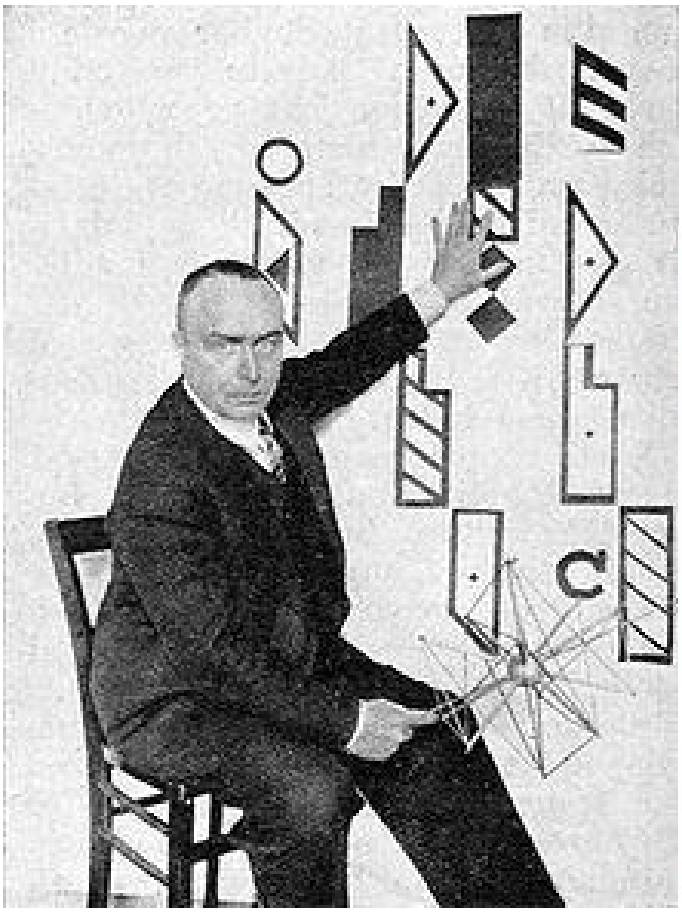

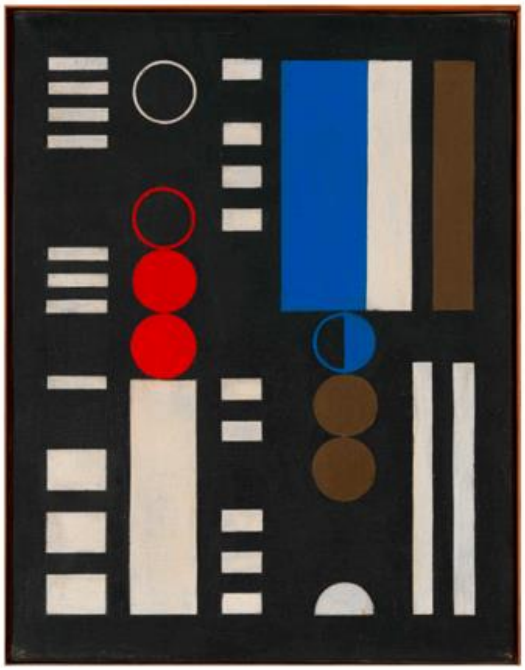

Figure 48: Rudolf Laban in front of an enlarged Labanotation score (circa 1929).

Figure 49: Sophie Taeuber-Arp, *Composition vertical à rectangles, cercles et barres*, 1930. Oil on Canvas.

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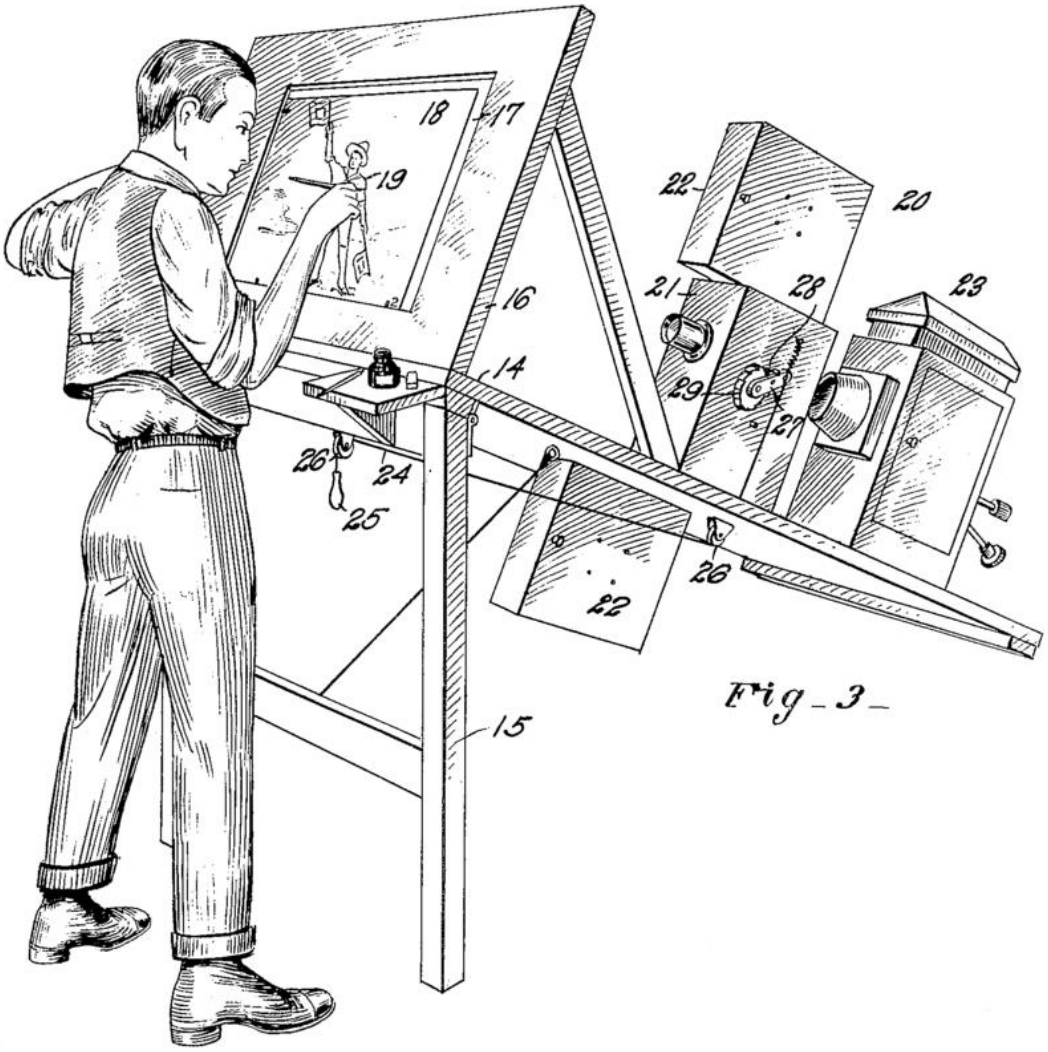

Figure 50: METHOD OF PRODUCTING MOVING-PICTURE CARTOONS. Patented 9 October 1917, USA. Patent drawing for Max Fleischer's original rotoscope featuring a transparent easel onto which a single movie frame is projected so that the artist can trace the body in the frame.

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Figure 51: Footage of dancer Marge Champion was used to animate the dance sequences performed by Snow White in the 1937 Walt Disney Classic, *Snow White and the Seven Dwarves*. Image source: Bellaluna, "Behind the Scenes: Snow White and the Seven Dwarfs (1937)," 11 April 2017. https://imgur.com/gallery/IZkSR

Figure 52: Side-by-side comparison, Cab Calloway with his band, and a still from *Betty Boop: Snow White* (1933), YouTube. In this scene, Koko the Clown transforms into a ghost and sings

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St. James Infirmary Blues. His movements are rotoscoped from American Jazz band leader Cab Calloway's live performance.

Figure 53: YouTube still from the music video for "Light it Up" by Major Lazer, produced by Method Studios (2016) depicting a dancing avatar made of ribbons, most likely animated by Mocap.

Figure 54: YouTube still from the music video for "Light it Up" by Major Lazer, produced by Method Studios (2016) depicting a dancing avatar made of paper-like feathers, most likely animated by Mocap.

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Figure 55: Still from the music video for Ed Sheeran's 2019 single "Cross Me," feat. Chance the Rapper, directed by Ryan Staake. YouTube. Featuring dancer Courtney Scarr.

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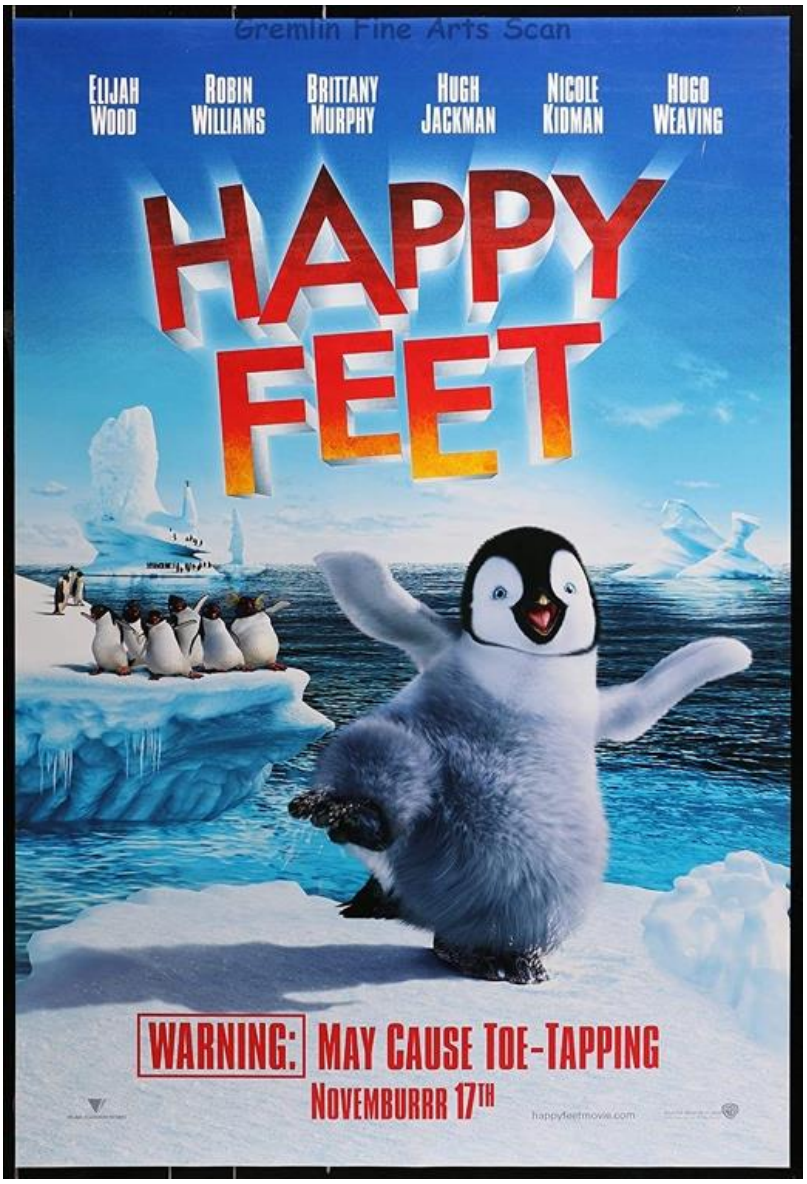

Figure 56: The movie poster for *Happy Feet* (Warner Bros, 2006) directed by George Miller, which credits the voice actors but not Savion Glover, who provided movement for Mumble's tap dance scenes.

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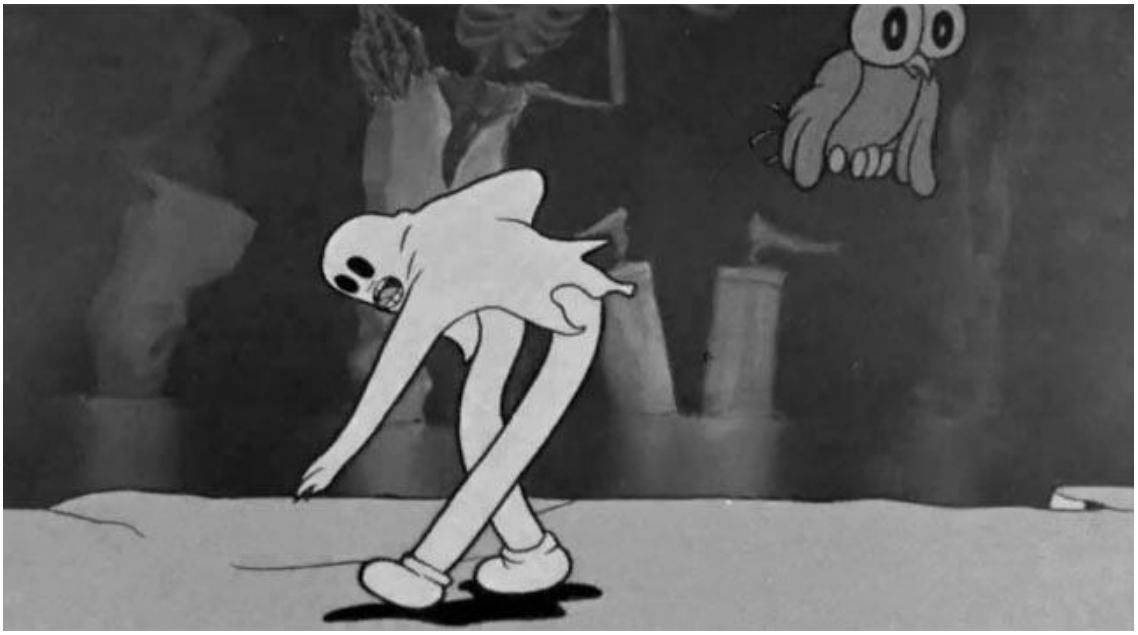

Figure 57: A ghostly iteration of Koko the Clown, danced and voiced by Cab Calloway, in the *Betty Boop* Cartoon, "Snow White" (1933). YouTube Still.

Figure 58: Koko the Clown's dancing body morphs into a pendant on a chain in *Betty Boop's Snow White* (1933). Screen grab from YouTube. https://www.youtube.com/watch?v=aDATXtewPrg

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Figure 59: Still from *Ghostcatching* (1999), improvised and performed by Bill T. Jones, animated with motion capture by Paul Kaiser and Shelley Eshkar (OpenEndedGroup).

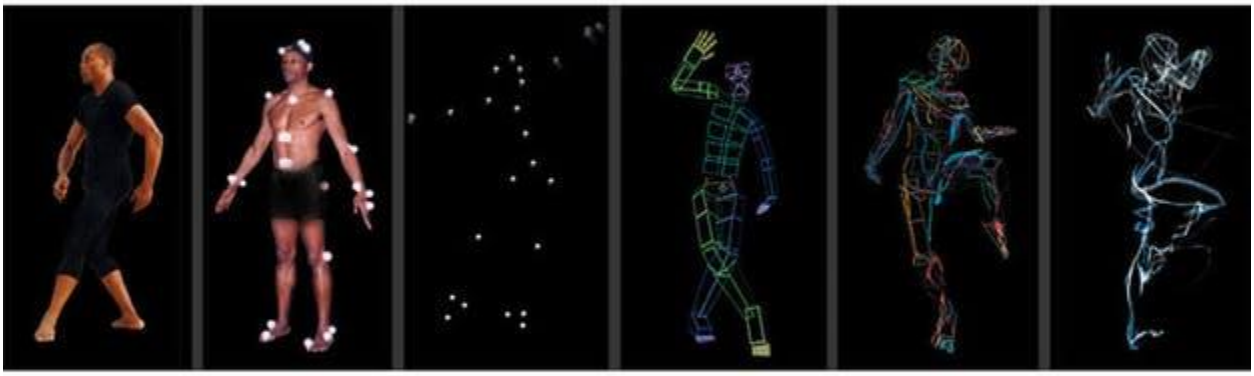

Figure 60: Bill T. Jones outfitted in mo-cap equipment, and the resulting stages of his dancing digital avatar (OpenEndedGroup).

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CONCLUSION:
Virality / TikTok / Pandemic

Figure 61: The cover for Kate Bush's studio album *The Red Shoes* (Abbey Road, 1993).

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Figure 62: Individuals traverse public space in a kind of choreography of bodies, as seen from above. *New York Times.*

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Endnotes

Introduction:

[1] Higuchi, Yu. 2008. "Mikumikudance". *Softonic*. https://mikumikudance.en.softonic.com/.
[2] Bush, Kate. "Wuthering Heights." *The Kick Inside*, 1977, EMI.
[3] Zeynep Gündüz, "Digital Dance: Encounters between Media Technologies and the Dancing Body," *At the Interface / Probing the Boundaries* 85 (2012): 309-333, 317.
[4] Talbot, Margaret. "The Enduring, Incandescent Power of Kate Bush." *The New Yorker*, 19 December 2018, https://www.newyorker.com/culture/culture-desk/the-enduring-incandescent-power-of-kate-bush.
[5] There are actually two music videos for Bush's "Wuthering Heights:" the "red dress" version, shot on a foggy, verdant moor, and the "white dress version," shot in an empty studio. Both videos are directed by Keith MacMillan and choreographed by Bush with help from one of her dance tutors, Robin Kovac. See Chen, Min. "Roll And Fall In Green: Kate Bush's "Wuthering Heights" video is still moving," Proxy Music, 20 August 2018. https://proxymusic.club/2018/08/20/kate-bush-wuthering-heights-video/
[6] Wuthering Heights Montreal, "Kate Bush Wuthering Heights Choreography," YouTube video, 4:27, 30 June 2016, https://www.youtube.com/watch?v=IziOMwBu7ws
[7] "Hatsune Miku," Vocaloid Wiki, accessed 4 August 2021, https://vocaloid.fandom.com/wiki/Hatsune_Miku
[8] I was the organizer of the first Montréal edition of this event, in 2016.
[9] Here I am thinking of Bruno Latour's methodology, which is informed by Actor-Network Theory (ANT), and maintains that our world is made up of "actors" (or human and non-human agents) that are not just symbolic but active. ANT suggests that in order to make sense of social and cultural phenomena and produce new associations, we must "follow the actors themselves" and learn from what their collective existence tells us without attempting to attribute their agency to an outer social force. See Latour, Bruno. *Reassembling the Social: An Introduction to Actor-Network Theory* (Oxford University Press, 2005), 17.
[10] It is worth noting that a 2019 episode of Charlie Brooker's *Black Mirror* (Season 5, Episode 3), titled "Rachel, Jack and Ashley Too" features American popstar, Miley Cyrus, in a role very similar to the premise of Hatsune Miku, as a holographic, programmable doll and entertainer. The episode, which aired 5 June 2019, explores the ethical implications of such a venture, especially as related to ownership, authorship and agency of the female body.
[11] Marketing Miku as a hologram makes it seem as though there is a 3D object to clone, when really, she's always been a 2D iamge. Also: this misuse of "hologram" fits into a pattern of technical terms like "robot" and "automaton" that are commonly misused in the development and narrative of new technological forms. See my commentary in chapter 2 on Instagram influencer, Lil' Miquela, who is marketed to her followers as a "robot."
[12] "Who is Hatsune Miku?" Crypton Future Media, INC., https://ec.crypton.co.jp/pages/prod/vocaloid/cv01_us (accessed 5 December 2018).
[13] Stina Marie Hasse Jørgensen, Sabrina Vitting-Seerup, and Katrine Wallevik, "Hatsune Miku: An Uncertain Image," *Digital Creativity* 28.4 (2017): 318-331, 323.
[14] Nico Nico Dōga, the most popular video sharing website in Japan, launched in 2006. It now has more than 23 million registered users. Many of its design features resemble YouTube, but a significant difference is its ability to allow users to add comments in direct overlay atop the videos at specific playback times.
[15] "Otaku." *Merriam-Webster.com Dictionary*, Merriam-Webster, https://www.merriam-webster.com/dictionary/otaku. Accessed 12 Jul. 2022. In Japan, the use of the term *otaku* is somewhat more derogatory than in the North American or European context, and is often used to refer to "school-age males with poor social skills who devote themselves to technology or some aspect of [Japanese] pop culture" (Merriam-Webster).
[16] Lam, Ka Yan. "The Hatsune Miku Phenomenon: More Than a Virtual J-Pop Diva," *The Journal of Popular Culture*, Special Issue: *Asian Popular Culture*, 49.5 (2016): 1107-1124.
[17] David M. Bourg and Bryan Bywalec, "Physics for Game Developers," 2nd Edition, Chapter 14: Physics Engines, https://www.oreilly.com/library/view/physics-for-game/9781449361037/ch14.html (accessed 8 February 2019).
[18] Siegert, Bernhard. *Cultural Techniques: Grids, Filters, Doors, and Other Articulations of the Real*, Trans. Geoffroy Winthrop-Young (Fordham University Press, 2015), 97.
[19] Jørgensen et al., 323.
[20] Miku is licensed as Attribution-NonCommercial 3.0 Unported (CC BY-NC 3.0) and the license can be read in its entirety here: https://creativecommons.org/licenses/by-nc/3.0/legalcode

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[21] For example, in one song created for Miku's live show in 2015—a mashup of VOCALOID singer Gumi's "Echo" and Miku's "Hibikase," Miku sings:
What the hell's going on?
Can someone tell me please
Why I'm switching fast than the channels on TV?
I'm black, then I'm white
No! Something isn't right!
My enemy's invisible
I don't know how to fight.
The trembling fear
Is more than I can take
When I'm up against
The echo in the mirror.
[22] "Worlding" is a new materialist term for human/non-human enmeshment. As Donna Haraway writes, "Worlding is a particular blending of the material and the semiotic that removes the boundaries between subject and environment." See Donna Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2008).
[23] Patrick W. Galbraith, "Moe: Exploring Virtual Potential in Post-Millennial Japan," *Electronic Journal of Contemporary Japanese Studies* 31 (October 2009): http://www.japanesestudies.org.uk/articles/2009/Galbraith.html.
[24] Ibid.
[25] Ibid.
[26] Adam Jasper and Sianne Ngai. "Our Aesthetic Categories: An Interview with Sianne Ngai," *Cabinet Magazine* 43 (Fall 2011), http://www.cabinetmagazine.org/issues/43/jasper_ngai.php.
[27] Jørgensen et al., 318-331.
[28] Galbraith.
[29] Heather Warren-Crow, *Girlhood and the Plastic Image* (Hanover: Dartmouth College Press, 2014), xiv.
[30] Ibid, 11.
[31] Deborah Jowitt, *Time and the Dancing Image* (William Morrow & Company, 1989), 39.
[32] "Advanced capitalism" is Rosi Braidotti's term for the era we are currently living in. See Rosi Braidotti, "A Theoretical Framework for the Critical Posthumanities," *Theory, Culture & Society*. 2019, 36(6):31-61.
[33] Laura Mulvey, *Death 24X a Second: Stillness and the Moving Image* (London: Reaktion Books Ltd., 2006), 9.
[34] Rosa Menkman, "The Glitch Art Genre," The Glitch Moment(um), *O Fluxo*, July 2012. https://www.ofluxo.net/the-glitch-art-genre-by-rosa-menkman/
[35] Kate Bush, "The Kick Inside" (London: EMI Records, 1978)
[36] David Mitchell, "Kate Bush and Me," *The Guardian,* 7 December 2018, https://www.theguardian.com/books/2018/dec/07/david-mitchell-kate-bush-lyric-poetry.html.
[37] This occurrence has resulted in a new wave of Kate Bush fans: teenagers who had never heard of Bush before this episode of *Stranger Things* are now taking to TikTok to proclaim her genius.
[38] Thomas DeFrantz and Philipa Rothfield, eds., *Choreography and Corporeality: Relay in Motion* (Basingstoke: Palgrave MacMillan, 2016), 212.
[39] Ken McLeod, "Living in the Immaterial World: Holograms and Spirituality in Recent Popular Music," *Popular Music and Society* 39.5 (2016): 501-515.
[40] Emily Brontë, *Wuthering Heights*. (London: Thomas Cautley Newby, 1847).
[41] Lorraine Sim argues that Brontë claims liminal spaces in Wuthering Heights as "sites of transcendence, thereby resisting traditional philosophical and Christian dichotomies such as matter and spirit, self and other, immanence and transcendence." See: "Wuthering Heights' and the Politics of Space." *Limina: A Journal of Historical and Cultural Studies* 32-51 (2021): 32–51.
[42] As seen in the stills from our final video, we approximated Bush's iconic red dress and black sash using costuming available in MMD's database: a revealing kimono-style dress with red knee-high stockings.
[43] Jonathan Sterne, *MP3: The Meaning of a Format* (Durham: Duke University Press, 2012), 4-5.
[44] Kirstie Ball, Kevin Haggerty and David Lyon, eds., *Routledge Handbook of Surveillance Studies* (Abingdon: Routledge, 2012), 1.
[45] Emmanuel Levinas, *Difficult Freedom: Essays on Judaism*, trans. Sean Hand (Johns Hopkins Jewish Studies, 1997), 294.
[46] Emmanuel Levinas, *Totality and Infinity*: *An Essay on Exteriority*, trans. Alphonso Lingis (Boston: Martinus Nijhoff Publishers, 1979), 207.

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[47] Siegert, *Cultural Techniques*, 97.
[48] Ibid.
[49] Bailey Johnson, "Hatsune Miku: The World's Fakest Pop Star," *CBS News*, 9 November 2012, https://www.cbsnews.com/news/hatsune-miku-the-worlds-fakest-pop-star/.
[50] Lukman Aroean and Philip Sugai, "An Analysis of Anger Responses Within the Context of Virtualized Consumption of Hatsune Miku," *Advances in Consumer Research* 41 (2013): 342-345, 343.
[51] By "violence" I'm referring here to the long history of scrutiny –medical, legal, scientific—and classification that has been enacted upon the female body, in an attempt to know or even control the unknown.
[52] Andre Lepecki, "Choreography as Apparatus of Capture," *TDR: The Drama Review* 51, no. 2 (2007):119-123, 120.
[53] Rosi Braidotti, "A Theoretical Framework for the Critical Posthumanities." *Theory, Culture & Society* 36, no. 6 (November 2019): 31–61, 34.
[54] See, for example, the Turing Test and chatbots who simulate human conversation like Eliza (Joseph Weizenbaum's "therapist" chatbot, created at the MIT Artiicial Intelligence Lab from 1964-1966, and Ada, a chatbot instrument for automating language-based encounters, designed in 2021. See https://www.ada.cx/about.
[55] Deborah Levitt, *The Animatic Apparatus: Animation, Vitality, and the Futures of the Image* (Winchester: Zero Books, 2018), 121.
[56] Susan Sontag, "Dancer and the Dance," *Reading Dance*, ed. Richard Gottlieb (New York: Pantheon, 2008), 338.
[57] Ibid.
[58] Roger Copeland and M. Cohen, eds., *What is Dance?* (Oxford: Oxford University Press, 1983), 52.
[59] Judith Hanna, *To Dance is Human: A Theory of Nonverbal Communication* (Chicago: Chicago University Press, 1987), 3.
[60] Susan Leigh Foster, *Valuing Dance: Commodities and Gifts in Motion* (Oxford: Oxford University Press, 2019), 6-7.
[61] Catherine Adams and Terrie Lynn Thompson, Researching a Posthuman World: Interviews with Digital Objects (Palgrave Macmillan, 2016), 1.
[62] Foster, *Valuing Dance*, 17.
[63] Marcia B. Siegel, "At the Vanishing Point: A Critic Looks at Dance," New York: *Saturday Review Press*. (1972: 5)
[64] Andre Lepecki, "Choreography as Apparatus of Capture," 15.
[65] Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," *Illuminations*, ed. Hannah Arendt, trans. Harry Zohn, (New York: Shocken Books, 1969), 4.
[66] Ibid, 3.
[67] Ibid, 4.
[68] Barbara Bolt, "Shedding Light for the Matter," *Hypatia* 14, no. 2 (2000): 202-216, 202.
[69] Bernhard Siegert, "Cultural Techniques: Or the End of the Intellectual Postwar Era in German Media Theory," *Theory Culture and Society* 30, no. 6 (2013): 48-65, 48.
[70] Rosi Braidotti, "A Theoretical Framework for the Critical Posthumanities," 2.
[71] Ibid, 2.
[72] Ibid, 9.
[73] Ibid, 3.
[74] Donna Haraway, "A Cyborg Manifesto: Science, Technology and Socialist-Feminism in the Late Twentieth Century," *Simians, Cyborgs and Women: The Reinvention of Nature* (New York: Routledge, 1991): 149-181.
[75] Cornelia Vismann, "Cultural Techniques and Sovereignty," *Theory, Culture and Society* 30, no. 6 (2013): 83-93, 84.
[76] Rizvana Bradley, "Black Cinematic Gesture and the Aesthetics of Contagion," *TDR: The Drama Review* 62, no. 1 (Spring 2018): 14-30, 21.
[77] John Martin, "Dance as a Means of Communication" and "Metakinesis" in Marshall Cohen and Roger Copeland, Eds. *What is Dance?: Readings in Theory and Criticism* (Oxford: Oxford University Press, 1983), 22-24.
[78] Douglas Rosenberg, *Screendance: Inscribing the Ephemeral Image* (Oxford University Press, 2012): 39.
[79] Noel Carroll, "Toward a Definition of a Moving-Picture Dance," *Dance Research Journal* 33, no. 1 (2001): 46-61, 47.
[80] For example, the genre of screendance uses the screen as a founding component of its definition. But Carroll points out that early dance films such as the dances of Annabelle and Crissie Sheridan, were not projected on screens by Edison, but rather were shown as a kind of peep show for audiences, using a device called a "movieola"

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[81] Nicolas Salazar Sutil and Sebastian Melo, "Exposed to Time: Cross-Histories of Human Motion Visualization from Chrono- to Dynamophotography" *The Oxford Handbook of Screendance Studies*, Ed. Douglas Rosenberg (New York: Oxford University Press, 2016): 143-166, 149.
[82] Kittler's book is in part a response to Michel Foucault's archaeology of discourse in *The Order of Things*, which Foucault ends in 1850, before the second industrial revolution and the introduction of the typewriter (1867).
[83] Friedrich A. Kittler, *Discourse Networks 1800/1900*, Trans. Michael Metteer, Foreword by David E. Wellbery (Stanford University Press, 1990).
[84] Ibid, 81-85.
[85] Anna Munster, *Materializing New Media: Embodiment in Information Aesthetics* (Hanover, New Hampshire: Dartmouth College Press, 2006), 3.
[86] Gilles Deleuze and Felix Guattari, A Thousand Plateaus: Captialism and Schizophrenia (University of Minnesota Press, 1987): 6.
[87] David Scott, "The Re-Enactment of Humanism: An Interview with Sylvia Wynter," *Small Axe* (1999), 120.
[88] Jinthana Haritaworn, "Decolonizing the Non/Human," Theorizing Queer Inhumanisms: The Sense of Brownness, *GLQ: A Journal of Lesbian and Gay Studies* 21, no. 2-3 (June 2015): 209-248, 213.
[89] Zakiyyah Iman Jackson, "Outer Worlds: The Persistence of Race in Movement 'Beyond the Human,'" Theorizing Queer Inhumanisms: The Sense of Brownness, *GLQ: A Journal of Lesbian and Gay Studies* 21, no. 2-3 (June 2015): 209-248, 216.
[90] One exception may be Karen Barad, whose posthuman theory of intra-action is indebted to dance and performance.
[91] Edison's *Annabelle Serpentine Dance,* for example, is credited as the first hand-tinted movie. Here filmic proof of Annabelle dancing the Serpentine works against Fuller's claims of invention and ownership of the dance. http://www.warpedfactor.com/2020/02/cinematic-firsts-first-colour-film.html
[92] Walter Benjamin, "The Work of Art in the Age of Mechanical Reproduction," 4.
[93] Rosenberg, *Screendance*, 54.
[94] Anna Tsing, "Arts of Noticing," *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins* (New Jersey: Princeton University Press, 2015), 20.
[95] Ibid, 20.
[96] Ibid, 20.
[97] Quoted in Elizabeth Anderson, "Dancing Modernism: Ritual, Ecstasy and the Female Body," *Literature and Theology* 22.3 (2008): 354-367, 359.

Chapter 1: *La* Loïe and the Multiple Body of the Serpentine Dance

[99] Ted Merwin, "Loïe Fuller's Influence on F.T. Marinetti's Futurist Dance," *Dance Chronicle* 21, no. 1, (1998): 73-92, 80.
[100] Sally Sommer, "Loïe Fuller," *The Drama Review* 19, no.1: Post-Modern Dance Issue (March 1975): 53-67, 61.
[101] Haraway, "Cyborg Manifesto," 181.
[102] See Brannigan 2003; Gunning 2003, McCarren 2003, Sommer 1975. Sommer writes: "[c]entral to Fuller's performance was a moving image made animate by the projection of coloured light and slides" (Sommer 1975: 54). Both Tom Gunning and Noam Elcott also remark on Fuller's use of a darkened theatre—a novel practice at the time which served to enhance the magical effects of her lighting and can be compared to cinematic spectatorship conventions emerging with the Lumiere brothers. Tom Gunning has also linked Fuller's performances with his category of early cinema: the "cinema of attractions." See Tom Gunning, "The Cinema of Attractions: Early Film, Its Spectator and the Avant-Garde," *Wide Angle* 8.3 (1986): 63-70. See Noam Elcott, *Artificial Darkness* (University of Chicago Press, 2016).
[103] For example, in his analysis of the Annabelle Serpentine films made by Thomas Edison, and performed by a dancer named Annabelle Moore, Gunning writes: "the Serpentine was most definitely associated with a single (although widely imitated) dancer who most likely invented it, cobbling together several related practices—and it most certainly made her name famous worldwide: Loïe Fuller." See Tom Gunning, "Loïe Fuller and the Art of Motion," *Camera Obscura, Camera Lucida*, Eds. R. Allen and M. Turvey (Amsterdam: Amsterdam University Press, 2003): 75-89, 78). Rhonda Garelick writes that the Serpentine was "an art form [Fuller] had invented in the

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United States." See Rhonda K. Garelick, *Electric Salome: Loïe Fuller's Performance of Modernism* (Princeton: Princeton University Press, 2007): 1.
[104] Loïe Fuller, *Fifteen Years of a Dancer's Life: With Some Account of her Distinguished Friends* (Boston: Small, Maynard & Company, 1913): 53.
[105] Ibid.
[106] Ibid, 54.
[107] Rhonda Garelick, "Loie Fuller and the Serpentine," The Public Domain Review, 5 November 2019, https://publicdomainreview.org/essay/loie-fuller-and-the-serpentine.
[108] Francesca Ferrando, *Philosophical Posthumanism* (London: Bloomsbury Academic), 2.
[109] Fuller, *Fifteen Years of a Dancer's Life,* 40-41.
[110] Fuller, *Fifteen Years of a Dancer's Life,* 33.
[111] Fuller, *Fifteen Years of a Dancer's Life,* 37.
[112] Andre Lepecki, *Singularities: Dance in the Age of Performance* (Routledge, 2016): 15.
[113] Anthea Kraut, *Choreographing Copyright: Race, Gender, and Intellectual Property Rights in American Dance* (Oxford: Oxford University Press), xiii.
[114] Kraut, *Choreographing Copyright*, 64.
[115] See Thomas Macho (2003), Cornelia Vismann (2013), Bernhard Siegert and Geoffroy Withrop-Young (2015).
[116] Kraut, *Choreographing Copyright*, 55.
[117] This photograph, from the Jerome Robbins Dance Division at the NYPL, depicts Papinta, "posing in a voluminous costume in a 'Serpentine' dance": https://digitalcollections.nypl.org/items/8d7f18e1-dd14-c275-e040-e00a18065814 but the date of capture is approximate (1890-1909) and therefore is unhelpful in determining whether the photo was taken before or after Fuller's "invention" of the dance.
Also of note: I have made contact with a Chicago-based independent dance historian (not associated with any institution) named Cyrilla Behrndt who has been cataloguing articles as proof of Papinta's status as creator of the Serpentine (https://www.facebook.com/Papinta/).
[118] Benjamin, "Work of Art," 3.
[119] Ibid, 3-4.
[120] Duncan qtd. in Erin Brannigan, "'La Loïe' As Pre-Cinematic Performance—Descriptive Continuity of Movement." *Senses of Cinema* no. 28 (Sept-Oct 2003). Online. December 30, 2008. 32.
[121] Benjamin, "Work of Art," 4.
[122] Ibid.
[123] Michel Foucault, *The Archaeology of Knowledge* (Paris: Éditions Gallimard, 1969), 21.
[124] Barbara Will, *Gertrude Stein, Modernism and the Problem of 'Genius'* (Edinburgh University Press, 2000): 7.
[125] Will, *Genius*, 3.
[126] Jennifer Ouellette, "Two visionaries: Marie Curie forged a friendship with dancer Loïe Fuller," Interview with Liz Heinecke, author of *Radiant*, *Ars Technica*, 17 February 2021, https://arstechnica.com/science/2021/02/when-physics-met-dance-marie-curie-and-loie-fuller-in-belle-epoque-paris/, accessed 3 June 2022.
[127] Phillip McIntyre, *Creativity and Cultural Production: Issues for Media Practice* (Palgrave Macmillan, 2012): 15.
[128] Lara Karpenko, "The inanimate becomes animate": Loie Fuller, speculative feminist aesthetics, and posthuman embodiment," *Nineteenth-Century Contexts* 41, no. 5 (2019): 565-584, 573.
[129] Brannigan, "La Loïe' As Pre-Cinematic Performance," 23.
[130] Gilles Deleuze and Felix Guattari, *A Thousand Plateaus: Captialism and Schizophrenia* (University of Minnesota Press, 1987): 6.
[131] Other modernist examples of this phenomenon which I mention in my dissertation include the motion studies of Eadweard Muybridge and Etienne Jules Marey (1883-1895), which presented the (often female, often dancing, sometimes nude) body as a series of framed poses; Busby Berkeley's Hollywood cinema musical numbers (1927-1935) in which female chorus dancers appeared like posthuman copies of one another; and the cloned dancing robot "maschinenmensch" Maria from Fritz Lang's film *Metropolis* (1927).
[132] Will, *Genius*, 1.
[133] Benjamin, "Work of Art," 2.
[134] Roland Barthes, "The Death of the Author," *Image, Music, Text* (London: Fontana): 142-148, 146.
[135] Ben Singer, *Melodrama and Modernity: Early Sensational Cinema and its Contexts* (Columbia Univeristy Press, 2001), 70-90.
[136] Walter Benjamin, "On Some Motifs in Baudelaire," *Illuminations*. Ed. Hannah Arendt (New York: Shocken Books, 1968): 155-200.

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[137] Ben Singer, "Modernity, Hyperstimulus, and the Rise of Popular Sensationalism," *Cinema and the Invention of Modern Life*, Eds. Leo Charney and Vanessa R. Schwartz (University of California Press, 1995): 90-93.
[138] Jacques Rancière, *The Future of the Image,* Trans. Gregory Elliott (London: Verso Books, 2007), 98.
[139] Francesca Ferrando, "A Feminist Genealogy of Posthuman Aesthetics in the Visual Arts," *Palgrave Communications* 2 (2016): 7.
[140] Haraway, "Cyborg Manifesto," 150.
[141] Bruce Grenville, *The Uncanny: Experiments in Cyborg Culture* (Vancouver: Arsenal Pulp Press, 2001), 47.
[142] Tom Gunning, "Loïe Fuller and the Art of Motion," 79.
[143] Giovanni Lista, *LOIE FULLER DANSEUSE DE LA BELLE ÉPOQUE* (Paris: Hermann, 2007), 25.
[144] Gunning, 79.
[145] Qtd. in Lista, *Danseuse*, 328.
[146] Margaret Westby, *Empowering the Female Machine: Remapping Gender Dynamics in Technologically Augmented Dance,* PhD Thesis, Humanities (Montreal: Cocordia University, 2017), 8.
[147] See Garelick, *Electric Salome*, pp. 36; 40; 42. Garelick explains that Fuller first encountered phosphorescent salts at Thomas Edison's New Jersey laboratory in 1896, where he showed her his "fluoroscope," a prototype of the x-ray, prompting Fuller to experiment with the salts on her costumes.
[148] Ted Merwin, "Loïe Fuller's Influence," 98.
[149] Jacques Rancière, *The Future of the Image*, 98.
[150] Marcia Ewing Current and Richard N. Current, *Loïe Fuller, Goddess of Light* (Northeastern University, 1997).
[151] Harris, 1979
[152] Marshall Cohen and Roger Copeland, Eds. *What is Dance?: Readings in Theory and Criticism* (Oxford: Oxford University Press, 1983), 348.
[153] Rhonda Garelick, "Loie Fuller and the Serpentine," The Public Domain Review, 5 November 2019, https://publicdomainreview.org/essay/loie-fuller-and-the-serpentine.
[154] See Donna Haraway, *Staying with the Trouble: Making Kin in the Chthulucene* (Durham and London: Duke University Press, 2016), and Donna Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2008).
[155] Garelick, *Electric Salome*, 99.
[156] Ceclia Asberg and Rosi Braidotti, Eds. A Feminist Companion to the Posthumanities (Switzerland: Springer, 2018), 7.
[157] Donna Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," *Feminist Studies* 14, no. 3 (1988): 575-599, 588.
[158] Merwin, "Loïe Fuller's Influence," 87.
[159] For feminist interpretations of Loïe Fuller's work, see also Erin Brannigan, *Dancefilm: Choreography and the Moving Image*, (New York: Oxford University Press, 2011); Elizabeth Coffman, "Women in Motion: Loïe Fuller and the "Interpenetration" of Art and Science," *Camera Obscura*17, no. 1 (2002): 72-105; Tom Gunning, "Loïe Fuller and the Art of Motion," *Camera Obscura, Camera Lucida*, Eds. R. Allen and M. Turvey (Amsterdam: Amsterdam University Press, 2003): 75-89; and Dana Mills, "The Dancing Woman is the Woman Who Dances into the Future: Rancière, Dance, Politics," *Philosophy & Rhetoric* 49, no. 4 (2016): 482-499.
[160] Karen Beckman, *Vanishing Women: Magic, Film and Feminism* (Duke University Press, 2003), 5.
[161] Anna Sutton, "Infinite Light: The Dance of Loïe Fuller," *The Australian Ballet,* 23 March 2012, https://australianballet.com.au/behind-ballet/infinite-light-the-dance-of-Loïe -fuller.
[162] Tom Gunning calls her "rather pudgy," Ted Merwin mentions Fuller's "stocky body" (82), Felicia McCarren writes of her "heavy body not aiming to seduce its public" (62) and Rhonda Garelick describes her as "unglamorous" and "with little natural grace," noting that Marie Curie's daughter Eve spoke of Fuller's "shapeless figure" (Garelick n.p.). One reviewer of Fuller's show remarked that the audience must insist "upon seeing her pretty piquant face before they can believe that the lovely apparition is really a woman." All of the above quotes come from Sally R. Rommer, "Loïe Fuller," *Drama Review* 19, no. 1, (March 1975): 53-67.
[163] Jean Cocteau, *Souvenirs* (Paris: Editions Flammarion, 1935), 5.
[164] Garelick, *Electric Salome*, 8.
[165] Susan Bordo, *Unbearable Weight,* 217-218. Bordo is here detailing the feminist appropriation of deconstruction whereby gender is critiqued for its fixed binary structure and replaced by a narrative ideal of "ceaseless textual play"— that risks being "animated by its own fantasies of attaining an epistemological perspective free of the locatedness and limitations of embodied existence." Bordo calls this fantasy the "dream of everywhere."
[166] Stéphane Mallarmé Qtd. in Frank Kermode, "Poet and Dancer Before Diaghilev," Salmagundi 33/34, DANCE (Spring-Summer 1976): 23-47, 155.

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[167] Stéphane Mallarmé and Evlyn Gould, "Ballets," *Performing Arts Journal* 15, no. 1 (1993): 106-110.
[168] Amy Koritz, *Gendering Bodies/Performing Art: Dance and Literature in Early Twentieth Century British Culture*, (The University of Michigan Press, Michigan, 1995).
[169] Heather Warren-Crow, *Girlhood and the Plastic Image*, xiv.
[170] Ibid, 19.
[171] Deborah Jowitt, *Time and the Dancing Image*, 39.
[172] Ibid, 59.
[173] Ibid, 43.
[174] Ibid, 60.
[175] Garelick *Electric Salome,* 157.
[176] Ibid, 156.
[177] Stamatia Portanova, *Moving Without a Body: Digital Philosophy and Choreographic Thoughts* (Cambridge: MIT Press, 2013), 23.
[178] Ibid.
[179] F. T. Marinetti, "The Futurist Dance: A Manifesto," translated by Elizabeth Delza, *Dance Observer* (October 1935): 75-76, 76. Accessed through The New York Public Library Archive, Jerome Robbins Dance Division, August 2019.
[180] "Posthuman," Keyword, The Chicago School of Media Theory, https://lucian.uchicago.edu/blogs/mediatheory/keywords/posthuman/
[181] Marshall McLuhan, *Understanding Media: The Extensions of Man* (McGraw-Hill, 1964), 90.
[182] Brian Massumi qtd in Alanna Thain, *Bodies in Suspense: Time and Affect in Cinema* (University of Minnesota Press, 2017), 172.
[183] Jody Sperling is known for her reconstructions of Fuller's dances. Here is a video of Sperling performing the Serpentine: https://www.youtube.com/watch?v=TQTQ-_kw8pg
[184] Felicia McCarren, *Dancing Machines: Choreographies in the Age of Mechanical Reproduction* (Stanford University Press, 2003), 50.
[185] There is one 16mm film (*Pathé Freres*) supposedly of Fuller dancing the Serpentine, held in collection at the Museum of Modern Art. This film is referenced by Wendy Haslem in her 2019 book *From Melies to New Media: Spectral Projections* (Intellect Books Ltd, 2019), but the only documentation I could find is a video of the video, posted by a gallery visitor: https://www.youtube.com/watch?v=dD2-YEGmfWg
[186] Fuller, *Fifteen Years*.
[187] McCarren, *Dancing Machines*, 62.
[188] Joshua Yumibe, "The Phantasmagoria of the First Hand-Painted Films," *Nautilis*, 13 July 2015, https://nautil.us/issue/26/color/the-phantasmagoria-of-the-first-hand_painted-films, accessed 15 September 2020.
[189] These videos also have the zany, sped-up quality of almost all early cinema. Because early video cameras recorded footage at sixteen frames per second (fps), and because today we screen films at 24 fps, early films appear to be sped up.
[190] Teresa Rizzo, "YouTube: The New Cinema of Attractions," *Journal of Media Arts Culture* 5, no. 1 (2008), online. http://scan.net.au/scan/journal/display.php?journal_id=109.
[191] Wendy Haslem, *From Melies to New Media: Spectral Projections* (Intellect Books Ltd, 2019), 68-9.
[192] Under many of the videos one YouTube user named Cyrilla Behrndt repeatedly claims that the dancer is not Fuller or any of the other performers listed above, but *Papinta*, "the flame dancer." There is very little written on Papinta, but apparently her real name was Caroline Hipple Holpin and she is said to have died in Dusseldorf in 1907, "possibly due to the gas produced by the limelight" projected from the front of the stage, meaning that she would have been burned alive in front of her audience (from Victoria Bogushevskaya and Elisabetta Colla, Eds, *Thinking Colours: Perception, Translation and Representation* (Cambridge Scholars Publishing, 2015), 148). Behrndt is also the individual behind the FaceBook page dedicated to archiving newspaper articles on Papinta and advertisements for Papinta's live show.
[193] Burgess, Jean, Joshua Green, Henry Jenkins, and John Hartley. *Youtube : Online Video and Participatory Culture*. Digital Media and Society Series. (Cambridge, England: Polity, 2009).
[194] Michel-Rolph Trouillot, *Silencing the Past: Power and the Production of History* (Beacon Press, 1997), 25.
[195] John Hartley, *Digital Futures for Cultural and Media Studies* (Chichester: Wiley-Blackwell, 2012), 160.
[196] Ibid.
[197] Ibid, 167.
[198] Dana Mills, "The Dancing Woman is the Woman Who Dances into the Future: Rancière, Dance, Politics," *Philosophy & Rhetoric* 49, no. 4 (2016), 482-499: 495-6.

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[199] Ibid, 496.
[200] Arnesh Koul, "Understanding YouTube's Algorithm in 2019," *Best Practices*, 2 April 2019, Colorado State University, https://social.colostate.edu/strategy/youtube-algorithm/, accessed 22 June 2021.
[201] Rosi Braidotti, "A Theoretical Framework for the Critical Posthumanities," 3.
[202] Anthea Kraut, *Choreographing Copyright*, 6.
[203] Ibid, 15.
[204] Foster, *Valuing Dance*, 54.
[205] Mark Seltzer, *Bodies and Machines* (Routledge, 1992), 143.
[206] Rosi Braidotti, "A Theoretical Framework for the Critical Posthumanities," 4, 1.
[207] "Contagion" definition. *Oxford Reference*, https://www.oxfordreference.com/view/10.1093/oi/authority.20110803095634539
[208] Jussi Parikka and Tony D. Sampson, "The New Logics of Viral Media," *B20: Boundary 2*, 10 April 2020, https://www.boundary2.org/2020/04/tony-d-sampson-and-jussi-parikka-the-new-logics-of-viral-media/. Accessed 5 May 2021.
[209] Ann Cooper Albright, *Traces of Light: Absence and Presence in the Work of Loïe Fuller* (Middletown, Connecticut: Wesleyan University Press, 2007), 2.
[210] Ibid.
[211] Jacques Derrida, "Semiology and Grammatology: Interview with Julia Kristeva," in *Positions*, trans. and annotated by Alan Bass (London and New York: Continuum, 2004), 15-36.
[212] Laurent Melisi, "Derrida and Posthumanism (I): From Sign to Trace," in *Geneaology of Critical Posthumanism*, 14 September 2020. https://criticalposthumanism.net/derrida-and-posthumanism-i-from-sign-to-trace/#_ftn8
[213] Michel Foucault, *The Archaeology of Knowledge* (Paris: Éditions Gallimard, 1969), 21.
[214] Ibid, 22-25.
[215] Kraut, *Choreographing Copyright*, 57.
[216] Fuller, *Fifteen Years*, 28.
[217] Kraut, *Choreographing Copyright*, 4.
[218] See Jinthana Haritaworn, "Decolonizing the Non/Human," Theorizing Queer Inhumanisms: The Sense of Brownness, *GLQ: A Journal of Lesbian and Gay Studies* 21, no. 2-3 (June 2015): 209-248, and Zakiyyah Iman Jackson, "Outer Worlds: The Persistence of Race in Movement 'Beyond the Human,'" Theorizing Queer Inhumanisms: The Sense of Brownness, *GLQ: A Journal of Lesbian and Gay Studies* 21, no. 2-3 (June 2015): 209-248.
[219] Fuller, *Fifteen Years*, 270.
[220] Martin, "Metakinesis," 22.

Chapter 2:
Dance as a Cultural Technique of the Soul: from Automation to Animation

[221] Heinrich von Kleist, "*Über das Marionettentheater"* ("On the Marionette Theatre"), Berliner Abendblatt, 1810.
[222] Felicia McCarren's 2009 book *Dancing Machines* has been very influential in my analysis of the dancing robot. I continue to cite her (on Taylorism and the choreography of work) in my third chapter. When I use the term "dancing machine," I am echoing her.
[223] Stephane Mallarmé, "Another Dance Study: Settings and the Ballet," in *Mallarmé in Prose*, Ed. Mary Ann Caws (New York: New Direction Books, 2001), 113. See also Mary Lewis Shaw, "Ephemeral Signs: Apprehending the Idea through Poetry and Dance," *Dance Research Journal* 20.1 (Summer 1988): 3-9; Dee Reynolds, "The Dancer as a Woman: Loïe Fuller and Stéphane Mallarmé," in *Impressions of French Modernity*: *Art and Literature in France*, 1850-1900, Ed. Richard Hobbes (Manchester: Manchester University Press, 1998), 155-172.
[224] Michel Foucault, *Discipline and Punish: The Birth of the Prison*, (New York: Pantheon, 1977), 29-30.
[225] Bruno Latour, *Reassembling the Social: An Introduction to Actor-Network-Theory* (Oxford University Press, 2005), 53.
[226] Spyros Papapetros, "Movements of the Soul: Traversing Animism, Fetishism, and the Uncanny," *Discourse* 34, 2-3, Spring/Fall 2012, 185-208, 186.
[227] Bernhard Siegert, "Cultural Techniques: Or the End of the Intellectual Postwar Era in German Media Theory," 29.
[228] Ibid, 29-30.
[229] Vismann, Cultural Techniques and Sovereignty," 84.

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[230] Ibid.
[231]Thomas Macho, "Second-Order Animals: Cultural Techniques of Identity and Identification," *Theory, Culture and Society* 30, no. 6 (2013): 30-47.
[232] Siegert, "Cultural Techniques, 11.
[233] E.T.A. Hoffmann, "The Sandman," in *Fantastic Worlds: Myths, Tales and Stories*, Ed. Eric S. Rabkin (New York: Oxford University Press, 1979), 235.
[234] Ibid.
[235] Hoffmann 237. Here, Olympia calls to mind the classic automatons of the 1700s, who were often debuted and put on display at balls, parties and public events. The Jaquet-Droz automata, built by Pierre Jaquet-Droz, his son Henri-Louis and Jean-Frédéric Leschot, which were originally designed to sell watches and included a harpsichord player called "La musicienne" (1774).
[236] Hoffmann, 237-238.
[237] 238.
[238] 237.
[239] Friedrich A. Kittler, *Discourse Networks 1800/1900*, 3.
[240] Ibid, 42.
[241] Sigmund Freud, *The Uncanny*, eds. David McLintock, and Hugh Haughton (New York: Penguin Books, 2003), 7.
[242] Seltzer qtd. in Minsoo Kang, *Sublime Dreams of Living Machines: The Automaton in the European Imagination* (Harvard University Press, 2011).
[243] Kang, *Sublime Dreams*, 53.
[244] For more, see Hatfield 2007, (The Passions of the soul and Descartes's machine psychology); Waldow 2017 (Activating the Mind: Descartes' Dreams and the Awakening of the Human Animal Machine); Judovitz, 1998 Virtual Bodies: Anatomy, Technology, and the Inhuman in Descartes).
[245] Bianca Westerman, "The Biomorphic Automata of the 18th Century: Mechanical Artworks as Objects of Technical Fascination and Epistemological Exhibition," *Figurationen* 17, no. 2 (2016): 123-137.
[246] Voskuhl, Adelheid. "Producing Objects, Producing Texts: Accounts of Android Automata in Late Eighteenth-Century Europe." *Studies in History and Philosophy of Science* 38, no. 2 (2007): 422–44.
[247] Kang, *Sublime Dreams*, 229.
[248] Gregory D. Black, "Hollywood Censored: The Production Code Administration and the Hollywood Film Industry, 1930-1940," *Film History* 3, No. 3 (1989): 167-189.
[249] Andreas Huyssen, "The Vamp and the Machine: Technology and Sexuality in Fritz Lang's Metropolis." *New German* Critique 24-25, no. 24-25 (1981): 221–37.
[250] Benjamin, "Work of Art," 37.
[251] Ben Spatz, *What a Body Can Do : Technique As Knowledge, Practice As Research*. (London: Routledge, Taylor & Francis Group, 2015): 58.
[252] *Ex Machina*, directed by Alex Garland (A24, 2015).
[253] The name Ava is undoubtedly meant to evoke the name Ada, as it was Ada Lovelace, the English writer and mathematician (and daughter of Romantic poet Lord Byron), who is known for her work on Charles Babbage's early computer prototypes. It was Lovelace who recognized that the computer could do more than just calculate, and her explorations with algorithmic interaction meant that Lovelace is often understood as the first computer programmer.
[254] If I had the space here, I would also draw in another of Garland's films, *Annihilation* (Netflix, 2018), in which Mizuno lends dance data via mo-cap for a posthuman dancing villain who duets with Natalie Portman at the end of the film. The presence of Japanese-British actor Mizuno in both of these posthuman dance roles is interesting not least because of the way her racialized presence might be read in conjunction with the malleable imperative of posthuman dance.
[255] Huyssen, "Vamp," 223.
[256] Jennifer Piejko, "William Forsythe's Choreographic Objects," Gagosian Le Bourget, Paris, December 19, 2017.
[257] McCarren, *Dancing Machines*, 25.
[258] Ibid.
[259] Papapetros, "Movements of the Soul," 186.
[260] Ibid.
[261] Ibid, 188.
[262] Huyssen, "Vamp," 81.
[263] Hoffmann, "Sandman," 242.

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[264] Ibid, 243.
[265] The conclusion of Hoffmann's story is echoed, thematically, in Alfred Hitchcock's classic film (and exploration of the uncanny, the double, the animation of the inanimate), *Vertigo*, in which Judy (essentially a doll who her boyfriend Scottie makes up in the likeness of deceased lover Madeleine (who herself falls from a cliff to her death early in the film), dies by falling from the dizzying heights of a tower.
[266] Freud, "Uncanny," 8.
[267] Hoffmann, "Sandman," 243.
[268] Anne Anlin Cheng, *Ornamentalism* (Oxford University Press, 2019), 14. Cheng explains: "To attend to ornamentalism is to ask how racial personhood can be assembled not through organic flesh but instead through synthetic inventions and designs, not through corporeal embodiment but rathe through attachments that are metonymic and hence superficial, detachable and migratory" (19).
[269] Sandra Huber, *Witchy Methodologies: Bewitchment, Shapeshifting, and Communication with More-than-human Kin*, PhD Dissertation, Humanities, Concordia University, 2022, 48.
[270] Katharina Loew, *Special Effects and German Silent Film: Techno-Romantic Cinema*. Film Culture in Transition. (Amsterdam: Amsterdam University Press, 2021), 219.
[271] Papapetros, "Movements of the Soul," 188.
[272] Potolsky, Matthew. *Mimesis*. The New Critical Idiom. (New York: Routledge, 2006), 1.
[273] Ibid.
[274] Jean Baudrillard, *Simulacra and Simulation.* Translated by Sheila Faria Glaser. The Body, in Theory. (Ann Arbor: University of Michigan Press, 1994), 100.
[275] Ibid, 93.
[276] Ibid, 93.
[277] Ibid, 93.
[278] Loew, *Special Effects*, 198.
[279] Jean Baudrillard, *Simulacra*, 83.
[280] Ibid, 94.
[281] Benjamin, "Work of Art," 22.
[282] Somdahl-Sands, Katrinka, and John C Finn. "Media, Performance, and Pastpresents: Authenticity in the Digital Age." *Geojournal* 80, no. 6 (2015): 811–19. 812.
[283] Ibid.
[284] Baudrillard, *Simulacra*, 1.
[285] Yvonne Rainer, *Trio A* at perform feminism Archived August 12, 2011, at the Wayback Machine.
[286] Judith Hamera, *Dancing Communities : Performance, Difference, and Connection in the Global City*. Studies in International Performance. (Basingstoke England: Palgrave Macmillan, 2007), 4.
[287] Spatz, *What a Body Can Do*, 59.
[288] Ibid, 28.
[289] Ibid, 30.
[290] Marcel Mauss, "Techniques of the Body." Economy and Society 2.1 (1973), 83.
[291] Spatz, *What a Body Can Do*, 30.
[292] Ibid, 34.
[293] McCarren, *Dancing Machines*, 4.
[294] Ibid.
[295] Susanne K. Langer, *Feeling and Form: A Theory of Art Developed from Philosophy in a New Key*. (New York: Charles Scribner's Sons, 1953), 169.
[296] Ibid.
[297] Ibid, 174.
[298] Ibid, 174-75.
[299] Ibid, 175.
[300] Ibid.
[301] Ibid, 180.
[302] Ibid.
[303] Ibid.
[304] McCarren, *Dancing Machines*, 36.
[305] Ibid, 5.
[306] Ibid, 36.
[307] Isadora Duncan, "The Dance of the Future," 1908, Bowles-Goldsmith Co.

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[308] Isadora Duncan, *My Life*. (Liveright, 1927), 273.
[309] Kittler, Discourse Networks, 226.
[310] Ibid, 81-85.
[311] Thomas Lamarre, *Uncovering Heian Japan: An Archaeology of Sensation and Inscription* (Durham, NC: Duke University Press, 2000).
[312] Frédéric Pouillaude, *Unworking Choreography: The Notion of the Work in Dance* (Oxford University Press, 2017).
[313] Kittler*, Discourse Networks*, 3. Kittler begins his book *Discourse Networks* by analyzing the sigh ("*ach*!") in German poetry. He writes: "If this is not the sigh of a nameless self—no self appears in the sentence—it is certainly not the sigh of any known author. What moves through the cadence of old German Knittel-verse is a pure soul. The verses of the other German Classical Poet confirm this: the sigh "oh!" [*ach*!] is the sign of the unique entity (the soul) that, if it were to utter another signifier or (because signifiers exist only in the plural) any signifier whatsoever, would immediately become its own sigh of self-lament; for then it would have ceased to be soul and would have become "Language" instead.
[314] Ibid, xiv.
[315] Ibid, xv.
[316] Ibid.
[317] Miquela's singing voice, like her dancing, is outsourced and modular, and could be the topic of its own chapter. Her persona as a singer/dancer aligns her with Japanese popstar hologram Hatsune Miku, who I write about in my introduction.
[318] Jonathan Shieber, "The makers of the virtual influencer, Lil Miquela, snag real money from Silicon Valley," *Tech Crunch*, 24 April 2018, https://techcrunch.com/2018/04/23/the-makers-of-the-virtual-influencer-lil-miquela-snag-real-money-from-silicon-valley/.
[319] Heather Warren-Crow describes the face of Eve as a "now infamous image that digitally combines faces of different races "to create a composite subject of a networked economy" as a symbol of an America with an allegedly increasing acceptance of diversity" (18).
[320] See Kodwo Eshun (1998), Alexander Weheliye (2006), Ytasha L. Womack (2013), and Mark Dery (2006) for more on Afrofuturism.
[321] Cheng, *Ornamentalism*, 4
[322] Ibid, 13.
[323] Nora Khan, "Lil Miquela Shows us the Future of Fame," *Garage*, 7 September 2018, https://garage.vice.com/en_us/article/wjkbex/lil-miquela-interview,
[324] Haraway, "Cyborg Manifesto," 151.
[325] See Hetherington, Richard and Rachel McRae. "Make-Believing Animated Films Featuring Digital Humans: A Qualitative Inquiry Using Online Sources." *Animation: An Interdisciplinary Journal* 12, No. 2, (2017): 156-173.
[326] Lynn Hunt writes that "power not only represses, it also creates," and therefore the "most challenging of all is the realization that power creates truth and hence its own legitimation. It is the job of the historian to recognize this truth production as a function of power." See Lynn Hunt*, The New Cultural History*. (University of California Press, 1989), 34-5. One way I hope to avoid technological determinism and social constructivism in my account here is by focusing on the body as both object and process, as both material and semiotic. In the words of Anne Balsamo, "the female body is less a singular concept or discoverable unity and more an arrangement of texts, silences, laws and lines of force." See Anne Balsamo, *Technologies of the Gendered Body: Reading Cyborg Women*. (Duke University Press, 1996), 35.
[327] Kang, Sublime Dreams, 184.
[328] Ibid.
[329] Warren-Crow, *Plastic Image*, xiv.
[330] Ibid, 42.
[331] Ibid.

Chapter 3:
"Dancers Make Good Workers": Military Technology, Choreographed Labour and the Machinic Gaze

[332] Calvin Hennick, "All Together Now," Boston Dynamics blog, 29 June 2021, https://blog.bostondynamics.com/all-together-now. Accessed 4 June 2022.

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[333] Alessia Minaeva, Chris Grun and Oleg Pariser, "Dance Biometrics," https://www.f6s.com/dancebiometrics. Accessed 10 July 2022.
[334] Ibid.
[335] This is a comment I heard often when I was in dance school, and also rings true in my personal experience, as both a dancer *and* someone who had to work a variety of manual and customer service jobs in order to put myself through dance school. Yet there is also a tendency to exploit the work of dancers, assuming they will perform for free or sign up for long hours without breaks. A fitting example of this is the target of recent activism by American dance Taja Riley, who exposed the 2022 Superbowl as a proponent of such exploitation when the half-time show organizers asked countless dancers—specified as "African American movers"—to perform for free, or in "exchange for exposure."
[336] The word "robot" first appeared in Czech playwright Karel Čapek's 1920 play, *R.U.R., or Rossum's Universal Robots.*
[337] A Reddit thread that was posted right after the video was released for example contains a conversation between two commenters about whether the video has been augmented with CGI (computer generated image)-based animation. Commenter LaVieEstBizarre argues that at companies like Boston Dynamics, they "have a CGI to real robot pipeline where they turn the CGI into an offline trajectory optimisation problem and follow it online using a Model Predictive Controller." Commenter robothrowaway2020 responds: "The line gets blurry when you're looking at physics constrained animation, and blurrier when you talk about robots. After all, industrial robots are hand programmed with trajectories and we don't consider that CGI. Animation also uses some techniques you might find in robotics such as inverse kinematics or dynamics. Sometimes, CGI is entirely procedural. In this case what was done was a mixture of different techniques, some familiar to CG animators and some less so. Some of it was procedural. Some was hand animated. Some was a mixture of motion capture and other techniques" (https://www.reddit.com/r/engineering/comments/kmkc47/boston_dynamics_do_you_love_me/).
[338] Giorgio Agamben, *"What is an Apparatus?" and Other Essays* (Stanford, California: Stanford University Press, 2009), 14.
[339] Lepecki, "Choreography as Apparatus of Capture," 86.
[340] Louis Althusser, "Ideology and Ideological State Apparatuses," *Lenin and Philosophy and other Essays* (1971), 121–176. Translated from the French by Ben Brewster.
[341] Vincent B. Leitch, *The Norton Anthology of Theory and Criticism*. (New York: W.W. Norton and Company, , 2001), 1483–1496.
[342] Michel Foucault, "The Confession of the Flesh," (1977 interview). In *Power/Knowledge Selected Interviews and Other Writings*, ed. Colin Gordon (New York: Pantheon Books, 1980), 194–228: 194.
[343] Davide Panagia, "On the Political Ontology of the *Dispositif*," *Critical Inquiry* 45, no. 3 (2019): 714-745, 715.
[344] "Spot's On It," Boston Dynamics, YouTube, 29 June 2021. https://www.youtube.com/watch?v=7atZfX85nd4
[345] Hennick, Calvin. "All Together Now." Boston Dynamics Blog, 29 June 2021. https://blog.bostondynamics.com/all-together-now
[346] Darren Wershler, "Afterword," Nick Thurston, *Of the Subcontract: Or Principles of Poetic Right* (Information as Material, 2013), 135.
[347] Hennick.
[348] Ibid.
[349] Ibid.
[350] Baudrillard, *Simulacra*, 97.
[351] Ibid.
[352] Miriam Hansen, "Ambivalences of the 'Mass Ornament': King Vidor's The Crowd." *Qui Parle* 5, no. 2 (1992): 102–19. http://www.jstor.org/stable/20685952.
[353] Pamela Robertson, *Guilty Pleasures: Feminist Camp from Mae West to Madonna*. (Duke University Press, 1996).
[354] Siegfried Kracauer, *The Mass Ornament: Weimar Essays*. (Cambridge: Harvard University Press, 1995), 76.
[355] Ibid.
[356] McCarren, *Dancing Machines*, 143.
[357] Alain Badiou, "Dance as a Metaphor for Thought," *Handbook of Inaesthetics*, trans. Alberto Toscano, (Stanford University Press, 2004), 59.
[358] Ibid.
[359] Kristen Bialik, "Busby Berkeley and the Art of Order," *Medium*, 24 April 2015. https://medium.com/the-outtake/busby-berkeley-and-the-art-of-order-81e42c25bb6d

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[360] Striner, R. "Machine-Dance: An Intellectual Sidelight to Busby Berkeley's Career." *Journal of American Culture*, 7 (1984): 60-68, 61
[361] Kracauer, *Mass Ornament*, 78.
[362] Douglas Rosenberg, *Screendance: Inscribing the Ephemeral Image*. (Oxford University Press, 2012), 37.
[363] Elizabeth Stephens, "Cultures of Hyper-Productivity and the Quantification of Work," *SSN Seminar: Deakin Science and Society Network*, 17 November 2020. YouTube. https://www.youtube.com/watch?v=T89i5HBT0L0
[364] Wolfgang Ernst, *Chronopoetics: The Temporal Being and Operativity of Technological Media.* (Rowman & Littlefield, 2016), 48.
[365] Ibid.
[366] Fred Moten, *Black and Blur: Consent Not to be a Single Being* (Duke University Press, 2017), 73.
[367] Ibid, 73.
[368] Stephens, SSN Seminar.
[369] Rick Poyner, "Exposure: Motion Efficiency Study by Frank Gilbreth," *Design Observer*, 12 April 2016. https://designobserver.com/feature/exposure-motion-efficiency-study-by-frank-gilbreth/39272
[370] Ibid.
[371] McCarren, *Dancing Machines*, 29.
[372] "Dance" definition, *Britannica*, https://www.britannica.com/art/dance
[373] For more on Chaplin and Taylorism, see Owen Hatherley's *The Chaplin Machine* (2016), which examines the convergence of Hollywood slapstick, the "scientific management" of Frederick Taylor and Henry Ford, and the Soviet avant-garde.
[374] Sianne Ngai, *Our Aesthetic Categories: Zany, Cute, Interesting*, (Verso Books, 2012), 12.
[375] Hatherly, Owen. *The Chaplin Machine: Slapstick, Fordism and the International Communist Avant-Garde*, (Pluto Press, 2016), 20.
[376] Badiou, "Dance as a Metaphor for Thought," 59.
[377] This is an argument I will pick up on in my fourth chapter, on the technological extraction of dance movement from the body in order to animate digital bodies.
[378] Laura Mulvey, *Death 24x a Second: Stillness and the Moving Image*. (London: Reaktion Books, 2006):11.
[379] James Vincent, "The French army is testing Boston Dynamics' robot dog Spot in combat scenarios." *The Verge,* 7 April 2021. https://www.theverge.com/2021/4/7/22371590/boston-dynamics-spot-robot-military-exercises-french-army
[380] There is no space here to explore this, but conversely (or relatedly), this 2019 scientific study used dance therapy as treatment for military veterans with traumatic brain injuries: https://www-sciencedirect-com.lib-ezproxy.concordia.ca/science/article/pii/S0197455618301291
[381] Pasi Valiaho, "Marey's Gun: Apparatuses of Capture and the Operational Image," In: Annie van den Oever (Hg.): *Technē/Technology. Researching Cinema and Media Technologies – Their Development, Use, and Impact.* (Amsterdam: Amsterdam University Press 2014): 169–176, 171.
[382] Ibid.
[383] Ibid, 172-3.
[384] Badiou, "Dance as Metaphor," 67.
[385] Ibid.
[386] Ibid.
[387] Ibid.
[388] Rosi Braidotti, "Posthuman, All too Human: Towards a New Process Ontology," *Theory Culture & Society* 23, no. 7-8 (2006): 197-208, 204.
[389] Bolt, "Shedding Light," 202.
[390] Ibid, 204.
[391] One example of non-occularcentric screendance would be the work of Canadian animator Norman McLaren, whose films for the NFB experiment with images choreographically. For an analysis of McLaren see Alanna Thain, "In the Blink of an Eye: Norman McLaren Between Dance and Animation." In *The Oxford Handbook of Screendance Studies*. Ed. Douglas Rosenberg. (New York: Oxford University Press, 2016), 167-186.
[392] Lev Manovich writes about the shift from optical to digital capture in his work on database as symbolic form in *The Language of New Media* (he calls Dziga Vertov a "major database filmmaker of the twentieth century").
[393] This performance, which saw artists and engineers working together, occurred over two nights, October 14th and 23rd, 1966. The performance staged a tennis match between a man and woman with technologized tennis rackets, and, using infrared light and infrared television cameras, Rauschenberg picked up images of the audience and projected them onto three large suspended screens.

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[394] Rosenberg, *Inscribing*, 53.
[395] Laura U. Marks, *The Skin of the Film: Intercultural Cinema, Embodiment and the Senses.* (London: Duke University Press, 2000), xi-xii.
[396] Ibid, 163.
[397] Ibid, xvii.
[398] Elena Beregow, Introduction, *Culture Machine* 17, "Thermal Objects," (2018) https://culturemachine.net/vol-17-thermal-objects/thermal-objects-theorizing/
[399] Ibid.
[400] Haraway, "Situated Knowledges," 581.
[401] The infrared camera was invented in the early 1800s by a German musician and astronomer, Frederick William Herschel, who used prisms to study the spectrum of light, measuring the temperature of each colour, which led him to discover infrared light (Rogalski, 2012: 279).
[402] Galič, M., Timan, T. & Koops, BJ. "Bentham, Deleuze and Beyond: An Overview of Surveillance Theories from the Panopticon to Participation." *Philos*. Technol. 30, 9–37 (2017). https://doi.org/10.1007/s13347-016-0219-1
[403] *ORA* Press Kit, 2011, http://onf-nfb.gc.ca/medias/mediakit/orapresskit.pdf 2011. (Note: this file is no longer accessible online. I last accessed it in 2019.
[404] Marks, *Skin of the Film*, 140.
[405] *ORA* Press Kit, 2011.
[406] Ibid.
[407] Braidotti, "Posthuman, All Too Human," 201.
[408] José Ortega y Gasset, *The Dehumanization of Art and Other Essays on Art, Culture, and Literature.* (Princeton University Press, 1968), 69.
[409] Alexander G. Weheliye, "'Feenin' Posthuman Voices in Contemporary Black Popular Music," *Social Text* 20, no. 2 (2002): 21–47, 28.
[410] Ibid.
[411] Ibid.
[412] Ibid.

Chapter 4:
The Grain of the Body and the An-Ontology of Digital Dance

[413] Alain Badiou, *Handbook of Inaesthetics*. Trans. Alberto Toscano. (Stanford University Press, 2004), 57.
[414] Gilles Deleuze, *Cinema 1: The Movement-Image*. Trans. Hugh Tomlinson and Barbara Habberjam. (University of Minnesota Press, 1986), 6.
[415] Giorgio Agamben, *Means Without End: Notes on Politics*. Trans. Cesare Casarino and Vincenzo Binetti. (University of Minnesota Press, 2000), 58.
[416] Levitt, Deborah. *The Animatic Apparatus: Animation, Vitality, and the Futures of the Image.* (Zero Books, 2018), 118.
[417] Ibid, 128.
[418] Levitt, Deborah. "Animation and the Medium of Life: Media Ethology, An-Ontology, Ethics." *Inflexions* 7, "Animating Biophilosophy" (March 2014).118-161. www.inflexions.org, 130.
[419] Thain, "Blink of an Eye," 170. It's worth noting that McLaren's work can be understood as non-extractive, as he often inscribed his animations directly onto the medium itself, without an indexical reference, and the gesture of his hand on the film stock is what was captured.
[420] Ibid, 172-73.
[421] Levitt, "Animation and the Medium of Life," 130.
[422] In her response to Badiou's essay, Erin Brannigan writes that it is unclear what kind of dance or dancer Badiou has in mind, or whether he has actually watched much dance at all. See Brannigan, Erin. "Talking Back: What Dance Might Make of Badiou's Philosophical Project," *Performance Philosophy* 4, No. 2 (2019): 354-373, 360.
[423] Badiou, *Handbook of Inaesthetics,* 58.
[424] "Transhumanism" was first defined by evolutionary biologist, eugenicist and proponent of natural selection, Julian Huxley (who also happens to be Aldous Huxley's brother) in his 1968 article of the same name and is now associated with "technoutopian" views espoused by theorists like Nick Bostrom and David Pearce. Critical posthumanism has distanced itself from transhumanism, which seeks to improve the human race through

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technological intervention, yet there are significant overlaps between the two schools of thought that there is insufficient room to explore here. https://www.hedweb.com/transhumanism/index.html
[425] Badiou, *Handbook of Inaesthetics*, 58.
[426] Danielle Goldman, *I Want to Be Ready: Improvised Dance as a Practice of Freedom*. (University of Michigan Press, 2010), 131.
[427] Ibid, 131.
[428] Susanne K. Langer, "The Dynamic Image." *Feeling and Form: A Theory of Art*. (Charles Scribner's Sons, 1953), 78-79.
[429] Ibid, 79.
[430] Ibid.
[431] Ibid.
[432] Susan Jones, "'Une écriture corporelle': The Dancer in the Text of Mallarmé and Yeats." *The Body and the Arts*, edited by Corinne Saunders, Ulrika Maude and Jane Macnaughton, (Palgrave MacMillan, 2009): 237-253, 239.
[433] Gasset, "The Dehumanization of Art." 69
[434] Patricia Waugh, "Writing the Body: Modernism and Postmodernism." *The Body and the Arts*, edited by Corinne Saunders, Ulrika Maude and Jane Macnaughton, (Palgrave MacMillan, 2009): 131-147, 138.
[435] Ibid.
[436] Allison Muri, "Of Shit and the Soul: Tropes of Cybernetic Disembodiment in Contemporary Culture." *Body & Society* 9, no. 3, (Sept. 2003): 73-92, *73.*
[437] Arthur Kroker and Michael A. Weinstein. *Data Trash: The Theory of the Virtual Class*. (St. Martin's Press, 1994), 20.
[438] William Gibson. *Neuromancer*. Ace Books, 1984, 16.
[439] Roy Ascott. "Gesamtdatenwerk: Connectivity, Transformation and Transcendence." *Ars Electronica: Facing the Future. A Survey of Two Decades*, edited by Timothy Druckrey, (MIT Press, 1999): 86-89, 86.
[440] Michael Heim, *The Metaphysics of Virtual Reality*, (Oxford University Press, 1993) 100-1.
[441] Donna Haraway "A Cyborg Manifesto," 150.
[442] Donna Haraway, "Situated Knowledges," 581.
[443] Katherine N. Hayles, *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*. (University of Chicago Press, 1999), 4.
[444] Ibid. 4-5.
[445] Ibid. 5.
[446] Muri, "Tropes of Cybernetic Disembodiment," 78. I know that this brief and limited overview does not do justice to the variety of 90s cybertheory. I do not wish to flatten the genre into a one-note message but I do wish to point out the repetition of certain themes and fantasies, even within this short overview.
[447] Sylvia Wynter is one theorist that argues for an intervention into the flattening of humans into one category of sameness. In an interview with Katherine McKittrick, she writes, "The larger issue is […] the incorporation of all forms of human being into a single homogenized descriptive statement that is based on the figure of the West's liberal monohumanist *Man.*" See Wynter, Sylvia and Katherine McKittrick. "Unparalleled Catastrophe for our Species? Or, to Give Humanness a Different Future: Conversations." *Sylvia Wynter: On Being Human as Praxis,* (Duke University Press, 2015), 23.
[448] Bordo, Susan. *Unbearable Weight: Feminism, Western Culture and the Body*. University of California Press, 1995, 217.
[449] Ibid, 215.
[450] Johanna Drucker, "Performative Materiality and Theoretical Approaches to Interface." *Digital Humanities* 7, No. 1 (2013): http://www.digitalhumanities.org/dhq/vol/7/1/000143/000143.html.
[451] Ibid.
[452] Stamatia Portanova, *Moving Without a Body: Digital Philosophy and Choreographic Thought*. MIT Press, 2013, 58.
[453] Carolyn Lanchner, *Sophie Taeuber-Arp*. Museum of Modern Art, 1981, 11.
[454] Mark Franko, *Danced Abstraction: Rudolf con Laban. In Inventing Abstraction, 1910–1925: How a Radical Idea Changed Modern Art*, edited by Leah Dickerman. (New York: The Museum of Modern Art, 2012), 293.
[455] Flora L. Brandl, "On a Curious Chance Resemblance: Rudolf von Laban's Kinetography and the Geometric Abstractions of Sophie Taeuber-Arp." *Arts* 9, no. 1, (Feb. 2020), 15.
[456] Ibid, 8.
[457] Ibid.

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[458] One problem that notation highlights is precisely the thinking of dance in terms of individual movements or parts, when really most dance motion is much more fluid than this.
[459] Roland Barthes, "The Grain of the Voice." *Image-Music-Text*, translated by Stephen Heath (Hill & Wang, 1978), 182.
[460] Ibid, 182.
[461] Ibid, 188.
[462] Ann Hutchison, "Labanotation." *Britannica*, 2013, https://www.britannica.com/art/labanotation.
[463] Ann Hutchison, *Labanotation or Kinetography Laban: The System of Analyzing and Recording Movement*. (Routledge: 1991).
[464] Laban qtd. in Hutchinson (1991), xvi. Note Laban's use of spiritual language to describe dance here.
[465] Brandl, "Rudolf von Laban's Kinetography and the Geometric Abstractions of Sophie Taeuber-Arp," 16.
[466] See Choensawat et al. 2015, Li et. al 2017; Wang et. al 2018: and Zhou et. al 2018, among others. Choensawat, Worawat, Minako Nakamura, and Kozaburo Hachimura. "GenLaban: A tool for generating Labanotation from motion capture data." Multimedia Tools and Applications 74.23 (2015): 10823-10846.; Li, Min, Zhenjiang Miao, and Cong Ma. "Automatic Labanotation generation from motion-captured data based on hidden Markov models." 2017 4th IAPR Asian Conference on Pattern Recognition (ACPR). IEEE, 2017; Wang, Jiaji, and Zhenjiang Miao. "A method of automatically generating Labanotation from human motion capture data." 2018 24th International Conference on Pattern Recognition (ICPR). IEEE, 2018; Zhou, Ziming, Zhenjiang Miao, and Jiaji Wang. "A system for automatic generation of labanotation from motion capture data." 2016 IEEE 13th International Conference on Signal Processing (ICSP). IEEE, 2016.
[467] Li, Min, Zhenjiang Miao, and Cong Ma. "Automatic Labanotation generation from motion-captured data based on hidden Markov models." 2017 4th IAPR Asian Conference on Pattern Recognition (ACPR). *IEEE*, 2017, 161561
[468] Stamatia Portanova, *Moving Without a Body*, 25.
[469] Moritz Wedell, *Routledge Handbook of Interdisciplinary Research Methods*, 1st Edition, edited by Celia Lury, Rachel Fensham, Alexandra Heller-Nicholas, Sybille Lammes, Angela Last, Mike Michael, and Emma Uprichard, (Routledge, 2018) 117.
[470] Ibid, 119.
[471] Ibid.
[472] Patrick Bull, "Mouselight: Early Animation Through the Avant-garde." *Caméra Stylo* 17, (2017), 17
[473] Ibid.
[474] Papapetros, Spyros. "Movements of the Soul: Traversing Animism, Fetishism, and the Uncanny." *Discourse*, Vol. 34, No. 2-3, Spring/Fall 2012, pp. 185-208, 188.
[475] Ibid, 186.
[476] Ryan Pierson, *Figure and Force in Animation Aesthetics*. (Oxford University Press, 2020).
[477] Badiou, *Inaesthetics*, 58.
[478] Panpan Yang, "Rotoscoping Body: Secret Dancers, Animated Realism and Temporal Critique." *Spectator*, 36.1 (2016): 33–42.
[479] Ibid, 34. Yang points out that Marge Champion's rotoscoped dance footage for Disney's 1937 *Snow White* was reused in the 1973 animated feature *Robin Hood*, demonstrating the ability for dance sequences to remain tethered to the originating body and yet be revived in other animated bodies, resulting in a sense of "temporal discrepancy" across "multiple cohabitating worlds" (33).
[480] Haraway, "Situated," 581.
[481] Tanine Allison, "Blackface, *Happy Feet*: The Politics of Race in Motion Capture and Animation." *Special Effects: New Histories/Theories/Contexts,* (Palgrave, 2015): 114-126, 119.
[482] Ibid, 119.
[483] Kristyn Brady, "Meet the Motion Capture Star Who Brings Hollywood's Creatures to Life Terry Notary." *Dance Magazine*, 2019, https://www.dancemagazine.com/motion-capture/.
[484] Susan Kozel *Closer: Performance, Technologies, Phenomenology*, (Leonardo, 2008), 220.
[485] http://www.makehumancommunity.org/
[486] I have reached out to Method Studios multiple times to interview someone from their team about the creation of this video. They have not responded and there is very little information to be found about how the video was made. While it certainly appears to be created with mocap, given the realism of the dancing avatars and the way the dance movement seems to emanate from the dancers' cores, I cannot verify that mocap was used here. The secrecy around method again points to a potential erasure of the labour of dancers, much like Marge Champion's uncredited dancing in Snow White.

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[487] In chapter two I described a phenomenon wherein the inventors of dancing automata or robots take credit for the skill of their machines. Here, I see a similar impulse where the dancers whose labour produces the motion go uncredited, but the animators are given credit for their achievement at engineering life.
[488] Masahiro Mori, "The Uncanny Valley" (1970). *IEEE Spectrum*, 12 June 2012, Translated by Karl F. MacDorman and Norri Kageki, https://spectrum.ieee.org/the-uncanny-valley#toggle-gdpr.
[489] Richard Hetherington and Rachel McRae, "Make-Believing Animated Films Featuring Digital Humans: A Qualitative Inquiry Using Online Sources." *Animation: An Interdisciplinary Journal* 12, Issue 2, (2017): 156-173.
[490] This is even true of rotoscoped animations –not those rotoscoped directly from live footage, but those in which the performance was done in a studio specifically intended for producing an animated output. Marge Champion describes the harsh lighting and stand-in props she experienced when providing her dancing for Disney's Snow White. See: http://animatedeye.johncanemaker.com/blog/happy-birthday-marge-champion-at-100-years-youre-still-the-fairest-one-of-all/
[491] Benjamin, "Work of Art," 34.
[492] Ibid, 35
[493] Tanine Allison, "Blackface, *Happy Feet*," 116.
[494] Ibid, 115.
[495] Ibid.
[496] Joanna Bouldin, "Cadaver of the Real: Animation, Rotoscoping and the Politics of the Body," *Animation Journal* 12, (2004), 23.
[497] This tendency would match the trend of white patrons attending events at Black jazz clubs during the Harlem Renaissance. See Christopher P. Lehman, *The Coloured Cartoon: Black Representation in American Animated Short Films*, *1907-1954*, (University of Massachusetts Press, 2007) 31.
[498] Rosenberg, *Inscribing the Ephemeral Image*, 54.
[499] Ibid.
[500] Ibid, 56.
[501] Wershler, Darren. "Guy Maddin's 'The Night Mayor', Imaginary Media, and Contemporary Melodrama," *Criticism* 55, No. 4, (2013): 667-694, 682-3.
[502] Danielle Goldman, *I Want to Be Ready: Improvised Dance as a Practice of Freedom*. (University of Michigan Press, 2010), 122.
[503] Goldman's book critiques the "utopian project" of contact improvisation and other dance forms that appeal to freedom, within "1970s postmodern dance" (117).
[504] Ibid, 115.
[505] Ibid, 116.
[506] Ibid, 118-119.
[507] Croce qtd in Goldman 119.
[508] Cunningham collaborated with Kaiser and Eshkar in 1998 and 1999 on the critically acclaimed pieces *Hand-drawn Spaces* and *Biped*, both involving motion-capture.
[509] Goldman, 120.
[510] Ibid, 125.
[511] Ibid, 113.
[512] Marcia Siegel, "At the Vanishing Point, A Critic Looks at Dance," *Saturday Review Press*, 1972, 10.
[513] Fred Moten, *Black and Blur*. (Duke University Press, 2017), 76.
[514] Ibid, 76.
[515] Fred Moten, *The Universal Machine*, (Duke University Press, 2018), 131.
[516] Jones qtd. in Goldman 120.
[517] Goldman, 113.
[518] Paul Gilroy, *Against Race: Political Imagining Beyond the Color Line*, (Harvard University Press, 2000): 47, 43.
[519] Tiffany Barber, "Ghostcatching and After Ghostcatching, Dances in the Dark." *Dance Research Journal* 47, No.1 (2015): 44-67, 48.
[520] Not to mention cartoon Koko's suspiciously Klan-like white hood and minstrel-esque lips and eyes. These visual elements have not been analyzed, and I do not have time to delve in here, but they seem to signify histories of white supremacy.
[521] Weheliye, "Feenin,'" 28.
[522] Lev Manovich, *The Language of New Media*. (MIT Press, 2002), 295.
[523] Tom Gunning, "Animating the Instant: The Secret Symmetry between Animation and Photography," *Animating Film Theory*, edited by Karen Beckman, (Duke University Press, 2014), 37-38.

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[524] Sergei Eisenstein, *Eisenstein on Disney*, edited by Jay Leyda, (Methuen, 1988), 27.
[525] Sianne Ngai, *Ugly Feelings*. (Harvard University Press, 2005), 99.
[526] Ibid, 101.
[527] Thain, "In the Blink of an Eye," 167.

Conclusion

[528] Lynneth J. Miller, "Divine Punishment or Disease? Medieval and Early Modern Approaches to the 1518 Strasbourg Dancing Plague." *Dance Research* 35.2 (2017): 149-164: 149.
[529] John Waller, "A Forgotten Plague: Making Sense of Dancing Media." *The Lancet* 373, issue 9664 (21 February 2009), 624-625.
[530] Hans Christian Anderson, "The Red Shoes" in *New Fairy Tales*, First Volume, (Copenhagen: C. A. Reitzel, 1845).
[531] *The Red Shoes*, dir. Michael Powell and Emeric Pressburger (Eagle Lion Films, 1948).
[532] "The Red Shoes," Studio Album, Kate Bush (London: Abbey Road, 1993).
[533] Liam J. Donaldson, Julie Cavanaugh and J. Rankin. "The Dancing Plague: A Public Health Conundrum." *Public Health* 111, no. 4, (August 1997), 201-4.
[534] Ibid. 201.
[535] John Waller, *The Dancing Plague: The Strange, True Story of an Extraordinary Illness* (Source Books, 2009).
[536] John Koetsier, "Massive TikTok Growth: Up 75% This Year, Now 33X More Users Than Nearest Direct Competitor," *Forbes*, 14 September 2020, https://www.forbes.com/sites/johnkoetsier/2020/09/14/massive-tiktok-growth-up-75-this-year-now-33x-more-users-than-nearest-competitor/?sh=79f932d84fe4
[537] "The All-Conquering Quaver," *The Economist*, 9 July 2022, https://www.economist.com/interactive/briefing/2022/07/09/the-all-conquering-quaver
[538] Hanna Lustig, "TikTok star Charli D'Amelio debuted the 'distance dance' to drive donations during the COVID-19 pandemic," *Insider.com*, 25 March 2020, https://www.insider.com/charli-damelio-distance-dance-on-tik-tok-to-drive-donations-2020-3#:~:text=Charli%20D'Amelio%2C%20the%20most,by%20the%20COVID%2D19%20pandemic.
[539] Ibid.
[540] Daniel Klug, "It took me almost 30 minutes to practice this": Performance and Production Practices in Dance Challenge Videos on TikTok." arXiv, 2020. Presentation from NCA 106th Annual Convention: Communication at the Crossroads.
[541] Trevor Boffone, *Renegades: Digital Dance Cultures from Dubsmash to TikTok* (Oxford University Press, 2021). You can see Lizzo's TikTok video here: https://www.tiktok.com/@lizzo/video/6781866235706477830?lang=en
[542] Ali Johnson, "Copyrighting TikTok Dances: Choreography in the Internet Age." 96 WASH. L. REV. 1225 (2021): 1226.
[543] Ibid, 1226-7.
[544] Ibid, 1227.
[545] See: Connor Murray, "TikTok algorithm error sparks allegations of racial bias," *NBC News*, 9 July 2021; Janice Gassam Asari, "Does TikTok Have A Race Problem?" *Forbes*, 14 April, 2020; and Megan McCluskey, "These TikTok Creators Say They're Still Being Suppressed for Posting Black Lives Matter Content," *Time Magazine,* 22 July 2020.
[546] Ali Johnson, "Copyrighting TikTok Dances," 1237.
[547] Ibid 1245.
[548] Sylvia Wynter and Katherine McKittrick, *Sylvia Wynter: On Being Human as Praxis,* (Duke University Press, 2015), 23.
[549] qtd. in Backman Backman, Eugene Louis, *Religious Dances in the Christian Church and in Popular Medicine.* (Westport, CT: Greenwood Press, 1977).
[550] Thomas DeFrantz and Philipa Rothfield, Eds. *Choreography and Corporeality: Relay in Motion*. (Palgrave MacMillan: 2016), 218.
[551] John Martin, "Dance as a Means of Communication." In *What is Dance?: Readings in Theory and Criticism* by Roger Copeland and Marshall Cohen, (Oxford University Press, 1983): 22.