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## **Beyond a Digital Écriture Féminine:**

### **Cyberfeminism and experimental computer animation**

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#### **Where is the feminist experimental computer animation?**

With the current resurgence of interest in feminism and growth in the proportion of women choosing to study animation at university<sup>1</sup>, this chapter began with a search for examples of innovative, feminist approaches to experimental computer animation. Despite extensive literature review, online searches, calls on social media and academic networks, these proved harder to uncover than anticipated, which led to three further, related questions:

- Where are the women working in computer animation (and animation in general and in Information Technology (IT))?
- How do you define experimental computer animation?
- What might a feminist approach to experimental computer animation be?

As part of this enquiry, women artists who contributed to the earliest emerging forms of computer animation and cyberfeminist<sup>2</sup> discourses from the turn of the millennium will be re-examined. Following the utopian ideas of these early adopters of technology, did women go on to liberate themselves through technology? The chapter will conclude that negotiating the issues of essentialism and intersectionality that follow a re-examination of cyberfeminism has wider implications for the possible futures that our society creates for itself.

#### **Where are the women in computer animation?**

To be assigned the female gender at birth is to be subject to a number of gendered assumptions and discourses from day one. From the pressure to wear a pink Disney princess outfit and play with *girls'* toys, to the idea that technology is too

complicated for women, we are, to paraphrase Simone de Beauvoir, not born but become women. We may choose to either perform or defy these expectations, but, despite a century of four successive waves of feminism, they still run deeply in the fabric of our society. Although the current, fourth wave of feminism is heavily identified with social networks such as the Vagenda<sup>3</sup> and the Everyday Sexism Project<sup>4</sup>, this familiarity with online technologies has not correlated with equality of employment for women in IT, animation or games and women of colour remain particularly under-represented. There is a shocking lack of diversity amongst the individuals who are employed to make the popular culture that surrounds us and that reinforces all of our ideas about the world.

Rather than considering the mainstream animation industry as a whole, however, this chapter is concerned with digital experimentation: animations on the cutting edge that have been created with a spirit of creative investigation rather than for the purpose of entertainment. Experimentation and innovation is vital, because if the developers of new technologies and new forms of entertainment continue to be limited to a small section of the population, they will continue to represent their own interests and not the wider concerns of the general population.

### **How do you define experimental computer animation?**

A quick survey of many experimental animation festivals around the world today will reveal that there is a tendency for animation that foregrounds its digital origin to make up the minority of films on offer.<sup>5</sup> Although all animation can now be considered digital, or at least digitized (unless it only exists on film), animation that appears autographic<sup>6</sup> - hand-made or hand-drawn - tends to have a privileged status in the experimental context<sup>7</sup>, as opposed to work made through industrial processes, such as CGI or code-driven animation, which may be considered as commercial or overly led by mainstream graphic design trends.<sup>8</sup> This was not always the case. Since the beginning of computer animation, artists, avant-garde filmmakers and creative technologists have been producing new methods of expression through digital processes. However, if all animation now involves the computer at some point in its making, does that mean all experimental animation is experimental computer animation? Further clarification about these terms becomes necessary in order to be more specific about what is under discussion here.

‘Experimental’ is a slippery concept to pin down and there are many ways to be experimental in and with animation. For the purpose of this chapter, experimental computer animation is considered as being a work of expanded moving image – which could be a linear short film; form part of a spatial experience in an installation or be non-linear and interactive - that experiments with computing itself: animation in which material and conceptual investigation can be demonstrated to go beyond the realm of aesthetic style or subject matter to examine the very notion of the digital. This is not intended to be a reductive formula for how

to be experimental in computer animation, but to define the scope of examples of animation to include in this chapter. Its concern with medium and materiality may be considered Modernist and 'retro', but the intention is to make an argument about the importance of a more diverse group of artists taking control of technology.

'What special capacities can the computer offer the artist?', asked experimental filmmaker, Malcolm Le Grice in 1974.<sup>9</sup> Le Grice, who first joined the Computer Art Society in 1969, argued that for computing to be considered as an art form, it should explore digital materiality - that which was unique to and could only be created through computers.<sup>10</sup> By necessity, all the animations he produced were programmed directly through code, a process in which visual investigation was analysed and translated into a text-based programming language. Clearly influenced by Conceptual and Systems artists of the era, such as Sol le Witt, for him this new tool had the potential to explore variation: 'systems of incrementation, permutation and random number generation'<sup>11</sup> as well as the potential to expand the very structure of film language itself.<sup>12</sup>

In addition to an exploration of what is specific about the digital, for computer animation to be considered as experimental (in the terms of this chapter) there should be a control over and extension of technical processes, rather than a reliance on the default settings of commercial software programmes. Frieder Nake, who first exhibited his computer art in 1965, argues that to create imagery through code is to work without the clichés of conventional processes that are inherent in mainstream software. To use software is to lack authorship over the results since it means working with the 'ready-made' and appropriating someone else's ideas about how a computer can be used.<sup>13</sup> This tendency to 'appropriate' is not restricted to the use of software, however. Traditional techniques and learned assumptions about how to work in a particular discipline that are not critically examined have been termed 'automatisms' by the philosopher Stanley Cavell.<sup>14</sup> In this sense, commercial software comes with a set of implicit 'automatisms' that can influence the aesthetic outcome. This can be seen in style trends in computer graphics and animation that follow new developments in software such as gradients, opacity and fur texture.<sup>15</sup> Nake's early plotter drawings, such as, *Hommage à Paul Klee, 13/9/65 Nr.2* (1965) drew upon mathematics and probability theory to extend what was predictable and introduce the element of chance into his programming through a use of random variables.<sup>16</sup> His work illustrates how innovation results from the critical questioning of conventional modes of practice.

### **Pioneering female innovators in computer animation**

Amongst the early developers of computer animation who took an active role in discovering new ways of working were a small number of women, including

artist Lillian F Schwartz, who worked on developing code to produce images and animation. Through her experimentation with kinetics she began to collaborate with computer technologists at Bell Labs in 1968, where she remained artist-in-residence for three decades. Frequently returning to art history for inspiration, she endorsed a consistent exploration of digital tools in terms of colour, form, tone, kinetics, proportion and the representation of movement that underpinned her own pioneering work in computer animation, which continued to push the boundaries of what was possible. Her enthusiasm for this evolving medium is palpable from an article she published on computer animation in 1974:

To give more variety and interest to a given set of instructions, there is flexibility in programming allowing for surprises and unexpected images. It is this element of excitement, of new, amazing images, shapes and textures that I find so rewarding. These visual surprises coming out of the computer are awesome experiences.<sup>17</sup>

In an industrial society subject to increasing automation, Schwartz argues that artists bring freedom, new approaches and an assertion of the human spirit to computers, instruments with the potential to be 'devastating tools of oppression'<sup>18</sup>. At times, unexpected outcomes contributed to developments in her work. While creating her film *Trois Visage* in 1977, a bug in the programme caused the image to disintegrate. The code for this was then examined and reproduced as an effect in future work.<sup>19</sup> Although her work is not primarily concerned with feminism, her poster commissioned for the opening of the Museum of Modern Art in New York, *Big MOMA* (1984) is considered an icon of digital art.<sup>20</sup> This single image took over a year to produce. Developing new techniques for analyzing visual data, appropriating a database of scanned images, palette matching and simulating perspectival mapping in three-dimensional space, the work features Gaston Lachaise's giant sculpture, *Standing Woman* (1932), covered in a three-dimensional, digital 'skin' of iconic paintings from MOMA's collection. The material that she created in the making of this poster was later used for a thirty-second public service announcement on local TV stations about the new MOMA, for which she won an Emmy.<sup>21</sup> Creating a giant woman out of paintings made by male artists was not just a technical challenge. This image draws attention to the lack of work by female artists at the centre of the MOMA's collection.

Although a few women artists were able to get access to the highly specialised facilities needed to develop computer animations in the 1970s, there were significant barriers. Very few research labs were engaged with creative computing at the time, so this kind of investigation was limited to those countries with the economic capacity to invest in such expensive facilities. In an interview from 2003, Rebecca Allen relates how she had to persuade her teachers at RISD to allow her to create her first computer animation in 1974 and subsequently spent

a lot of time contacting the few research labs she could find in her native USA before she got taken on as a graduate student by the MIT Architecture Machine Group. The first projects she worked on were for the Defence Department. However, her interest was in subverting the 'antihuman' nature of the computer and bringing sensuality to it. Her first animation, created with graphs and punch cards, featured abstracted rotoscoping of a 1950's erotic film of a woman lifting her dress.<sup>22</sup> She went on to build a formidable career investigating natural motion and the organic through advanced technologies in three-dimensional scanning, CGI modelling, virtual and augmented reality and interactive experience design. Amongst many other projects, Allen is responsible for milestones in computer animation such as the Kraftwerk's *Musique Non-Stop* video in 1986, for which she developed state-of-the-art facial animation software.<sup>23</sup>

The barriers to women were not limited to the scarcity of research facilities available. Reflecting in 1990 on her experiences in the 1970s, artist Vibeke Sorensen describes how the expectations of equality she had inherited from her Danish background were confounded by a number of 'glass ceilings' that she encountered in the USA. After studying architecture in Copenhagen, she was turned down for two Masters course in Architecture for being a woman and also had evidence of direct discrimination when applying for jobs. She also faced assumptions that a woman couldn't be technical or work with complex mathematics. She observes:

The bottom line is that there is not a conflict between numerical reasoning and women's nature. There is simply no math gene! Numerical ability, scientific observation and artistic expression are basic to women's nature. It seems that this knowledge and confidence has been lost from the general population. Women in computer graphics are reclaiming this territory [...]<sup>24</sup>

These experiences led her to make one of her first films, *Etyma*, in 1974, which examined

the relationship between the history of written language and patterns of thought, especially the origins of the word "woman," and I asserted my identity as a woman experimental filmmaker through symbolic visual poetry.<sup>25</sup>

Sorensen had hopes, however, that there would be more opportunities for women to come and that women working with technology might make a positive contribution to the future. In 1990, she noted:

while there are quite a few women in computer graphics, they are still a minority and I observe that even fewer women are entering the field from

the next generation of artists. However, because the field is young, there is less of an "old boy's club" rife with harassment, and the field is more open to women than are other fields. Indeed, the democratization of the personal computer has provided women more opportunity for access with dignity. After all, the computer itself does not discriminate on the basis of age, sex, or race. Perhaps it can help to lead us to a more integrated and idealistic society than we currently live in.<sup>26</sup>

Tenaciously continuing with her work in computing, Sorensen has gone on to explore visual music, generative systems, nature, stereoscopy and Asian cosmologies through computer animation, networked performance and interactive architectural installation, such as *Mood of the Planet* (2015). In this installation that takes the shape of an arch or doorway, live data based on keywords is sampled from Twitter to create colour animation that is generated from human emotions around the world at that particular point in time.<sup>27</sup>

### **Feminist approaches to computing**

As access to personal computers became more widespread in the 1990s, techno-utopianists and cyberfeminists made a number of grand claims for the computer age including the potential for the creation of new, virtual worlds and the transformation of gender relationships in society. Inspired by Donna Haraway's *Cyborg Manifesto*, the term cyberfeminism was coined in 1991 in two places at once, both by cultural theorist Sadie Plant in the UK and the feminist art group VNS Matrix in Australia.<sup>28</sup>

Although there were many approaches to cyberfeminism, the movement builds on the work of post-structuralist French feminists, such as Hélène Cixous, Monique Wittig and Luce Irigaray, in seeking new forms of female language - *écriture féminine*. These ideas came from the *politique et psychanalyse* group - radical French women who did not actually call themselves feminists as they did not want equality with men, but rather aimed for a revolutionary overthrow of the patriarchal social order. The term, *écriture féminine*, was first presented in Hélène Cixous's 1975 essay 'The Laugh of the Medusa'. In a society in which the mainstream media, literature and institutions were all dominated by the ideas of men, she argues for women—who had never had their turn to speak, to assert their own voices, take control of their own representation—to defy the ways in which they had hitherto been portrayed and overturn the oppressive tongue of patriarchy. She wrote:

Now, I-woman am going to blow up the Law: an explosion henceforth possible and ineluctable; let it be done, right now, in language [...] If woman has always functioned "within" the discourse of man [...] it is time for her to dislocate this "within," to explode it, turn it around, and seize it;

to make it hers, containing it, taking it in her own mouth, biting that tongue with her very own teeth to invent for herself a language to get inside of.<sup>29</sup>

For Cixous, writing is important to the process of liberation because it introduces 'the very possibility of change' and is a 'springboard for subversive thought' that could transform society.<sup>30</sup> This should be a new kind of writing, not logical or full of reason, but saying the unthinkable, poetic, plural, resisting definition, transgressive, of the body, of pleasure and physical desire, liberated from censorship or guilt about sexuality, erotic, dirty, oozing the abject. A woman should have no fear of her own bodily fluids: 'There is always within her at least a little of that good mother's milk. She writes in white ink.'<sup>31</sup> Getting in touch with her body would allow woman access to her primordial strength, for so long repressed. Cixous continues:

A woman's body, with its thousand and one thresholds of ardour - once, by smashing yokes and censors, she lets it articulate the profusion of meanings that run through it in every direction - will make the old single-grooved mother tongue reverberate with more than one language [...] Women must write through their bodies, they must invent the impregnable language that will wreck partitions, classes, and rhetorics, regulations and codes [...]<sup>32</sup>

Other women associated with the group became similarly inspired by the notion of *écriture féminine*. In her text, *Body I*, Madeleine Gagnon reflects on the frustration of being a woman speaking a language that had been defined by men, 'I am a foreigner to myself in my own language and I translate myself by quoting all the others'.<sup>33</sup> For Marguerite Duras, the writing of women is 'translated from the unknown... like a new way of communicating rather than an already formed language'.<sup>34</sup> It bypasses rational thinking. Duras declares:

I know when I write there is something inside me that stops functioning [...] - the analytical way of thinking inculcated by college, studies, reading, experience [...] It's as if I were returning to a wild country.<sup>35</sup>

The issue was not to stop speaking in French, but to find new ways to use that language: to customise it in a manner that reflected female experience since that had not been represented in the mainstream before.

For the cyberfeminists two decades later, developments in personal computing and the spread of the internet represented new frontiers to this 'wild country'. Cyberfeminism did not simply argue for equality of access to digital technology, but for a profound re-thinking of to use it. Women had the opportunity to

adopt this new technology to re-code the way they had been represented and to create a digital *écriture féminine*, in the words of Faith Wilding, to create 'new languages, programs, platforms, images, fluid identities and multi-subject definitions'.<sup>36</sup> Leading the way on these utopian ideas was Sadie Plant's 1998 book *Zeros + Ones*, which made a series of connections between the essential nature of women and the new skills needed for an information society, between the traditionally female craft of weaving and non-linear hypertext. Plant believed in the possibility for an 'unmanned' future through new forms of technology that could be adopted by women and no longer dominated by white men.<sup>37</sup> Seeking to reveal the repressed feminine side of technology, Plant argues that the skills women have always had – such as networking, multi-tasking, the ability to continuously update their skills - makes them ideal for working in a new digital era of interconnected computing. She writes:

Weaving was already multimedia: singing, chanting, telling stories, dancing and playing games as they work, spinsters, weavers, and needle workers were literally networkers as well [...] the textures of woven cloth functioned as means of communication and information storage long before anything was written down.<sup>38</sup>

The non-linear structure of the book itself adds to the discourse about multiplicity, fluidity and hypertextuality. Refuting Freud's claim that women had made few contributions to the invention of new technologies apart from weaving, the book interlaces many discourses from the history of computing such as the role of women in computing, textiles and the manufacture of electronics. *Zeros + Ones* celebrates the achievements of Ada Lovelace, the Victorian mathematician who is considered as the first computer programmer for her work on extending the theoretical capabilities of Charles Babbage's proposed mechanical computer, the Analytical Engine. In translating the Italian engineer Luigi Menabrea's notes on the Analytical Engine, Lovelace's footnotes contained commentary more sophisticated and three times longer than the original text itself, which Plant argues is a precursor of hypertext,

The utopian zeitgeist that the future could be female through new technologies inspired artists in Australia such as VNS Matrix and Linda Dement to create new kinds of female-centred artwork using 'new media'. Australia in the 1990s was a fertile ground for cyberfeminist art due to a supportive environment for art and technology that included the Australian Network for Art and Technology (ANAT).<sup>39</sup> VNS Matrix (pronounced Venus Matrix) was founded in 1991 by four artists: Virginia Barratt, Francesca da Rimini, Julianne Pierce and Josephine Starrs who, in the words of their own myth of origin:

crawled out of the cyberswamp [...] and via an aesthetics of slime [...] forged an unholy alliance with technology and its machines [...] on a



mission to hijack the toys from technocowboys and remap cyberculture with a feminist bent.<sup>40</sup>

Declaring a *Cyberfeminist Manifesto for the Twenty-First Century*, they exhibited this text in different arenas, such as on billboards in Sydney, in print form posted around their hometown of Adelaide and at the 1992 SIGGRAPH convention in Chicago.<sup>41</sup> It reads as follows:

We are the modern cunt  
positive anti reason  
unbounded unleashed unforgiving  
we see art with our cunt we make art with our cunt  
we believe in jouissance madness holiness and poetry  
we are the virus of the new world disorder  
rupturing the symbolic from within  
saboteurs of big daddy mainframe  
the clitoris is a direct line to the matrix  
VNS MATRIX  
terminators of the moral code  
mercenaries of slime  
go down on the altar of abjection  
probing the visceral temple we speak in tongues  
infiltrating disrupting disseminating  
corrupting the discourse  
we are the future cunt<sup>42</sup>

With its reference to *jouissance*<sup>43</sup>, making art with the body and the abject, there is a clear link to the earlier French radical feminist ideas of *écriture féminine*, although this is taken into the digital age through the use of multimedia and the adoption of metaphors from hacking, such as corrupting the patriarchal discourse of the military-industrial complex like a virus. *All New Gen*, 1994 expresses these ideas in the form of a video game in which play is based around the hacker as virus infecting the patriarchal corporate culture in a quest to sabotage the databanks of Big Daddy Mainframe. At the start of the game, the player is asked to indicate their gender as Male, Female or Neither. However, only a gender fluid position is available – unless Neither is chosen the game will terminate.<sup>44</sup> Enemies to avoid include the techno-himbo, Circuit Boy (whose penis morphs into a mobile phone) and Big Daddy Mainframe himself, a ‘transplanetary military-industrial-imperial data environment’.<sup>45</sup> The players measure their energy in stores of G-slime and can receive assistance from mutant *sheroes*, the DNA sluts.<sup>46</sup>

These themes of sexually active women, slime and abjection polluting the rational, clean digital world can also be seen in the work of Linda Dement,

another Australian artist. In her interactive works for CD-ROM such as *Typhoid Mary* (1991), *Cyberflesh GirlMonster* (1995) and *In My Gash* (1999) clicking without an apparent interface on an on-screen monstrous re-combination of wounds, organs and dismembered body parts reveals hyperlinks to stories, animations, sounds, quotes, diary extracts, medical information, statistics and images telling tales of patriarchal violence, addiction, prostitution, suicide and abuse.<sup>47</sup> In an artist's statement, Dement describes her preoccupations in these works thusly:

I work with the disease and detritus of bodily interiors, subcutaneous landscapes, in order to give form to lived experience and its inner disturbances. I am interested in the possibilities for embodiment and technology, particularly where the bodies concerned are those mad, damaged, uncontrolled and perverse ones from the peripheries of mainstream culture. It's in the outpourings of bloody unreason from bent flesh and fast machines that I find a potential for something truthful and real.<sup>48</sup>

Through a multimedia assemblage of animation, digital imaging, hypertext and audio, Dement gives a non-linear voice to the dispossessed – the junky, the suicide, the prostitute.

### **Essentialism or intersectionality**

Despite its radical intentions, cyberfeminism came under fire at the turn of the millennium for its unquestioned fetishisation of new technology and unexamined reliance upon privilege. In 1998, Faith Wilding warned against an uncritical attitude towards new technologies that were not neutral zones, but had resulted from military research projects. She pointed out that new media was inscribed in a social system rooted with sexual and racial prejudice.<sup>49</sup> In addition, many developments in online technology, such as video streaming, were led by the economics of investment in pornography.

It was also unrealistic to presume that cyberfeminism would have relevance for all women. Equal access to digital technologies is predicated not only on being able to afford the hardware, but having stable telecommunications networks and consistent electricity supplies. There are also other access issues – being able to learn how to use and contextualise these tools - more available for speakers of dominant language groups and the simple economic luxury of having the time to creatively engage with technology outside of work, domestic labour or childcare. Adopting a post-Colonial position, in 2002 Radhika Gajjala and Annapurna Mamidipudi questioned the reproducibility of cyberfeminist models to the third-world and the 'blindspot' of race, class and location. They noted:

we are concerned with the issue of whether "the bequeathed" are or are not empowered through the transfer of technologies produced and

designed within socio-cultural environments situated in a Westernized and Masculinized world [...] Thus, our approach to finding solutions emphasizes the re-designing of "new" technological environments, rather than a mere attempt at "transferring" so-called advanced technologies in the name of a notion of Progress that is in itself situated in socio-economic, historical and political contexts not necessarily empowering to all communities of the world.<sup>50</sup>

How could liberation in cyberspace materially improve the lives of women in rural India? Technology, they argued, needed to be rethought for localised contexts.

A backlash against feminism in the popular consciousness of the first decades of the twenty-first century has focussed on its concerns with language, which came to be thought of as policing expression, desire and appearance through 'political correctness', and being 'anti-sex'. However, as the previous section demonstrates, there was never one type of feminism, but many approaches to feminism. Those feminist arguments derived from the post-structuralist French theorists were not about censoring or denying, but were both utopian in conceptualisation, through exploring language or technology as new forms of articulation to express sexuality and subjectivity from a female perspective, and revolutionary in aiming to overthrow the patriarchy. The biggest criticism of all forms of radical feminism, however, came from within the women's movement itself and was that of essentialism: that assumptions were being made about what it is to be 'woman' from a primarily privileged white and Western perspective and subsequently presented as if this were a universal experience and applicable to all women, whatever their circumstances may be.

Addressing accusations of essentialism and exclusivity, new generations of feminism seek to engage with intersectionalism, a more expanded conceptualisation of inequality that grows from Black feminism, cultural studies and the increasing realisation that a feminist analysis on its own is not enough to explain the complex intertwining of social injustice<sup>51</sup>. Indeed, how can an understanding of violence against women in Iraq result from an analysis of gender alone?<sup>52</sup> Through the study of how different social categories – such as race, gender, sexuality, class, age, location - are complex, interconnected and mutually constitutive, intersectionality aims to unite communities of practice who seek social justice to understand and counter multiple inequalities. This approach enables links to be created between communities and a more nuanced view of power relations.

### **Post-cyberfeminism: xenofeminism, Afrofuturism and glitch feminism**

A renewed interest in cyberfeminism appears to be emerging that takes into account the critiques of essentialism that tore apart the women's movement in the

1990s. A new open-access peer reviewed journal *Ada: a Journal of Gender, New Media and Technology* was launched by the Fembot collective in 2012.<sup>53</sup> Google launched a Made with Code project in 2014 to encourage school girls to take up coding.<sup>54</sup> Indeed, Helen Hester argues that cyberfeminism should be re-visited and upgraded in order to develop a post-cyberfeminism that aims for social and political activism rather than neo-liberal individual freedoms. For Hester, 1990s feminism was too fragmented and dispersed across networks to form a unified, radical plan for action: resulting in decentralised micro politics rather than organised, mass political action. For Hester, this is exemplified by Sadie Plant's hypertextual weaving together of different information sources and blurring of conceptual boundaries in *Zeros and Ones*, which has the consequence of 'substantially restricting much of the text's diagnostic capacity and political utility.'<sup>55</sup> To counter this, Hester argues for the collective Laboria Caboniks's proposal for a new xenofeminist movement defined through means of an *n* hypothesis – a theory that is constantly reviewed, iterated, updated like new software patches or open source software and 'awaits and invites revision':

**'Hypothesis:** Xenofeminism is a gender abolitionist, anti-naturalist, technomaterialist form of posthumanism, building upon the insights of cyberfeminism. Its future is unmanned.'<sup>56</sup>

This manifesto for xenofeminism has the ambition to go beyond the 'excess of modesty in feminist agendas of recent decades' that was 'not proportionate to the monstrous complexity of our reality'.<sup>57</sup> It stands firmly against essentialism: 'Nothing should be accepted as fixed, permanent, or 'given' – neither material conditions nor social forms.'<sup>58</sup> Central to this is 'gender abolitionism' or 'the ambition to construct a society where traits currently assembled under the rubric of gender, no longer furnish a grid for the asymmetric operation of power.'<sup>59</sup> They argue for an intersectional approach that would abolish power relations based on race or class<sup>60</sup>. They state:

Gender inequality still characterizes the fields in which our technologies are conceived, built, and legislated for, while female workers in electronics (to name just one industry) perform some of the worst paid, monotonous and debilitating labour. Such injustice demands structural, machinic and ideological correction.<sup>61</sup>

Xenofeminism is concerned with who is authoring the technology and whose interests it reproduces:

XF seeks to strategically deploy existing technologies to re-engineer the world. Serious risks are built into these tools; they are prone to imbalance,

abuse, and exploitation of the weak. [...] Technology isn't inherently progressive. [...] Technoscientific innovation must be linked to a collective theoretical and political thinking in which women, queers, and the gender non-conforming play an unparalleled role.<sup>62</sup>

In animation, these themes of technology and gender fluidity are explored in the work of contemporary Chinese artist, LuYang, whose film *Moving God* was included in the Chinese Pavilion at the Venice Biennale in 2015. Her short film, *Delusional Mandala* (2015) shows the artist being 3D-scanned, desexualised and becoming a CGI avatar of indeterminate gender alongside medical imagery, brain surgery and Buddhist iconography. This is accompanied by an automated voice in Chinese drily recounting medical facts with a rock music background. Parodying the pop video, the dancing figure morphs, ages and reveals its internal organs before being entombed in a psychedelic hearse. Although the artist states that her work is a meditation upon neuroscience and consciousness<sup>63</sup>, it can also be read as a comment upon the medical construction of gender. This interpretation is reinforced by her earlier creation, *Uterus Man*, produced in the form of an animation in 2013 and subsequently an arcade game in 2014. Adopting the visual language of manga, this character is an asexual hero enmeshed within powerful armour formed from a uterus.<sup>64</sup>

A thread of intersectional cyberfeminist discourse can be seen re-emerging occasionally in Afrofuturism, a movement in music, literature and art that uses the form of science fiction to analyse the injustices of the past and suggest alternative futures. Key figures such as musician Sun Ra and writer Octavia Butler use the form of speculative fiction to examine race and identity through a range of approaches including the utopian, the dystopian and the grotesque. In the collages and animations of artist Wangechi Mutu, such as *The End of Eating Everything* (2012), themes of the monstrous female body re-emerge.<sup>65</sup> Mutu's use of collage to re-member and distort disparate body parts into female figures shows a similar approach to the earlier work of Linda Dement, but the result speaks more of the body victimised through colonialism, ecological disaster, hunger and slavery rather than Dement's concern with abjection and the results of sexual violence.

Glitch feminism, a term coined by Legacy Russell in 2012, is another form of post-cyberfeminism that considers gender to be a technology that is fundamentally broken. Russell regards the 'mechanized micro-seizures' of mechanical failure as deeply significant in our relationship with technology:

**The glitch is the digital orgasm**, where the machine takes a sigh, a shudder, and with a jerk, spasms. [...] The glitch is the catalyst, not the error. The glitch is the happy accident. When the computer freezes mid-conversation, when the video buffers and refuses to progress.<sup>66</sup>

Thus, the glitch is a revolutionary moment of malfunction when the smooth functioning of a piece of technology comes into question and reveals its mechanics. As a metaphor, it can be extended to an approach to gender:

Glitch Feminism [...] embraces the causality of “error”, and turns the gloomy implication of *glitch* on its ear by acknowledging that an error in a social system that has already been disturbed by economic, racial, social, sexual, and cultural stratification and the imperialist wrecking-ball of globalization— processes that continue to enact violence on all bodies—may not, in fact, be an *error* at all, but rather a much-needed erratum.<sup>67</sup>

For Jenny Sundén, 'Glitch is a struggle with binaries'<sup>68</sup>: this could be binary code or binary approaches to gender. Indeed, perhaps the glitch, the error, the failure to conform to accepted codes is more indicative of the system than the ideal:

femininity is a technology of failure, and the ideal of smooth, slick, seamless, effortless femininity impossible. There will always be glitches, slippages, slips; too feminine, not feminine enough, not feminine in the right way, a never-ending struggle for everybody with femininity aspirations. There is no such thing as flawless technologies, or bodies, this is the ideal.<sup>69</sup>

This fascination with the glitch and an exploration of the limitations and failures of CGI is apparent in the work of a number of contemporary female experimental computer animators. The glitchy CGI visuals of Kathleen Daniels in films such as *Hillbilly* (2013) demonstrate a deliberate disregard for photorealism and feature strong female characters, oversized body shapes, relationship issues and the experience of being an African American woman in Berlin. In the film, *alteration-de-la-voix* (2015) by Wednesday Kim, which is based on dreams that resulted from traumatic childhood memories, multiple body parts join together to form writhing, mutant bodies.<sup>70</sup> In Lilli Carré's film *Jill* (2016) a rebellious CGI character refuses to obey the instructions of the narrator and her digital body refuses to obey the rules of a human body.

### **Conclusion: whose future?**

This chapter began with a search for examples of innovative, feminist approaches to experimental computer animation. Although a few were uncovered, these were not easy to find and more research needs to be done on this subject. Despite a small number of contemporary women animation artists working at a very high level of technical and conceptual sophistication in experimental digital processes, to name but a few - Chunna Yu, Claudia Hart, Katerina Athanasopoulou,

Carol MacGillivray, Hito Steyerl, Oddscene, Jennifer Steinkamp, Zarah Hussein, Bärbel Neubauer, Kim Laughton, Eva Papamargariti, Kathy Smith and this list is not intended to be exhaustive – their work does not show a consistent engagement with an explicitly feminist agenda. Films that engage more overtly with feminism – and a look through the catalogue of films on offer at feminist animation festivals such as Tricky Women in Austria will confirm this – are overwhelmingly created through hand-drawn or hand-made processes. It is also the author's experience as an educator in animation, that the majority of female students – whether feminist in outlook or not - prefer to engage with hand-drawn or hand-made aesthetics over more technical processes such as CGI or code.

Reading between the lines of existing literature on the history of computer animation, traces of women artist pioneers using technology can be found as potential role models - Schwartz, Allen and Sorensen, but they are few and far between. Is it that it was too hard for women to access the technology, which required an affiliation with big institutions, or have others been written out of history? At the opening of the Electronic Superhighway exhibition of digital arts at London's Whitechapel Gallery in 2016, a protest was staged at the omission of many key female artists and none of the 1990s Australian cyberfeminist artists were included. What is at stake here is not simply about history. Why are equal numbers of women not adopting technology in either experimental practice or the mainstream labour market? It's not just women that are underrepresented - experimental practice in computer animation itself is also a minority discourse. However, experimentation is needed for innovation and to imagine new ways of using these technologies. To be in control of technology is to be in control of the future and to not engage with technology is to take no responsibility for the future. It has been argued that inequality is hard wired into the very code of the technologies we take for granted due to the language used and assumptions programmed into them by the people who created them. This has been demonstrated by recent cases documenting how search engines return ALT-right results. A 'bug' in the automatic tagging of photographs in Google Photos, claimed the manufacturers, led to photos of Black people being labelled as gorillas. Tay, Microsoft's experiment in artificial intelligence was 'led astray' on Twitter and ended up pledging allegiance to Hitler.<sup>71</sup>

This chapter is not intended as a definitive study, but as a call for action. There needs to be more research into why women and BAME groups are underrepresented in the tech sector, calls for funding and strategies to counteract this – otherwise a large part of the talent pool is being neglected at a time when economies need skilled workers. This is not just a matter for the labour market. This is about social justice and who creates the fabric of the electronic world we live in. The importance of more diversity is not just because of whose viewpoints are being represented now, but, in an age of increasing disparity between rich and poor, also about whose perspectives shape the future. In order to deal with the complex and challenging future our world faces, we need to be able to draw upon a diverse range of ideas and solutions to the many problems that face us.

The advance of technology is not simply the result of some neutral force of 'progress', but results from political decisions about where research and development funds are invested and what issues have priority. We all need to take collective responsibility to ensure that inclusivity, not division, is at the centre of this. But we also need new ways to work with these tools, not simply learning to be part of the power structure but finding new and surprising strategies in articulating the voices of those whose languages - female, Black, post Colonial, trans, queer, migrant, old, poor – have all been excluded from the mainstream. Radical experimenters need to dismantle and re-assemble these technologies, to subvert dominant discourses, imagine and work towards new and more inclusive futures.

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<sup>1</sup> Deborah Vankin, 'Animation: At CalArts and Elsewhere, More Women Are Entering the Picture', *Los Angeles Times*, 25 May 2015.

<sup>2</sup> Cyberfeminism is a term originating in the 1990s that refers to a feminism that engages critically and conceptually with digital media and networked technologies.

<sup>3</sup> 'The Vagenda', accessed 20 April 2017, <http://vagendamagazine.com/>.

<sup>4</sup> 'Everyday Sexism Project', accessed 20 April 2017, <https://everydaysexism.com/>.

<sup>5</sup> This tendency is less noticeable in animations chosen for exhibition in a gallery context.

<sup>6</sup> For a detailed examination of autographic vs allographic art practices, cf. Maryclare Foá and Birgitta Hosea, 'Chapter 1. Communicating', in *Performance Drawing: New Practices since the 1960s*, ed. Maryclare Foá et al. (London: I B Tauris, 2019).

<sup>7</sup> For a more fully developed version of this argument, cf. Birgitta Hosea, 'Made by Hand', in *The Crafty Animator*, ed. Caroline Ruddell (Basingstoke, Hampshire: Palgrave Macmillan, 2019).

<sup>8</sup> This observation refers to tendencies rather than absolute selection criteria. Some experimental CGI and algorithmic animations are selected for experimental animation festivals, but they are in the minority.

<sup>9</sup> Malcolm Le Grice, *Experimental Cinema in the Digital Age* (London: British Film Institute Publishing, 2006), 219.

<sup>10</sup> Malcolm Le Grice, 'Computer Film as Film Art', in *Computer Animation*, ed. John Halas (London; New York: Focal Press, 1974), 162.

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- <sup>11</sup> Le Grice, *Experimental Cinema in the Digital Age*, 220.
- <sup>12</sup> Le Grice, 'Computer Film as Film Art', 166–67.
- <sup>13</sup> Birgitta Hosea, 'Drawing Animation', *Animation: An Interdisciplinary Journal* 5, no. 3 (2010): 357.
- <sup>14</sup> Cavell, 1979, quoted in Rosalind Krauss, "'The Rock': William Kentridge's Drawings for Projection', *October*, no. 92 (2000): 4.
- <sup>15</sup> Hosea, 'Drawing Animation', 356–57.
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- <sup>25</sup> *Ibid*.
- <sup>26</sup> *Ibid*.
- <sup>27</sup> Vibeke Sorensen, 'Mood of the Planet', Artist's website, *Vibeke Sorensen* (blog), 2015, <http://vibeke.info/mood-of-the-planet/>.
- <sup>28</sup> Zoë Sofia, 'Contested Zones: Futurity and Technological Art', ed. Judy Malloy (Cambridge, Mass.; London: MIT Press, 2003), 511.
- <sup>29</sup> Hélène Cixous, 'The Laugh of the Medusa', in *New French Feminisms: An Anthology*, ed. Elaine Marks and Isabelle de Courtivron (Brighton, Sussex: The Harvester Press, 1986), 257.
- <sup>30</sup> *Ibid.*, 249.
- <sup>31</sup> *Ibid.*, 252.
- <sup>32</sup> *Ibid.*, 256.
- <sup>33</sup> Madeleine Gagnon, 'Body I', in *New French Feminisms: An Anthology*, ed. Elaine Marks and Isabelle de Courtivron (Brighton, Sussex: The Harvester Press, 1986), 180.
- <sup>34</sup> Marguerite Duras, 'From an Interview', in *New French Feminisms: An Anthology*, ed. Elaine Marks and Isabelle de Courtivron (Brighton, Sussex: The Harvester Press, 1986), 174.
- <sup>35</sup> *Ibid.*, 175.
- <sup>36</sup> Faith Wilding, 'Where Is the Feminism in Cyberfeminism?', *N.paradoxa* 2 (1998): 9.
- <sup>37</sup> Sofia, 'Contested Zones: Futurity and Technological Art', 511.
- <sup>38</sup> Sadie Plant, *Zeros + Ones: Digital Women + The New Technoculture* (London: Fourth Estate, 1998), 65.
- <sup>39</sup> Tully Barnett, 'Monstrous Agents: Cyberfeminist Media and Activism', *Ada: A Journal of Gender, New Media, and Technology*, no. 5 (2014), <http://adanewmedia.org/2014/07/issue5-barnett>.
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- <sup>41</sup> Sofia, 'Contested Zones: Futurity and Technological Art', 511–12.
- <sup>42</sup> Barnett, 'Monstrous Agents: Cyberfeminist Media and Activism'.
- <sup>43</sup> When translated into English this word has multiple meanings – use, pleasure and orgasm.
- <sup>44</sup> Claire L Evans, "'We Are the Future Cunt': CyberFeminism in the 90s', *Motherboard/Vice.com* (blog), 2014, [https://motherboard.vice.com/en\\_us/article/we-are-the-future-cunt-cyberfeminism-in-the-90s](https://motherboard.vice.com/en_us/article/we-are-the-future-cunt-cyberfeminism-in-the-90s).
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- <sup>46</sup> Sofia, 'Contested Zones: Futurity and Technological Art', 511–12.
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- <sup>49</sup> Wilding, 'Where Is the Feminism in Cyberfeminism?', 9.
- <sup>50</sup> Radhika Gajjala and Annapurna Mamidipudi, 'Gendering Processes within Technological Environments: A Cyberfeminist Issue', *Rhizomes* (blog), 2002, <http://www.rhizomes.net/issue4/gajjala.html>.
- <sup>51</sup> Patricia Hill Collins, 'Intersectionality's Definitional Dilemmas', *Annual Review of Sociology*, no. 41 (2015): 6.
- <sup>52</sup> *Ibid.*, 12.
- <sup>53</sup> <http://adanewmedia.org/about/>
- <sup>54</sup> <https://www.madewithcode.com>
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- <sup>56</sup> *Ibid.*
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- <sup>58</sup> *Ibid.*, 1.
- <sup>59</sup> *Ibid.*, 6.
- <sup>60</sup> *Ibid.*, 6.
- <sup>61</sup> *Ibid.*, 2.
- <sup>62</sup> *Ibid.*, 2.
- <sup>63</sup> D J Pangburn, "'Nonsexual' Humanity Takes Form as an Artist's 3D Avatar', *Creators/Vice.com* (blog), 2015, [https://creators.vice.com/en\\_au/article/nonsexual-humanity-takes-form-as-an-artists-3d-avatar](https://creators.vice.com/en_au/article/nonsexual-humanity-takes-form-as-an-artists-3d-avatar).
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