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E L P U T N A M

[A]lthough the idea of the work involves the question of how the world is so radically changing, I do not address it directly.

Joan Jonas (2015: 19)

In the above quote, Joan Jonas describes her intentions behind 'They Come to Us without a Word', her exhibition for the United States pavilion at the 2015 Venice Biennale. In this multi-room installation, Jonas crafts a work custom-made to the unique space, incorporating tools and methods she has been cultivating over decades of practice, including performance, video, drawing and sculpture. Even though she does not use the term directly, the resulting impact is a diffraction of a world in crisis, with the body and technology as means of enquiry. According to Karen Barad (2007), diffraction is a physical phenomenon associated with waves and is used as a metaphor to describe how art reveals patterns of difference and material entanglements. Through my interpretation of 'They Come to Us without a Word', I argue that physical and metaphorical diffraction reframe corporeal-machinic relations through performance gestures. Swiss artist Pipilotti Rist is also recognized for her experimental use of moving image and performance that draws attention to the material properties of technology while revealing and informing the relationship of human bodies to this technology. Moreover, the processes of these artists exemplify how art functions as a diffraction apparatus, where 'diffraction not only brings the reality of entanglements to light, it itself is an entangled phenomenon' (72). In this analysis, emphasis is placed on corporeal interactions with digital moving image technologies, drawing from Gilbert Simondon's (2016 [1958]) understanding of the technical object, which he entwines with humanity and the environment, blurring boundaries of subject and object, being and thing, artificial and natural, as he redefines these concepts from a position

of technological co-existence. Performance in this context includes artistic performance to camera, but also the performed gestures of spectators as they engage with a work. Three works in particular are analysed. The first is the mirror room from Joan Jonas's exhibition 'They Come to Us without a Word', which includes the diffraction of projected digital video through a crystal chandelier and warped mirrored walls. The second is Rist's *Pixelwald* (Pixel Forest) (2016), which I argue is the diffraction of video into individual pixels that are strung throughout the gallery as sculptural forms. The final work is my 2017 performance *Ember*, created in collaboration with sound artist David Stalling, where the performing body is diffracted through live projections of slit-scan imagery. As such, these works taken together make evident how art enables a rethinking of embodied digital experience through performance.

SURFACE TENSION

For Joan Jonas's exhibition 'They Come to Us without a Word', the central rotunda of the US Pavilion in Venice's Giardini is lined with warped mirrors, creating marbled light that appears like the surface of water as it caresses the floor. In the centre of the room is an orbital chandelier comprised of glass prisms that fracture the light of projected video, spilling broken rainbows that mix with shadows as light flows onto the floor. The rippling of light through the room resonates with Venice's canals that have captivated artists and tourists for centuries. The open doorways of the room enable a peek into surrounding installations, where video and light flicker as reflected images of kites and fish mingle in the kaleidoscoping line of sight. The rotunda is a thoroughfare between the galleries, but it is also a swirling respite from the complex, multi-part installations that occupy the other rooms, like

a meditative palette cleanser. Standing in front of the mirrors, I linger on the image of my body sharing this space where perception is fractured and interference flows. Claire Bishop emphasizes how installation art has a theatrical, immersive quality that makes the viewer aware of her embodied state through aesthetic experience:

[I]nstead of *representing* texture, space, light and so on, installation art *presents* these elements directly for us to experience. This introduces an emphasis on sensory immediacy, on physical participation ... and on the heightened awareness of other visitors who become part of the piece. (Bishop 2012 [2005]: 11).

While Bishop highlights the increased prominence of installation as a contemporary art medium, Jonas's engagement with the form emerges from her practice that centres on the body and technology through performance.

In this context, Jonas has crafted a work that is custom designed for the rotunda, incorporating a material that she describes as her first prop: the mirror (Jonas 2015: 19). The mirrors for this exhibition were created on nearby Murano, internationally famous for its glass production. Intentionally warped, they are designed for diffraction through their capacity to refract light. Refraction is connected to the physical phenomenon of diffraction through the deflection of waves from straight paths. Unlike reflection, which returns a light wave so it appears undisturbed, refraction reveals patterns of difference by altering the wave's movement. Thus, while a mirror that reflects is celebrated for its verisimilitude of an image that hides the physical properties of light, a mirror that refracts light reveals these physical properties as it presents an image interrupted by diffraction patterns.

Even though Jonas does not use the term 'diffraction', this physical process underlies the formal properties of the mirror room of 'They Come to Us without a Word' described above. Karen Barad (2007) emphasizes how diffraction constitutes a material phenomenon particular to waves and occurs when waves overlap, bend and spread when meeting some sort of barrier, gap or obstruction, creating patterns of difference. When light strikes the mirrors in the Rotunda of the US Pavilion, diffraction patterns spread through the room, as light and dark bands appear through the physical movement of light. Barad utilizes

the concept of diffraction on a number of levels, including physical phenomenon that she 'can't help but see nearly everywhere [she] looks in the world' (72). She also draws from Donna Haraway, treating diffraction as a metaphor in place of reflection, which Barad argues has dominated Western philosophical and scientific thought.

Mirrors tend to be affiliated with reflection, including by Rosalind Krauss who, in her essay 'Video: The aesthetics of narcissism' (1976), describes the immediacy of video as a mirror that endorses self-reflection that represses the difference between subject and object. Krauss argues that the video works capable of breaking from this collapse into narcissism are those such as Joan Jonas's work *Organic Honey's Vertical Roll* (1972), which 'represent[s] a physical assault on the video mechanism in order to break out of its psychological hold' (59). She describes the video as follows: 'the rhythmic roll of the image, as the bottom of its frame scans upward to hit the topic of the screen, causes a sense of decomposition that seems to work against the grain of those 525 lines of which the video picture is made' (60). Krauss focuses on how Jonas manages to reveal the apparatus of production as she undermines the norms of the visual language of moving images, but also describes how Jonas creates a diffraction pattern by shooting a television monitor with a video camera – a pattern of difference that reveals the presence of the apparatus and how it is entangled with the image. As Karen Barad emphasizes:

So while it is true that diffraction apparatuses measure the effects of difference, even more profoundly, they highlight, exhibit, and make evident entangled structure of the changing and contingent ontology of the world, including the ontology of knowing. In fact, diffraction not only brings the reality of entanglements to light, it is itself an entangled phenomenon. (Barad 2007: 73)

Barad contrasts diffraction from reflection, not just as a physical phenomenon where reflections are more or less faithful representations, but diffraction patterns 'mark differences in the relative characters (i.e., amplitude and phase) of individual waves as they combine' (Barad 2007: 81). Diffraction, unlike reflection, draws attention to the physical properties of light, highlighting its materiality. Barad extends the

significance of this difference between reflection and diffraction to challenge the predominance of representationalism and reflexivity. Barad states: ‘while reflection has been used as a methodological tool by scholars relying on representationalism, there are good reasons to think that diffraction may serve as a productive mode for thinking about nonrepresentational methodological approaches’ (88). She indicates how diffraction is performative – or where the subjects and objects are constituted through ‘intra-actions’ – as a means of breaking from reliance on optical metaphors of reflection and representation. At the same time, she draws attention to material phenomena that are not visually observable, proposing alternative modes of knowledge production that are relational and dynamic.

The interplay of humans with technology is integral to the work of French philosopher Gilbert Simondon. He does not just consider technology as merely a mediator of human activity or tools at our disposal, but argues that technical objects function as part of a milieu that they modify, thereby making technology, humans and the environment co-constitutive. These milieus are geographic, material, biological, psychological and social. His understanding of the gesture in relation to technology is notable, where machines function as the exteriorization of gestures: ‘what resides in the machines is human reality, human gesture fixed and crystallized into working structures’ (Simondon 2016 [1958]: 18). Thus, human gestures are embedded within the creation of technical objects, which are formed from and carry knowledge systems, but also anticipate certain gestures.

Technical objects, for Simondon, are not restricted to particular uses, but also have a degree of indeterminacy that invite other, even unanticipated, actions. This indeterminacy means that even though technical objects have material properties that invite specific uses and gestures, they may also be repurposed and used in ways that are not intended, such as when a hammer, a tool designed to hit nails, is used as a weapon. Simondon (2012 [1982]) values the aesthetics of technical objects, with aesthetics functioning as the means of connecting to an object’s material properties through sensation. At the same

time, Simondon treats aesthetics as inferior to philosophical thought, since ‘it refracts aspects of reality, but it does not reflect them’ (2016 [1958]: 243). As Yves Michaud indicates, Simondon treats aesthetics as a means of ‘insertion and inscription’, instead of imitation (2012: 125). As aesthetic objects draw attention to moments and instances through detachment from space and time (Michaud 2012), they are refractions that engage with fragments of reality perceived through the senses, which, for Simondon, makes aesthetics inferior to philosophical thought, which is reflective. Therefore, Simondon perpetuates the prioritization of representationalism and reflection in knowledge production that Barad challenges. What he treats as a limiting feature of aesthetics actually functions as a chance to introduce non-representational methodologies where ‘knowing comes from direct material engagement with the world’ (Barad 2007: 49).

Jonas’s early explorations with video, as in *Vertical Roll*, and mirrors, as in her 1969 performance *Mirror Piece I*, create patterns of difference with these diffraction apparatuses that are entangled with the phenomena they produce. Both video and mirrors are utilized in the mirror room of ‘They Come to Us without a Word.’ Like her earlier works, the material qualities of the production apparatus, which include light, are made apparent through diffraction. The performers in the mirror room are not the artist or delegated participants (as in the other videos included in other rooms of the pavilion), but the visitors to the exhibition, who roam through the installation, introduce further interference through their physical presence and interruption of light, as manifest through warped mirror images (fig. 1) and the creation of shadows.

Throughout Jonas’s artistic oeuvre, gestural explorations, actions and technology coalesce through entanglements. Jonas (2014) emphasizes the significance of technology in her practice when she states ‘you can’t separate my work from technology, because my work exists within the fabric of technology. And it’s also affected by it. So technology is inseparable from my work.’ Her treatment of technology is not just about what it enables through its use, but involves how it functions as a tool and how this relates

to the human body, with the intersection being the gesture. Chris Salter (2010: xxii) studies the intersection of performance and technology, pointing to a longer history where ‘the performing arts are really an unstable mixture amalgamating light, space, sound, image, bodies, architecture, materials, machines, code, and a perceiving public into unique spatiotemporal events’, encompassing entangled relationships. Salter emphasizes how technology is not restricted to tools and their affordances, but

technology in the performing arts reveals itself not only in the machines that descend from the heavens by their own will, but also in how – through craft, skill, construction, or making (what the Greeks called *techne*) – it orders the world (*logos*). (Salter 2010: xxiii)

The relationship between technology, as understood in the broader scope of *techne*, and world-making is found in ‘They Come to Us without a Word’, as humans and machines form the space of engagement where experiences are constituted through apparatuses of diffraction. Technology and human bodies are entangled in this world that unfolds in the rotunda of the US pavilion.

SCATTERED IN MULTIPLE DIMENSIONS

Like Jonas, Pipilotti Rist has worked extensively with moving image and performance, highlighting how video technologies occupy a shared milieu with human bodies. In addition to documenting performed actions to camera, such as *Open my Glade (Flatten)* (2000) where Rist pushes her face

up against a piece of glass, making it appear that she is inside a video monitor, she also documents the performances of others, as in *Pickelporno* (Pimple Porno) (1992), *Ever is Over All* (1997) and *Pour Your Body Out (7354 Cubic Meters)* (2008). Rist creates luscious multi-media installations, with videos presented in atypical manners – in corners, on the ceiling, filling rooms or tucked into holes in the ground – encouraging viewers to move their bodies to most effectively witness the moving images. As such, the actions and gestures of the viewers’ bodies, as they shift and move, have kineasthetic connections to the bodies portrayed in the videos, both becoming entangled in sensations of colour and light. While one performance is for the camera, the other is in relation to the screen. There is also the hidden performance of the one operating the camera, where the camera becomes an extension of the body through its use. For instance, Rist has developed a distinctive shooting technique where a small video camera is attached to a broom handle, which she describes as a dance that creates ‘footage that rarely provides the viewer with the sense of distance and perspective, even of up or down, that the conventions of television and movies have led us to expect’ (Kennedy 2009). The relationship between the body and the camera is multifaceted, as the camera is not just a prosthesis for seeing, but a gestural extension of fully embodied ways of seeing.

While Rist started working in analogue video, digital shooting and editing technologies have altered what and how she can produce, introducing new modes of engagement with moving image. In *Pixelwald* (2016), the moving image is broken down into 3,000 pixels as individual light-emitting diode (LED) lights fitted in small plastic forms, dangling together as hundreds of beaded chains, with each light controlled by a video signal. This work takes the notion of image immersion to another degree, as the viewer can walk through the image itself with each LED light corresponding to one pixel of the image, and is feasible due to the affordances of digital technology.

Art critic Roberta Smith (2016) describes how ‘Rist ... has rarely met a technological breakthrough that she couldn’t use.’ When installed in the New Museum in 2016, *Pixelwald*

■ Figure 1. E L Putnam and David Stalling, *Ember*, 2017. Live performance with fibre optic skirt, web cameras, Raspberry Pis, and projectors. Photo courtesy of the artist



occupied an entire floor comprised of strings of glowing orbs hanging from the ceiling. As with other installations Rist has created over the years, soft seating on the floor is available, inviting audience members to break from the typical gallery-going behaviour of walking through an exhibition, and instead become fully absorbed in the sensory stimuli. Harriet Hawkins analyses the impact of projected light and colour saturation of Rist's video installations on the body, arguing that Rist's installations involve an intersection of light, touch and vision that creates corporeal geographies through immersion. Through this process, Rist 'puts at stake the separation of bodily interiors and exteriors, folding cameras and audiences into bodily cavities' (Hawkins 2015: 164). These bodily cavities are symbolically presented through the content of Rist's videos, which tend to include close-ups of human bodies melding with organic materials, but also the metaphorical cavities of architectural spaces that her projections illuminate. These are not images to be looked at, but 'environments to be moved through' (166). I build upon Hawkins's interpretation, where 'the touch of light in Rist's work tenders a way of thinking through the mingling of subjects and objects, or bodies and worlds' (174), to consider the presence of technical objects in this milieu. In particular, the breakdown of the video image into LEDs dispersed in three dimensions in *Pixelwald* involves a distinctive material formation of the moving image as the notion of immersion is taken in a different direction from projection. These material configurations challenge preconceived understandings of the digital image, since the pixels have a sculptural form, inviting unanticipated gestures through defamiliarization that highlights how video functions as aesthetic technical objects as defined by Simondon. As a result, there is an unknown means of engaging with the entangled milieu of the body with pixels, where the body of audience members are the primary means of exploration.

Unlike digital 3D objects used in augmented reality (AR) and virtual reality (VR) that are based on an illusion of a third dimension on the two-dimensional plane of the screen, Rist's installation diffracts the two-dimensional video image into a three-dimensional sculptural

form. Such a process is not meant to increase verisimilitude, like AR and VR, but decrease the recognizability of the image through abstraction, highlighting difference through the isolation of single pixels into LEDs, disrupting the illusion of continuity of digital colour. Carolyn Kane describes how digital technology 'is defined by a series of discrete units of information from which other formations can then derive' (2019: 111). Comparing the composition of colour in digital images to the abacus, Kane argues that while analogue colour involves a continuous field, digital colour is comprised through many individual coloured units: 'Digital colours retain distinctions between inside and outside: where one color begins and where it ends, and what one colour is and what it is not' (114). Rist formalizes these qualities in the LEDs of *Pixelwald*, enabling the audience to inhabit the space between pixels – a space that is rendered inaccessible on the screen. Through this diffraction of the image, the differences of digital colour, which emerge from its material qualities as technical objects, are made explicit while revealing entanglements through corporal movement.

IGNITING EMBERS

On the winter solstice of 2017, David Stalling and I presented the two-hour collaborative performance *Ember* at The Complex theatre and gallery space in Dublin, Ireland. Just a few blocks away from one of the city's major shopping districts, jam packed with shoppers days before Christmas, art historian Kate Antosik-Parsons (2018) describes the event as a 'refuge' that 'offered the space to contemplate the enigmatic rhythms of the solstice and the interplay of human connections'. The performance took place in a darkened room that was formally a storage facility of the Keelings Fruit Company, with the interior of the room still unfinished from its transition to an art space.

I began the performance on the ground underneath a black cloth, wearing a skirt made of fibre optics programmed by a wearable microprocessor to simulate the flickering light of a fire. Two projectors sat on pedestals on one end of the room, facing me and the wall. Stalling sat to the side at a table with his sound kit,

consisting of modular synthesizers, instruments, microphones and other tools, creating an amorphous form of wires and gadgets that mimicked the fibre optics of my skirt. I slowly rose from underneath the cloth, restraining my gestures to minimal movements. At that point, abstracted images appeared from the projectors, which were connected through live feed to two web cameras placed on the ground. These videos were not of representative images, but were translated live through a program that created slit-scan imagery. That is, the middle column of pixels (y-axis) in the video frame was captured in each shot. This column was then placed on the x-axis, and in the next frame, another column of pixels was captured and placed next to it. The result is a diffracted transmission of actions that fed back into the performance, presenting a spatialized version of the video image over time. In the darkened room, the cameras picked up the pulses of the fibre optics, freezing these dynamic flickers to create abstracted traces of gestures, interrupted by the silhouette of my shadow (fig. 1).

At the heart of *Ember* is an ineffability – an inability to express something in words. The intersection that David Stalling and I inhabit in *Ember* is that between the corporeal and the digital, with digital technologies functioning as modes of expression and mediation. As an artist, I aim to navigate this terrain of constraint and plasticity that never ceases to surprise and provoke me, resulting in an ambivalent relationship with digital technology where I am both excited and disturbed by its capabilities. Throughout my practice, I consider ways to extend and alter the use of my tools, taking advantage of the sharing of knowledge and availability of modifiable hardware popularized through open-source software and the ‘maker movement’ (Dougherty 2012). For this project, the slit-scan camera was developed using the open-source programme openFrameworks, re-purposing the web cameras from devices for home broadcasting to tools that abstract a scene. Through this process of programming the cameras for use with the Raspberry Pis, which are restricted in their computing capacity to capture and process digital imagery like the live webcam feed, I become familiar with the technological

and material limits of my tools. Thus, my performed gestures are informed by situated knowledge of how the cameras work and their formal parameters, correlating with Simondon’s emphasis on the value of understanding the mechanical properties of technology. Artists become aware of the material capacities of their media through use, which affords the ability to test of their creative and aesthetic potentials. Digital technologies are not an exception.

As I create images of light and shadow using my body as the manipulator, Stalling crafts sounds that respond to and drive my actions. I am caught in the middle of a simulated fire, designed to emulate smouldering coals that are at the brink of being extinguished or re-ignited. I am intrigued by the images created in this scene, using the tools of fibre optics and the two webcams. My initial intention was to remain static and to let my subtle movements slowly coerce the fibre optics in relation to the cameras placed at my feet. However, as I tend to find with live performances that engage with minimal actions over a number of hours, I let go of these intentions as my gestural relations with the tools and materials became manifest. That is, I have a plan when I begin a performance, but, as it progresses, I discover means of engaging with tools and materials that I did not anticipate or I find that my intended actions are not having a desired aesthetic impact, so I alter my actions in response to the situation at hand. In *Ember*, I soon found my planned parameters to be too constraining, and so I decided to pick up the cameras, further integrating the relationship between bodily and digital gestures. As such, there is a quality of indeterminacy to every performance I do, much like Simondon’s treatment of technical objects as having a degree of indeterminacy that enables repurposing, which include the repurposing of the webcams into slit-scan cameras using open-source hardware and software.

Throughout *Ember*, what mattered was not the explicit communication of meaning and ideas, but drawing attention to our relations to one another through and with technology, made evident through diffraction, including the metaphoric diffraction of the slit-scan imagery. These images, created as part of the performance and capturing a fraction of the scene, function as spatial and

temporal documents of actions in process. These images also influence future gestures and sounds as I moved in response to how they were produced. At one point during my interaction with the cameras, I brought them together and held them at my abdomen, where the brightest lights were present as the LED sources for the fibre optics sat at my waist. I realized that the relationship of the cameras to my body was similar to an ultrasound during an antenatal scan, which was notable as I was 16 weeks pregnant at the time of this performance. I was not visibly pregnant at that stage, so I was aware that this reference would not be caught by many witnesses, if at all. Instead, these actions remained enigmatic gestures between the body and technological tools, feeding the mechanism of image production that circulated light back into the space. Emotional sensations, colour and beauty emanate from the gestural connections created through these moments that are diffraction patterns illuminating embodiment within digital experiences through performance.

CONCLUSION

While the intersection of moving image and performance can take advantage of the physical process of diffraction, the artworks discussed above also function as metaphorical diffraction apparatuses that draw attention to the differences and entanglements of human bodies and technology. Jonas and Rist are recognized for their works that draw together technology and performance through moving image, which captures performing bodies and are regularly presented as immersive installations that influence how the bodies of spectators move in space. Both artists do not just use moving image as a means of documenting performance, but they take advantage of the technological affordances of video (initially analogue and later digital) to diffract performed gestures. I build upon this legacy in my own practice as an artist, creating live performances that are diffracted through digital moving image technologies that feed back into the work. Through this process, I investigate how bodies can interrupt images and such interruptions are aesthetic experiences, according to Simondon, which enable a re-framing of the

body's relationship to technology. Emphasis in all these works is placed on the shared materiality of the body and digital technology through performance: an entangled relationship that is made evident through diffraction.

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