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Animation is a moving image practice that extends across a global landscape of technologies, screen platforms and social relationships, many of them imbued with an undercurrent of spatial politics. The practice of animation coalesces from a fluidity among illustration and sculpture, fine art, technological innovation and the digital and information revolutions. Animation is a manipulated moving image form that has many formal, aesthetic and critical intersections with experimental film, video art and digitally rendered features and figures in changing 'high/low' art economies and dominating information technology interfaces.

The last three decades have witnessed a dramatic increase in digital animation production and in the genres and media forms it encompasses. Critical discourse on animation has developed from an initial set of institutional, historical, ontological and occasionally reductive approaches, with a focus on narrative, experimental, abstract or documentary genres. Some writers have attempted a definition of animation, but there is no scholarly consensus on a single one. The mode is impossible to funnel into *a* theory of animation because it is not a single profession, technology or practice. Animation is neither a medium nor a genre, but a set of techniques, a mode or, as Edwin Carels has proposed, "the staging of an agency".[1]

In this contribution, I work with a notion of *pervasive animation*, and my concerns address the effects and affects of animation in contemporary culture on the humans who engage with it, and with informing relations and distinctions between a range of subjects, technologies and platforms on which it is experienced. The latter of these two words—animation—is subject to a wide range of formal and conceptual understandings and usages: a technique of filmmaking, a film form, an all-embracing term for the millions of works it can apply to. As a descriptive attribute, the adjective 'pervasive' specifically qualifies a noun—in this case, animation—as spreading widely throughout an area or group of people, with a particular, unwelcome influence or physical effect. I use this attribute, as it is distinct from the adjective 'ubiquitous', which means widespread or omnipresent, though much of what I consider pervasive is indeed widespread, for instance, in entertainment and advertising. 'Pervasive' specifies an element of extensive penetration and can imply in some cases insidiousness, and this has a semantic function that adds a specific meaning to the noun 'animation'. As a paradigm, pervasive animation thus denotes specific, aggressive, active, affective qualities of *some* works made using these moving image techniques. In the following, I distinguish four possible subsets of pervasive animation: impossibly real, disruptive, useful and peripheral.

The immediate question is not what is animation, but rather, what is it not? As digital technologies develop, the borders between, for example, virtual reality, augmented reality or new media art and animation are increasingly porous, as these often use animation—as does, for example, Masaki Fujihata's "Beyond Pages" (2015). Implications of digital media on the animated form, and vice-versa, bring it in closer proximity to contemporary discourses on aesthetics, socio-politics and techno-cultural progression. As a digital mode, animation is impacting the digital

[1] Edwin Carels, "Animation Beyond Animation: A Media-Archaeological Approach to the Use of Animation in Contemporary Art", doctoral thesis, University College Ghent, Royal Academy of Fine Arts (2014), B21.

humanities and influencing academic, artistic, political and cultural capital agendas that, in turn, affect people in their daily lives.[2] This is relevant in considering the ethical responsibilities of makers, distributors and consumers of animation on screens in homes, shops, computer games, the internet, broadcasting and in schools and the workplace. Reflecting upon animation as a distinct moving image form means acknowledging a major change in cultural metaphor, moving away from the truth values of indexical representation to simultaneity, interactivity and a manipulation of the pure (pre-digital) and digital moving image. This informs the ethical, aesthetic and cultural implications of what I call pervasive animation in visual culture.[3]

Ideologies, ontologies and the impossibly real

Before the digital shift, 'pure' animation was mainly arts-based painting, drawing, graphics or puppet animation. Historically, the rise of photographic cinema marginalised animation, confining it to either rigid canons or avant-garde forms, such as Abstract Cinema and Structural Film, or to the more popular association with 'entertainment'. The object of study for most pre-digital, analog animation criticism was primarily film that uses planar graphic and cel techniques, with modest attention given to other techniques. The main reason for this lies in standardisation of cel animation and the distribution and screening strategies of the major studios. This has continued to determine canons and influence topics. As Kristin Thompson has noted, animation was eventually side-lined in the service of Hollywood film. Anticipating Lev Manovich's 2002 polemic[4] to reverse the traditional hierarchy and position digital animation as the general, higher-order category for the cinema, Thompson posits, "[i]f technology were the only factor determining the creation of motion pictures, animated films would logically share a prominence equal to that of live-action films in the history of cinema".[5] She suggests Hollywood ideology trivialised animation's magic and stylisation, arguing that an "ideology of realism" led to the "decline of the novelty effect in live-action films" as narrative cinema developed. Wishing to conceal cinema's own constructedness from audiences, which the magical novelty and the foregrounding of techniques in animation disrupted, "an ideological view of cartoons as comics developed".[6]

This ideology endured in Film Studies in a set of ideologies located in realism debates on ontology and on film's indexicality. An early example is Stanley Cavell, who claims that film must be a projection of reality, disavowing (drawn) 'cartoons' as having "nothing to do with projections of the real world".[7] David Rodowick, who declares his own position on animation as similar to Cavell's,[8] joins a persistent debate in Animation Studies about differences between animation (usually 2D or drawn) and live action. Interestingly, Rodowick states that cel animation "obviously has a strong indexical quality. Simply speaking, each photographed frame records an event and its result: the succession of hand-drawn images and cells [sic] reproduced as artificial movement through the automatism of succession. Here, as in all other

[2] The exhibition "Animated Wonderworlds" (2015/16) at the Museum for Design Zurich examined and critiqued the ubiquitous presence of (mostly) digital animation in culture, the arts, science and commerce.

[3] An early demonstration of this concept was the "Pervasive Animation" symposium I organised with Stuart Comer at Tate Modern, London in 2007 (online at Tate Media) that later resulted in the AFI Film Reader *Pervasive Animation* (New York, Abingdon: Routledge, 2013).

[4] Lev Manovich, *The Language of New Media* (Cambridge, MA, London: MIT Press, 2002) 298–300.

[5] Kristin Thompson, "Implications of the Cel Animation Technique", in: Stephen Heath & Teresa de Lauretis (eds.), *The Cinematic Apparatus* (London: MacMillan, 1980), 106–120.

[6] Ibid., 108–11.

[7] Stanley Cavell, *The World Viewed: Reflections on the Ontology of Film*, enlarged edition (Cambridge, MA: Harvard University Press, 1979), 167.

[8] David Rodowick, *The Virtual Life of Film* (Cambridge, MA: Harvard University Press, 2007), 53.

cases, the camera records and documents a past process that took place in the physical world."[9] Regardless of the technique used, although its photographic celluloid works belong in the ontology of the photographic image; animation has long been liberated from constraints of ordinary space and time, realism and depictions of the natural world. An 'ideology of realism' disavows the viewer's creative modes of perception and mental activity, as well as the ability to engage with animated mimetic and abstract art forms. We will see that this ideology is complicated by the pervasiveness of digital realism in almost all areas of film production since the burgeoning use of computer-generated imagery (CGI), that is, in my view, a mode of animation.

Thomas Lamarre offers a valuable discussion about various attempts at discipline formation for Animation Studies that oscillates between a specificity thesis and a modernity thesis in film history and theory. He attributes the rise of the digital as the reason why "emphasis falls on a sort of digital avant-gardism, [and] questions about the broader field of animation or animation studies tend to drop out of the picture".[10] Below I examine what I see as an exemplar of Lamarre's digital avant-gardism, one of a multitude of artists with subversive or critical agendas that address the pervasiveness of some types of animation, specifically the use of digital tools that are enabling filmmakers to create a new experience of on-screen realism that does not display a record of a real *profilmic* event.[11] The issue of total control of the image in digital animation leads to ethical implications concerning the truth values in a range of visual culture, particularly in the 'animation we are not supposed to see'. This ranges from sanitised images of digitally 'cleaned up' blood and body parts removed from broadcast war reporting since the introduction of software tools, to the labour politics of digital actors (critically thematised in Ari Folman's *The Congress* (2013)), the 'science faction' digital panopticon already visualised in 2002's *Minority Report* (Steven Spielberg) and the social and psychological effects of players' choices of idealised animated stand-ins in the chat communities of Massively Multi-player Online Role Playing Games (MMORPG).

Increasingly, the sought-after grail of perfect realism in digital filmmaking is becoming attainable as tools are refined at a dramatic pace. In the commercial arena, Johnny Hardstaff's works combine live action with slick, high-realism CGI for clients ranging from Sony to Honda. (His works also bear comparison with the audacious digital veracity of Limbo City in Christopher Nolan's *Inception* (2010).) Hardstaff is an interesting and relevant case in point to discuss pervasive animation because, while he works in what he calls the 'impossibly real', he also expresses ambivalence about working within the politics and unsavoury ethics of commercial CGI. In a 2007 essay, written around the time of the hyper-naturalistic commercials *Cog* (Antoine Bardou-Jacquet, 2003), *Balls* (Nicolai Fugslig, 2005), and his own *Paint* (2005) created with CGI animation, Hardstaff states that "technology permits me, at least, for this is how I like to use it, to conjure the 'real' using the faultless hard-edged tools of power".[12] However, he is concerned that "[t]he real is being trivialised and the natural has become in some way suspicious",[13] and that "[t]he potency of animation is unarguable, and in the wrong hands, animation does indeed become a weapon"[14]— in other words, pervasive. Hardstaff also advocates an alternative to the perfect

[9] Ibid., 121.
[10] Thomas Lamarre, Editorial "Animation Studies", in: *The Semiotic Review of Books* 17:3 (2008) 1–6, here 1.
[11] This refers to events or materials in a camera's field of view to be captured and recorded on analog film stock.
[12] Johnny Hardstaff, "The Impossibly Real: Green Belting the Imaginary", in: *animation: an interdisciplinary journal* 2:2 (2007), 187–202, here 190.
[13] Ibid., 200.
[14] Ibid., 199.

digital realism: “Electronic media offers the opportunity […] to level the playing field, appropriate the themes, aesthetics and messages of industry and, should we choose to do so, to subvert them.”[15] This resonates with Wanda J. Orlikowski's distinction in 2000,[16] between “a technology-in-practice"—the specific structure routinely enacted as we use a machine, technique, appliance or device in recurrent ways—and that of a technological artefact: "The artefact is the thing that people use.”[17] Depending on whose hands the artefact is 'in', so to speak, and how restricted these hands are or are not by digital labour economies, its use has a huge spectral range, from the commercial perfection of a CGI character’s eyes to artistic video degradation, datamoshing or glitch.

Disruptive animation: scratch, datamosh and glitch

When the critical potency of animation is in the right hands of artists, they can challenge and offer alternatives to industry's dominant digital realism and the ideology inherent in the (bigger, better, faster, smoother, more desirable) 'impossibly real' aesthetic. This potential for subversion lies in digital animated works that do not seek to seduce us with the polish and perfection of commercial films, and instead work with an agenda of intentional ‘imperfection’ through interpellation of the artist, intentionality and non-intentionality and authorial control. Before discussing digital works, it is worth considering an analog precursor, early video art, in which some artists worked with ideas of failure and "deliberately bad techniques”, as did Pippilotti Rist, as Gezky and Millner suggest.[18] They write that Rist’s early works from the 1980s embody "a style of video that harks back to the form's inception, when degraded aesthetics corresponded with the accessible and affordable technologies of the day".[19] We see this operating on multiple levels in a later work by Rist, "I'm Not the Girl Who Misses Much" (1997), that displays an aesthetics of degradation, a process involving the transfer of video material from one VCR tape onto another, multiple times; what results is a video glitch. Another early example of animation convergence was the 1980s UK-based Scratch Video group, who reworked ubiquitous broadcast adverts, news and documentary. They used rapid montage, distorting video techniques and emerging electronic, i.e., digital tools to lay bare the pervasive and persuasive conventions of television and commercials to critique, parody and ironise everything from global politics to the art world. Leo Goldsmith suggests that “the style of Scratch Video was perhaps uniquely adept to present (or re-present) the processes of dehumanisation that were underway—in many ways, through the very technologies of representation themselves”.[20] Artists continued to explore these animated techniques; a merging of the relatively uncontrollable moving image video degeneration and the error-based digital glitch resulted in a technique of artistic control: datamoshing, a process where “a regular digital video file is taken and manipulated to introduce noise artefacts that include pixilation, blurring of images and movement that has been radically changed”.[21] An example of

[15] Ibid., 190.
[16] Wanda J. Orlikowski, “Using Technology and Constituting Structures: A Practice Lens for Studying Technology in Organizations”, in: *Organization Science* 11:4 (2000), 404–428.
[17] Paul M. Leonardi, “Digital Materiality? How artifacts without matter, matter”, in: *First Monday* 15:6–7 (June 2010): http://firstmonday.org/ojs/index.php/fm/article/view/3036/2567 (last accessed 31/10/2016).
[18] Adam Gezky & Jacqueline Millner, *Fashionable Art* (London, New York: Bloomsbury, 2015), 119.
[19] Ibid.
[20] Leo Goldsmith, “Scratch’s Third Body. Video Talks Back to Television”, in: *View: Journal of European Television History and Culture* 4:8 (2015), 114–26.
[21] Shad Gross, “Glitch, Please: Datamoshing as a Medium-Specific Application of Digital Material”, from: *Proc. 6th International Conference on Designing Pleasurable Products and Interfaces* (New York: Association for

this is Takeshi Murata's *Monster Movie* (2005) that works with excerpts of a B-monster film *Caveman* (Carl Gottlieb, 1981). Layers and fragments of the 1981 film fitfully emerge and are transformed into glitchy, pixelated and chunky, digital colour flows. Rosa Menkman observes that the bleeding effect "shows the materiality of digital film—it metaphorically translates the grain of the celluloid to the digital pixel".[22]

Elements of the attraction and pleasure of these works for viewers is that the manipulated images subvert expectations. And, if we know about the technologies, we also know the artist too experienced and made self-reflexive artistic choices with the unexpected and the unpredictable. This is also what makes malfunction-based glitch artefact errors different in their reception than programmed digital effects. What I call 80s VCR glitch animation art worked with the 'stuff'—the machines, tapes and materiality of analog technology—with which more could go wrong. Most moving image technology now is digital, with few naturally arising malfunctions. Software such as After Effects Creation VHS Effects allows artists to use digital artefacts to nostalgically reference wavy image distortion, desaturation and analog TV static in digital film. These and other techniques have entered the mainstream through a number of works, from Kayne West's 2007 music video "Welcome to Heartbreak" to Disney's animated feature *Wreck-It Ralph* (2012), in which glitch is no longer a signal of machine or software malfunction. Instead, it is an endearing character's 'disability'; the glitch events of the character Vanellope, who suffers from a condition of 'pixlexia', are more like decorative, narrative and character-defining hiccups than an aesthetic foregrounding of software malfunction.

The simplicity of software and technology has also given rise to a significant counter-culture and the democratisation of digital tools. Now everyone with pixels and a programme can animate, datamosh or glitch, although David OReilly observes that "many people have access to the tools but very few have any meaningful guidelines on how to use them".[23] OReilly, whose *Please Say Something* (2009) was awarded the 2009 Berlin Golden Bear for Best Short film, has since established himself as a clear voice for an alternate digital animation aesthetics, which he unambiguously describes as 'basic'.[24] He makes a statement about his methods that resonates with Paul M. Leonardi's claim that "[w]hether in physical or digital form, an artefact that translates ideas into action is material".[25] OReilly notes: "There's a kind of back and forth between software and idea that goes on when I work in 3D, because to me it's weird NOT to acknowledge that everything is fake and animation is basically an optical illusion—but it's still ultimately a medium to get ideas across."[26] OReilly is also conversant with the video work of the 1980s and 1990s, reminding us "there were a lot of analog errors being explored, and the errors in the 2020s will probably look a lot different".[27] OReilly was commissioned by the animated TV series *Adventure Time* to create an episode; he wrote, directed and animated "A Glitch is a Glitch" (2013) in which he "wanted to focus on glitch as a narrative device".[28] Yet

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Computing Machinery, 2013), 175–184, here 178. Also available at: http://dl.acm.org/citation.cfm?id=2513506 (last accessed 23/2/2019).

[22] Rosa Menkman, "Sunshine in My Throat", blog: http://rosa-menkman.blogspot.co.uk/2009/02/from-compression-artifact-to-filter.html (last accessed 31/10/2016).

[23] David OReilly, "Basic Animation Aesthetics": http://www.media-arts-uts.com/aes1/wp-content/uploads/2012/01/BasicAnimationAesthetics.pdf (last accessed 30/8/2019).

[24] Ibid.

[25] Leonardi, "Digital Materiality?", op. cit., 8.

[26] Daniel Rourke, "Datamoshing in the Land of Ooo. A Conversation with David OReilly", in: *Rhizome* (2013): http://rhizome.org/editorial/2013/apr/25/datamoshing-land-ooo-conversation-david-oreilly/ (last accessed 7/11/2018).

[27] Ibid.

[28] Ibid.

unlike Disney's Vanellope, OReilly's styled glitches were "all generated from 'real' glitches—but since everything is run through compositing software and sort of controlled, you could also say it was all fake".[29] This is a category of digital artworks Meredith Anne Hoy describes as "us[ing] the medium reflexively, to consider how both objects and knowledge are reconfigured within a digital epistemological framework. In this instance, the appearance of discrete units on the image surface is not attributable to technological failure, insufficiency, primitivism or to a lack of technical dexterity on the part of the artist/programmer."[30] OReilly has a community politics of sharing: He made 65 character rigs from his 2010 *The External World* available for free download, with the condition that people "can use and modify them in any way you like, as long as it's for a *non-commercial purpose*".[31] He and others are active members of the artist-led community of disruptive animation.

'Useful' and peripheral animation

Much of contemporary digital visual culture is unthinkable without animated media that use a wide range of platforms that include and extend beyond narrative entertainment or advertising. These range from gallery installation or mobile screens to computer game consoles, online DIY animation programmes and projection mapping. In 2017, Transparency Market Research released a report with estimates that the global computer graphics market is projected to rise from US$130.91 billion in 2015 to become worth US$211.60 billion by 2024. This report included some of the prominent, and dominant, corporations at the forefront of production, application, distribution and software creation: Microsoft Corporation, Intel Corporation, Adobe Systems Ltd., Imagination Technologies Limited, Sony Corporation, Nvidia Corporation.[32] Most of these are also major players and influencers, or they provide technological foundations for visual communication technologies and data harvesting that utilise animation in their visualisations, drawing from the military, design or architecture to mainstream and transmedia entertainment, advertising and more. Whether films, or the spatial politics of social media, games and apps, animation's increasing pervasiveness is influencing our understanding of how we see the world, and many of these areas require enhanced political, social and ethical scrutiny.

The other end of the pervasive animation spectrum is *useful animation*. This includes its exploitation in the sciences as a visualisation tool or its manifold uses and applications as a digital visualisation method, where animation functions as the main design element and interface. Animation is increasingly used to visualise the burgeoning volumes of data being collected on humans, our world and beyond. It can demonstrate the darks sides and bright sides of a range of abstractions, patterns and observations in the natural and social sciences, from astrophysics and climate change to demographic statistics. *Digital Workshops of the World* (Leon Gurevitch, 2014) is an interactive data visualisation that animates thirty years of the precarity of work-based migrations of 13,000 visual effects (VFX) professionals in the global digital economy (many working on high-realism digital films like *Lord of the Rings* or *Avatar*). Human data and human knowledge is being used to develop artificial intelligence, with the relentless commercial aim to replace wetware (a chilling

[29] Ibid.

[30] Meredith Anne Hoy, "From Point to Pixel: A Genealogy of Digital Aesthetics", doctoral thesis, U.C. Berkeley (2010), iii. Proquest ID: Hoy_berkeley_0028E_10496. Merritt ID: ark:/13030/m5hh6pxv. Retrieved from: https://escholarship.org/uc/item/25f4v730 (last accessed 30/6/2019).

[31] David OReilly, "My Things", 2013: http://blog.davidoreilly.com/post/45930207387/extw-rigs (last accessed 20/72019).

[32] Transparency Market Research: https://www.transparencymarketresearch.com/computer-graphics-market.html (last accessed 26/7/2019).

pejorative for human labour) with hard- and software, and animation is often the machine/human interface. Other useful animation includes serious citizen-science games like *Foldit*, that invite players to work on cell-level organic protein folding to solve human illnesses. They are dependent on the participation of thousands of individual gamers' unique reasoning and puzzle-solving capacities, which scientists discovered can be far more successful than time-consuming random computer calculations.

Another useful mode, *real-time animation,* will be increasingly used as visual technologies develop. Oxsight smart glasses, developed by Steven Hicks and his R&D team at Oxford University, help the visually impaired negotiate spaces and objects, and the company claims it has potential to help an estimated billion people afflicted by sight impairment. The wearer experiences a cartoonisation interface that visually bears comparison with the animation technique of analog rotoscope (or its digital successor Rotoshop). A key difference is that the wearer's visual field is experienced in real-time with an imperceptible 180 milliseconds delay.[33] This mode of animation is being used by artists, including Masaki Fujihata early on, whose "Morel's Panorama" (2003) recorded gallery visitors in the exhibition space in real-time and rendered this into a 3D cylindrical panoramic model.

A fourth pervasive mode, *peripheral animation,* refers to types and uses of animation many of us are less aware of—or take for granted—that are moving from larger screens or embedded in objects or clothing. These include simple messaging GIF emoticons, interactive navigation assistants, animation in social media environments, interactive music apps or animated LED wearable tech and fashion. As we engage in digital interaction with our fingers, hands or body, animation is an ever-present element in everything from motion comics to language learning, the workplace or our daily smartphone interactions. It is interesting to speculate how the human hand will physically develop as we move away from page-turning to the thumb-and-two-finger gesture used to expand images, the swipe and scroll, or two-thumb rapid texting. A best-selling audiovisual iPad app for Beatrix Potter's classic *The Tale of Peter Rabbit* (2011) invites a child to perform most all of these, with interactive menus, games, "tactile" pull tabs and pop-up pictures which animate the original book.[34] The pervasive element of these and other new media platforms and animated interactive products is that they affect family structures and interrelational communication, steering future consumption and defining visual environments in teaching and learning. Seductive and fantasy-filled virtual animated worlds of games and online zones are reducing children's explorations of natural outdoor surroundings. Nintendo's *Wii* games' living-room digital versions of participatory family or sporting events are proliferating and other games feature idealised animated avatars engaging in online relationships or VR and AR porn (*3D Holo Girlfriend*, 2018).

Via his cartoon character *Big Heel Watha* (1944), Tex Avery once said: "You can do anything in a cartoon." This prosaic comment has had a far-reaching impact. Because of its potential to visualise and interpret the repressed, the imagined, the desired and the invisible, animation can act as an intermediary between pervasive ideologies' suppression of information and community wisdom. Recent academic writing on animation is beginning to reflect on its pervasiveness, embracing a wider interdisciplinary scope of teleological, technological, social, media-archaeological, anthropological, philosophical, political, art-historical, post-humanist, functional or

[33] Oxsight, 2019: https://www.oxsight.co.uk (last accessed 8/8/2019).
[34] The mid-1950s US interactive children's TV show *Winky Dink and You* is probably the first prototype in a genealogy of such animated books and developments in AR.

aesthetic contexts. The animation I've discussed is extending Thompson's notion of promoting "formal play of a potentially disruptive kind".[35] As a moving image form, animation holds the potential to close C. P. Snow's famous two cultures divide[36] in our information-based era by defining how the visual language of animation opens up new dialogue channels and shared interdisciplinary toolsets to express and visualise concerns from the political to the eco-critical. The task ahead is to facilitate a much-needed dialogue and new perspectives on the pervasive and multidisciplinary nature of animation in the digital humanities, its future development and its ethical responsibilities for spatial politics and a moving image culture.

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[35] Thompson, "Implications of the Cel Animation Technique", 112, cf fn. 5.
[36] C.P. Snow, *The Two Cultures* (Cambridge: Cambridge University Press, 1998).