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Pseudorandom: generative animation as performance in *Emergent* (2020–2022)

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ABSTRACT

The body is the database of lived experience. *Emergent* was created during COVID-19 from the desire to explore the extended possibilities of digital performance beyond lens-based media. The work includes generative animations and sound compositions using data collected from a consumer fitness tracker worn since the start of the COVID-19 pandemic in 2020. As a portrait of experience through the data body (as both body of data and body producing data), *Emergent* engages with the memories of the flesh, becoming the impetus for aesthetic encounters through digital performance. In this article about the work, Putnam describes how it was produced, provides a detailed overview of the work and its theoretical context, and discusses how it functions as a digital performance between the artist and computer. The result is a work where data visualisation and sonification generates ambiguity, rather than clarity, introducing difference in how biometric sensing devices are used and understood.

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Prelude

In March 2020, I began running again. At that stage, it had been years since I ran regularly. I used to run track and field in high school, but it did not become a lifelong habit. During this first period of lockdown in response to COVID-19, when schools and creches were closed and we were confined to our home, I discovered running was the only time during the day that I was uninterrupted and alone. It became the only time I was able to think. As my feet hit the pavement in a rhythmic pattern and fuelled by endorphins, I let my mind wander, crafting webs of ideas. When I got back home, I would jot down everything I could recall, though like a dream, some thoughts were inevitably lost with my exhaled breaths and sweat. Running also helped my psychological state and became a way to process the ongoing stress of the pandemic through my body.

This period of staying close to home – initially within a 2 km radius in Ireland – got me thinking about movement within this sphere, and how my body responded to such constraints. Circling around the house repeatedly, following my two young daughters,

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I wanted to start counting these steps, with the intention of engaging with these motions as the material for an art work. I tried to make a pedometer using an Adafruit circuit playground (in order to maintain control over my data), though I was unable to find a way to log the data externally and it kept shutting down due to a battery fault. I ended up just purchasing a Fitbit. The model I acquired could also track heart rate. What began as an artistic impetus – a desire to track my steps and biometric data as a means of documenting this experience as a performance – soon came to influence my running. I found myself running further and faster, making sure to hit my step targets. I set an alert for every hour, so if I had not completed 250 steps per hour I would be prompted to do so. For a while, I just marched in place to meet these arbitrary targets. My bodily movements were modified in relation to this technical object; a digital device that tracked and logged my corporeal actions. I also noted its inaccuracies. Sometimes while driving for prolonged periods of time, steps would accumulate. If I received an hourly alert, I found I could swing my arm while behind the steering wheel, as these movements counted as steps since the car's motion combined with my arm's swinging were read as such by the accelerometer.

Once it became clear that working from home would extend into the new academic year, I noticed that my running sessions decreased, as I was no longer able to make time for them due to the demands of online teaching. What had become a significant means of coping with the unknown at this time – my runs became longer and longer as the months progressed and our circles of movement increased – suddenly had to give way to the demands of productivity affiliated with my job as a university lecturer. Sometimes after lecturing online for several hours, I noticed that my Fitbit stated I reached my step goals, despite the fact I remained put in my chair. My gesticulations combined with my swivel chair movements were enough for the accelerometer to calculate the motions. One time when I gave a conference paper virtually, my racing heart rate was tracked as exercise for that day. The Fitbit categorises activity minutes as lightly active, moderately active, very active, and sedentary; categories that are interpreted through heart rate data and movements. My very active minutes became my sedentary minutes as I fed the machine. Becoming machine. Became the machine.

Introduction: Sketching patterns

Emergent was created during COVID-19 from the desire to explore the extended possibilities of digital performance beyond lens-based media. It was developed through a fragmentary process of sketching using p5.js – the JavaScript version of Processing, an open-source software that was created as a sketchbook to teach the fundamentals of programming visually (Processing Foundation n.d.) – with most sketches completed within a day. Once completed, I posted these sketches on my Twitter, Instagram, and Facebook social media accounts as a 'Sketch of the Day.' I also presented them in a blog on my website, describing my influences and process, along with the code sources if sketches involved modification of already existing code (Putnam 2021b). I used what Nick Montfort defines as an exploratory method of programming, where computing becomes a means of inquiry (Montfort 2021). This approach to sketching was necessary due to the challenges of finding time to produce artistic work when working from home and with limited childcare resulting from the confined context of the pandemic and multiple lockdowns.

The title *Emergent* pays reference to this process of production, where focus is placed on creating and collecting small pieces. It is inspired by adrienne maree brown's emergent strategy as an approach to social justice that is a 'strategy for building complex patterns and systems of change through relatively small interactions' (brown 2017, 6). Within the context of my artistic practice, this process is literally applied to the development of the project, as small, computer-generated patterns that are produced daily. Emphasis is placed on the overall accumulation of works over time through sketching, rather than a rapid iteration process commonly found in the tech industry and promoted through processes like design thinking (Brown 2008). The result is a series of generative animations, some of which are based on data from the Fitbit I wore during the pandemic. As a whole *Emergent* explores what it means to create performance during the COVID-19 pandemic and the challenges of bracketing creative practice within this context, where time and space collapsed into a single sphere and processes of artistic production are regularly interrupted through the demands of care work (which in my context include caring for small children and the labour of care affiliated with university lecturing). After presenting a formal overview of the work, I discuss how by treating the body as the database of lived experience, *Emergent* provides a portrait of experience of the COVID-19 pandemic through the data body (as both body of data and body producing data). The project engages with the memories of the flesh, becoming the impetus for aesthetic encounters through digital performance. Through this analysis, I argue that through my use of the Fitbit in this context, I repurpose the device as the instigator of shared relational engagement between human subjects and technical objects as a performative intervention of such tracking devices.

Formal description

The resulting project when exhibited within the gallery context is presented on four windows on a single screen that shows the computer desktop (see Figure 1). *Emergent* has been exhibited as part of the Digital Art in Ireland Exhibition at Sample Studios (Cork, Ireland), curated by Conor McGarrigle (May to June 2022); the Exhibition of

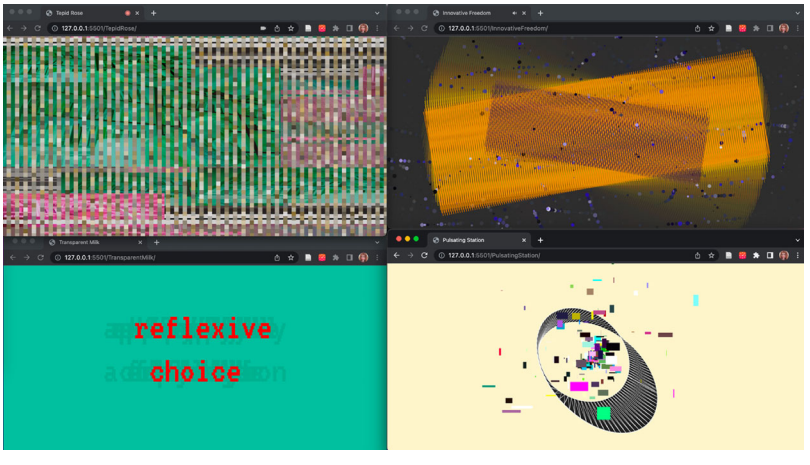

Figure 1. Screen shot of *Emergent*.

Digital Research in the Humanities and Arts Conference at the Stanley Picker Gallery (London, UK), curated by Bill Balaskas (September 2022); and in the solo exhibition *PseudoRandom* at Emerson Contemporary (Boston, MA, USA), curated by Leonie Bradbury (January to March 2023). I selected this mode of presentation to show that p5.js displays visuals using Internet Browsers, as it is written in JavaScript and HTML5. Within each window are a series of selected generative animations from my daily sketches, grouped together using an algorithm that cycles randomly between them. The titles of some of these animations and the three groups of sketches (*Innovative Freedom, Pulsating Station,* and *Tepid Rose)* were produced using an art work title generator I built called *Transparent Milk*, which is presented in the bottom left corner of the screen.

The top right window, *Innovative Freedom*, starts with *Viral Time* – a modified animation of a throbber. Based on code by Winnie Soon and Geoff Cox from their creative coding book *Aesthetic Programming*, the throbber is a recognised animation used to demonstrate a computer's action in process. There is no indication of beginning nor end. Instead the looping image merely shows that some*thing* is happening beneath the interface (Soon and Cox 2021, 74–77). I altered the code so that the spacing between the cycling circles is not regular, but becomes erratic through random placement around the circumference. While the throbber is meant to provide an illusion of order – of function in process – as a means of indicating to the computer user that despite the temporal delay all is okay, I found this communicator of emotion to be inaccurate for COVID-19. The structuring reliance of time took on a different feel during the pandemic; time was glitchy. My altered animation of the throbber is meant to evoke sensations of angst through geometric disorder. Such sensations of angst are compounded through the animations on the window to the bottom right, *Pulsating Station*, which contains a series of five 3D animations. While developed in the 3D space, the resulting animations appear more like twentieth century 2D vector graphics, as their planes are flattened to appear as assembled geometries (see Figure 2). Rotating forms quiver as certain parameters randomly change to provide a sense of trembling angst.

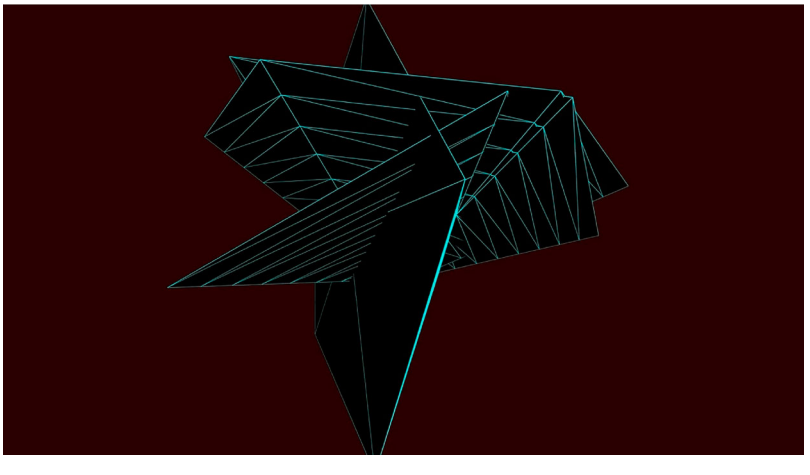

Figure 2. Screenshot of *Oblivious Network* from *Pulsating Station*.

Once *Viral Time* runs for a certain frameCount (the p5.js function for counting frames within a looping sketch, which I set for the computer to randomly select a number between 500 and 2000 frames), *Innovative Freedom* then transitions to a different animation. There are eight animations total within *Innovative Freedom*, five of which are based on biometric data from my Fitbit. The data is from a day or month selected at random from 2020 to early 2021. Three are based on heart rate data (*Brash Phone*, *Glib Drive*, and *Heart Grid*), one is based on activity-level data (*Ferocious Patience*, see Figure 3), and one is based on sleep data (*Android Dream,* see Figure 4). Several of the animations also include generated sound based on the data, creating an accumulating soundscape of oscillating sine and triangle waves. The amplitude and frequencies of the waves are mapped in relation to heartrate or sleep state data (depending on the sketch). However, sound does not cease once an animation transitions, but the tone lingers until the next generative animation with sound begins. The overall soundscape begins with pink noise, though as it generates, the sound gathers and changes not just in relation to the particular data of an animation, but also how the data of other animations impact the growing soundscape. Over time, the soundscape increases in volume and intensity, and if running for prolonged periods, becomes unbearable in certain generative cycles.

There are two more animations in *Innovative Freedom*, with one being a generative animation based on random movements presenting the image of a dynamic tangled knot

Figure 3. *Ferocious Patience* from *Innovative Freedom*.

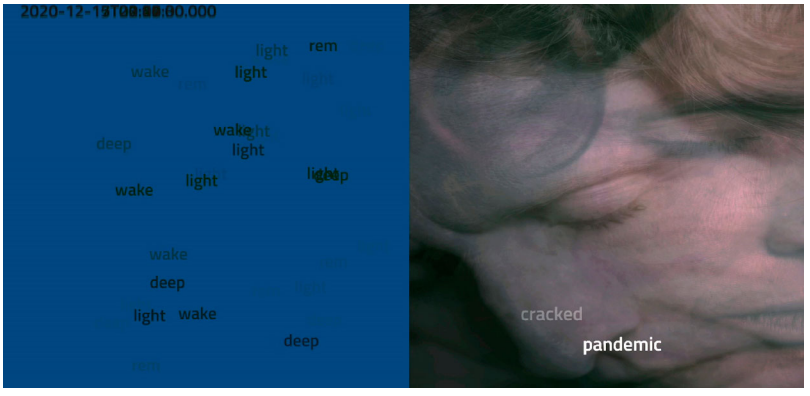

Figure 4. *Android Dream* from *Innovative Freedom*.

tethered to vibrating circles (*Tether*). The other animation not based on biometric data, *Indeterminate System*, contains a sequence of photographs extracted from a video of me playing with my daughter. These are placed in an array and played back in a random sequence, creating an animation of gestures that constantly refreshes but never repeats. Due to the manner in which all of these animations are coded, sometimes functions and visual features of one animation leak into another. For instance, the placement of text in *Android Dream* may shift due to the placing of text in a preceding animation. This leakage may also be visually manifest through the layering of imagery when the background does not reset after an animation completes. This intermingling between the animations is most evident in the building soundscape, as tones do not cease once an animation transitions, but continues to linger in accumulative drones.

The webcam and interactivity

The original animations as daily sketches posted on social media and the blog involved interactive elements, where viewers could move shapes and manipulate colours using a mouse or touchscreen. I wanted to translate the gesture of interaction into the gallery version of *Emergent*, though due to COVID-19, I avoided the physical act of touching a screen or other device. Part of this decision was practical to avoid the spread of the virus, but also a conceptual quality that is evocative of the first two years of the pandemic, when social distancing and stay-at-home orders bolstered reliance on digital technologies to come together while being geographically distant. While these characteristics of connecting over distance is inherent to the Internet and world wide web as networks, up to the start of the pandemic these technologies have not been the *primary* means of interaction in many social and professional contexts. I decided, therefore, to introduce interactivity to *Emergent* through a live webcam feed. Used in video conferencing platforms, including Zoom and Microsoft Teams, the webcam became a vital means of social engagement during the COVID-19 pandemic where our interactions with each other were mediated through the screen. I incorporated several sketches involving the webcam into the animation cycle *Tepid Rose*. In the first animation, simply titled *Fade cam*, the webcam would take an image every second, which then fades into the background. The stilted quality of the sequential imagery, which is too slow to provide

even an impression of stop motion animation, is disjointed and erratic, drawing attention to the inconsistencies between the camera and live interaction. This aesthetic decision was also rooted in a reference to the 1990s cam girls, early web cam operators and life casters who used webcams to upload an image every few minutes to their sites, as that is what technological parameters at the time only afforded (Senft 2008). In *Critical Nightshade* (see figure 5) and *Sedentary Productivity*, the webcam also takes images at fixed intervals, though instead of filling the window, these are laid out in grid format that is evocative of the 'Gallery View' in Zoom as well as the motion studies of nineteenth century photographer Edouard Muybridge. The grid images in *Emergent* fade over time, like a reverse process of photographic development. In *Anxious Functions*, sequential images are also laid out on the screen, though instead of a grid, these are placed randomly around the window, with varying image sizes and rolling white and black lines overlaying the images. There were no instructions for the audience accompanying the animations, though my hope was that when people realised that the camera was a live feed, they would begin to interact, much like someone may do when they see a CCTV display in a window or some of the closed circuit video works of Bruce Nauman, such as *Live-Taped Video Corridor* (1970). The process of performing for the camera and screen becomes a means of discovering how it records and presents images, which are not as an uninterrupted live feed, but as explicit manipulations of the image, introducing gaps and lags to draw attention to the already present mediation of digital technologies. As with the other cycles, there is no clear cut between animations in *Tepid Rose*, as images appear to bleed into each other (see Figure 6).

Leaking bodies

As noted in the prelude, I initially wanted to create a pedometer using an Adafruit Circuit Playground in order to avoid data leakage. Using a mass market device like the Fitbit involves companies having access to and use of data as indicated in the terms of

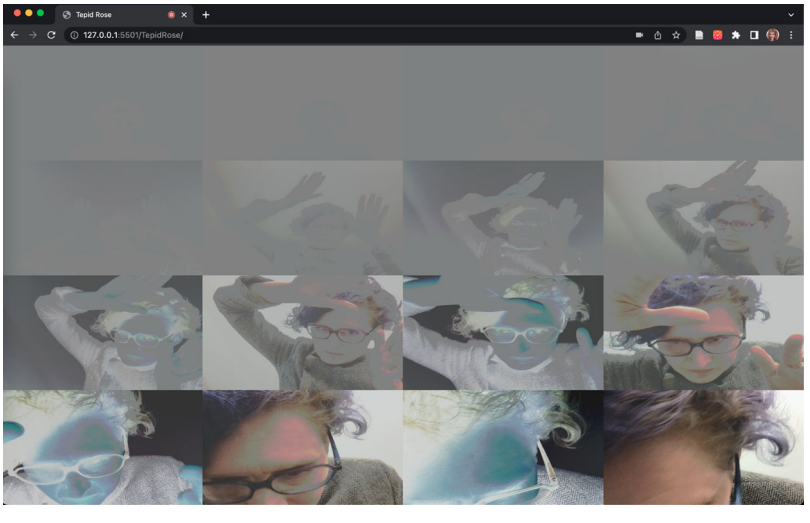

Figure 5. *Critical Nightshade* from *Tepid Rose*.

Figure 6. *Anxious Functions* overlaid by *Ferocious Sparkle* from *Tepid Rose*.

service (Fitbit Legal | Terms of Service 2018). Data collected by the Fitbit includes biometric and activity data as well as GPS locations. The collection of data through devices like the Fitbit contributes to what Shoshana Zuboff refers to as surveillance capitalism, which 'unilaterally claims human experience as free raw material for translation into behavioural data' (Zuboff 2019, 8). While the collection of data is marketed towards improving the experience of the user, its application is not restricted to the individual who produces it, but comprises 'a proprietary behavioural surplus, fed into advanced manufacturing processes known as 'machine intelligence,' and fabricated into prediction products that anticipate what you will do now, soon, and later' (Zuboff 2019, 8). Algorithmic decision-making plays increasingly prominent roles in everything including social interactions, healthcare, education, policing, governance, and military action (Benjamin 2019a, 2019b; Broussard 2018; Eubanks 2018; Ferguson 2017). John Cheney-Lippold notes how 'who we are in the face of algorithmic interpretation is who we are computationally calculated to be' (2017, 5). Increasingly, these computational calculations result from the use of data in the training of machine learning or artificial intelligence, where 'data is the basis for sensemaking in AI, not as classical representations of the world with individual meaning, but as a mass collection of data for machine abstractions and operations' (Crawford 2021, 95). The trust in data, AI, and algorithms is increasingly taking the place of human decision-making, where data collection, as Kate Crawford observes, involves the large-scale unquestioned reaping of data from whatever can be captured. As a result, according to Crawford, there is a 'ruthless pragmatism, with minimal context, caution, or consent-driven data practices while promoting the idea that the mass harvesting of data is necessary and justified for creating systems of profitable computational 'intelligence'' (Crawford 2021, 95). Once this data is collected, it exceeds the influence and context of its production, a disconnect from the instigating subject that in turn influences that subject individually and as a node that is part of networks.

My concerns over the collection and use of data exceed the impact of these practices on me as an individual, but also include data leakage. The phrase data leakage generally

refers to the unauthorised use of data. For instance, when the fitness tracking company Strava released heat maps in 2018, it inadvertently revealed the locations of undisclosed military bases as the tracings of soldiers' biometric data performing their daily rounds created the outlines of these sites (Hsu 2018). Legally when someone agrees to a Terms and Conditions document, they are authorising use of their data for unrelated purposes, including the sharing of data with other devices and third parties, as well as use in the training of machine learning as part of a broader networked ecosystem. However, as Zuboff (2019) notes, generally these agreements tend to be complex and involve extensive documentation that most users don't have the time or the legal comprehension to understand in detail before agreeing. At the same time, companies require agreement to such terms and conditions in order to use devices, leaving little to no choice to opt out of particular stipulations. Moreover, even though a user may technically authorise use of data for unrelated purposes, because this data becomes part of a networked ecology of devices and data systems used in algorithmic decision-making, the resulting use of data can be for purposes that the provider did not specifically authorise.

Despite the ongoing reliance on data as fodder for algorithmic systems that influence human life and our relations to the world, not all data is accurate or even necessary. Artist and writer Hito Steyerl describes how the structural conditions for ubiquitous surveillance, 'leaky and unevenly regulated information architecture,' could also be fake (2018, 3). Without context, it is not possible to discern if data is accurate or not, as in the instances of me tricking my Fitbit (even inadvertently) into counting steps as I move my arm driving or swivel in my office chair delivering online lectures. This 'dirty data' is part of my data set, my data body, that exceeds my control once transmitted digitally, contributing to a larger data set without indication of its accuracy (Steyerl 2018). A movement, even if it is not a step, is constituted as a step once classified as such. Whether or not it is factual, this data is collected, processed, and used on a mass scale to craft a world directed through algorithmic decision-making.

It is for such reasons that I was hesitant to use a Fitbit, but in the end resigned to working with it as it provided a more convenient means of collecting and using my data while also offering an opportunity for performative intervention into these systems. In their analysis of critical appropriation of biosensors, Naccarato and MacCallum describe how artists tend to use 'off-the-shelf biosensors designed for fitness training and self-tracking' (2017, 2). They note how such use of objects is informed by the affordances and constraints of the technologies, which places certain limits and implications on how these devices can be used. Therefore, I use the Fitbit with a qualified critical hesitance, which influenced how I developed *Emergent* and repurposed the technology from being a self-monitoring device to artistic tool. Wendy Chun shifts the conversation around data surveillance, pointing out that leakage is *inherent* to our devices: 'Our devices, our computers, constantly leak. They are wonderfully creepy' (2016, 52). Rather than merely critiquing the mechanisms of surveillance through data, as Zuboff, Cheney-Lippold, and many others do, Chun calls for an engagement with these networks. She emphasises how network analytics are not simply interpretations of data, but performative: 'it puts in place the world that it discovers' (Chun 2018, 62). There is a tension here between control and agency, not just through my mixed feelings of using a biometric device connected to the Internet of Things, but the way in which such devices provide a sense of agency while increasing control through ubiquitous surveillance – a tension

that I will return to in my discussion of the Quantified Self movement below. Moreover, *Emergent* is my response to Chun's question: 'what if we engaged, rather than decried, network performativity?' (2018, 67) as I attempt to cultivate new patterns through the generative capacities of digital art while defamiliarizing use of the fitness tracker.

Pseudorandom: pattern generation

The mass harvesting and analysis of data creates patterns. As Chun points out, these patterns are not just descriptive, but are constitutive. While networks are formed from the data that results from habitual actions, it also influences what actions can be taken next and modifies actions to become more trackable (Zuboff 2019). Chun proposes that we need to not just condemn the performativity of networks and point out the flaws of Big Data, but instead what if we were to engage with these constitutive networks, as 'it is critical that we realise that the gap between prediction and reality is the space for political action and agency' (2018, 68). Such gaps enable the creation of new patterns, which I do in *Emergent* through the use of collected data to create animations that embrace the capacity of computer algorithms to be generative.

In p5.js, there is a random function, which selects a random number within a declared range. However, its name is a bit misleading, as it is not truly random, but is created through a definite mathematical procedure. In computer programming, this is referred to as pseudorandom (Vadhan 2012). As Montfort (2009) elaborates, this randomness is not absolute, but rather a program selects an element from a predetermined distribution. The results, according to Robert Schoenbeck (2013), are an 'approximation of chaos' within a pre-programmed limit. It is between this friction of choice and limitation that patterns emerge. The use of the random function within the animations of *Emergent* enables a degree of uncertainty in how the animations generate. There are two implications for pseudorandom in *Emergent*: one addresses the tension between mediation and agency, challenging the determinist treatment of digital technologies as noted above in the discussion of surveillance capitalism and algorithmic decision-making; the other relates to generative aesthetics, which has long been a significant feature of digital and algorithmic art (Higgins and Kahn 2012). When creating and preparing the algorithms for *Emergent*, pseudorandom functions are incorporated in various ways. For instance, a day or month of biometric data is selected at random from 2020 to early 2021. Animations randomly are selected to generate within each window and are set with a random frame count to determine transitions between animations. The titles of some animations were generated by *Transparent Milk*, which selects an adjective and noun at random from two lists of terms. Randomness is also incorporated into the design of some animations, including colour saturation and brightness, thickness of lines, and the presentation of shapes, resulting in dynamic quivering geometries. Unlike the original presentations of some of these animations where shapes move based on user interaction with a mouse or touchscreen, in the gallery version, shapes randomly move across the screen. Here I incorporated Dan Shiffman's example of the Random Walker, which he uses to introduce his book *The Nature of Code*: 'Imagine you are standing in the middle of a balance beam. Every ten seconds, you flip a coin. Heads, take a step forward. Tails, take a step backward. This is a random walk – a path defined as a series of random steps. […] Yes, this may seem like a particularly unsophisticated algorithm. Nevertheless, random walks can be used to

model phenomena that occur in the real world' (Shiffman 2012, 1–2). Evocative of John Cage's chance operations, this approach affords the computer a degree of agency through pseudorandom processes, treating the computer as a collaborator, rather than simply a means of developing and presenting the work. Digital artist Amelia Winger-Bearskin describes how she collaborates *with* machines, enabling the computer to do things that she does poorly, faster, while she can do things that the machine does poorly, better (Craig 2020). That is, computers and other digital technologies are not just determinist mediators, but rather collaborators in processes of co-creation (Cizek and Uricchio 2022). I also take this position, where coding and generative animations become co-created durational performances. Here I am influenced by philosopher Gilbert Simondon (2016) who is recognised for his philosophy of technology that does not treat technical objects as merely tools, but rather are entangled in processes of becoming with humans and the world that constitute relational milieu. Simondon treats human subjects and technical objects as incomplete entities, and as I have noted elsewhere, these are involved in ongoing processes of becoming that lack 'finality, as human use of technical objects modify the world, which in turn alter human beings and their engagement with technologies' (Putnam 2022, 35). As I note in the prelude of this article, the Fitbit modified my behaviours as a runner, increasing my activity in ways that were at times unusual, such as marching in place in order to reach step counts. In turn, I modified the machine, which included the falsification of data and the repurposing of the Fitbit for generative animations. As noted, these animations involved setting multiple pseudorandom operations, providing the computer a degree of agency in artistic production.

Relational performance of generative animations

It is Simondon's emphasis on the relational engagement between humans and technologies that influence and drive *Emergent*, where both human and computer can be considered performers in an ongoing process of pattern production. Within *Emergent,* digital technologies become the means of presenting the archived performance of my flesh. The biometric data of the Fitbit mingle with the traces of learning to code and develop the work through exploratory methods, with the implementation of generative algorithms that are designed to playback inconsistently.

Performer 0: artist

The data from the Fitbit that was incorporated into animations (heart rate, activity-level minutes, steps, and sleep) present various bodily actions, only some of which I have conscious control over. When I decided to engage with this personal archive of data, I treated it as a record of my actions captured at a period when, as a working mother of two small children, I found it challenging to find dedicated time to perform. I also was interested in how the geographic confines of the COVID-19 pandemic and regular direct interactions with my children impacted my body, along with my own uptake of physical activity at that time that then reduced due to the demands of online teaching, as described in the prelude narrative. I shifted from bracketed moments of performance through staged livestreamed scenarios (see Putnam 2021a) to drawing aesthetic pleasure from mundane actions that may not be considered art, evocative of Allan Kaprow's description

of performance in 'Just Doing.' He states that 'the playground for experimental art is ordinary life' and 'we may say that experimental art is that act or thought whose identity as art must always remain in doubt' (Kaprow 1997, 103). Once such activities are identified as art, which I am aware I have done through the incorporation of this data into *Emergent* and within the current article, it means 'it is time to move on to other possibilities of experimentation' (Kaprow 1997, 103). To call something art means to make it concrete, much like the quantification of the fleeting gesture through the capture of biometric data. The presentation of performance within *Emergent* evokes the works of Tehching Hsieh, who incorporated processes of documentation into some performances. For instance, in his work *Time Clock Piece (One Year Performance 1980–1981)*, Hsieh punched a timeclock every hour on the hour for one year while shooting one frame on 16 mm film. The work is commonly presented as a room filled with prints of the film strips accompanied by the time clock cards. Stretched as a grid across the wall, the documentation provides a visual database of Hsieh's performance. As with the capture of data from the Fitbit, Hsieh's performance is documented with a temporal regularity, where its profound impact comes not from single frames, but the accumulation of data over time.

(Un)quantified self

Quantification and capture can equate data with evidence and truth, as promoted through the Quantified Self movement, which was developed and popularised by Gary Wolf and Kevin Kelly. In a 2009 *Wired Magazine* article, Wolf describes how data can be captured from nearly every facet of life. Increased access to sensors and wearable computing through the growing Internet of Things means that 'numbers are making their way into the smallest crevices of our lives' (Wolf 2009). Wolf immediately dismisses dystopian warnings, but instead argues how the massive collection of personal quantitative data is empowering, perpetuating a libertarian ideology of self-determination.

The 'Quantified Self' creates a self-image of the body that enables the self to be recognised, but also to communicate the self to the self. While Wolf treats such presentations of data as indisputable truths, where the capture of the body through data becomes a means to 'know thyself,' there is a risk here of trusting data without qualification, which may not always be accurate nor does it fully encapsulate embodiment. Richard Shusterman argues how we 'cannot simply rely on further technological instruments to do our somatic monitoring, because we need our own body sensitivity to monitor the performance of those devices whose functioning and fit are always fallible' (2008, 13). Ksenia Fedorova instead defines such bodies of data as a data portrait or a 'data-body-image.' She highlights how the representation of the body through data as an image is distinct from the lived body, while like an image it is related to the body while influencing how that body exists in the world (Fedorova 2020). That is, I am able to gain insight into myself using sensors through the ongoing accumulation of data, in turn altering my behaviours in response to insights gained from this data. This image is not simply dissociated from the body, as 'processes of perception, recognition, and identification happen at the very material and biological levels of the body' (Fedorova 2020, 73). Fedorova emphasises how the body is a meaning-making entity, with new sensing technologies and data processing enabling new ways of seeing the potential of the body as such. Engaging with the

self-image of the body through its data is technologically mediated, but also invites different modes of relating to other bodies and draws attention to the limits and inaccuracies of sensing devices. The challenge is: how can we use technologies as a means of cultivating corporeal connection without dissolving the body into its quantification? Through *Emergent*, I attempt to counter the unquestioned reliance on data as a means of 'knowing thyself.' The aestheticisation of my archived gestures through generative animations present a performed portrait of the pandemic. Here my work resonates with Chris Salter's (2022) challenge to the Quantified Self movement. Instead of data simply making the body more intelligible through numbers as objective facts, data makes 'possible new situations and experiences that resonate with us.' Unlike typical data visualisations that are meant to provide clarity on data, perpetuating the notion that data functions as a sort of objective truth, the data of *Emergent* is presented with little context and is programmed in a manner where the generation of animations enables the computer to perform.

Performer 1: Computer

Including so many random parameters, or more accurately pseudorandom, within the animations and the presentation of the work as a whole was to ensure that each time *Emergent* runs it is a distinctive experience and non-repeatable. The pseudorandomness of generative art connects to its capacities as a live performance: 'generative algorithms in digital art can produce singularity on par with an event: an ephemeral object that is subject to viewing, passing into memory briefly before disappearing' (Schoenbeck 2013, n.p.). I want to add that when *Emergent* runs, nothing is recorded or captured (except for the occasional screen shot), but instead these animations are ephemeral experiences. Moreover, the memory that Schoenbeck mentions relates to both the memories of those witnessing the work, but also the memory of the computer, as resulting files are not stored. These performative qualities of code as constituting the animation also function as a performance between myself and the computer, both as programmer and the source of biometric data. I developed the animations to take advantage of the looping qualities of computer code (in p5.js, the draw function repeats), where iteration as the functioning capacity of computers is also the means of introducing difference. As Winnie Soon and Geoff Cox note: 'in programming, a loop allows the repeated execution of a fragment of source code that continues until a given condition is met, such as true or false. Indeed a loop becomes infinite (or endless) if a condition never becomes false' (Soon and Cox 2021, 73). Reference to Soon and Cox is present in *Emergent* directly through the appropriation and modification of their 'throbber' code from *Aesthetic Programming* in *Viral Time*, the first sketch of *Innovative Freedom*. Starting with *Viral Time* brings awareness of time to the foreground of the work as a whole, treating time as a medium of artistic production. With no particular end point programmed into the cycling animations, *Emergent* potentially plays indefinitely. In other words, there is a definite starting point to the animation, which in terms of the code is the setup function that runs once within a p5,js sketch, but there is no final condition present, meaning that nothing triggers the computer to stop generating. Simply stated, the performance ends when the browser windows are closed and the programme no longer runs.

Viewer engagement

The viewer has a multifaceted role in *Emergent*. For instance, they are able to engage directly with the work through a live webcam feed in the animation cycle *Tepid Rose*. As noted in the formal description of the work, the incorporation of imagery from the webcam is not a direct stream, but the capture of stills at set intervals. The inclusion of the camera is intended to enable the viewer to draw attention to their presence in the work and the mechanics of the technological apparatus. By breaking the continuity of camera to screen, disrupting the flow of seeing, my aim was to highlight the mechanisms of capture. This opens space for the viewer to interact with these mechanisms in order to explore how they function, such as performing for the camera to create images or taking a photo of the work that includes their presence in the screen (both of which were observed actions of audience members).

The engagement of the viewer does not come just through interaction with the webcam, but also through the durational quality of the work. As a generative work, *Emergent* does not have a fixed length, and therefore functions as a durational performance for the computer to process and for the viewer to witness. My presence as the artist is through the traces of my data performing durational performances asynchronously. The viewer experiences duration in tandem with the computer. The animations cycling between the four windows present different juxtapositions of image, sound, and movement as the work generates. There is no narrative arch and transitions between animations are dynamic, meaning that experiencing the work over time or at different times will vary. As such, the work invites an experience of duration from the viewer as witness. The viewer's engagement with the work is dependent on interest – how long they remain with the work before boredom or disinterest takes over – but also tolerance. The angsty geometries and flashing graphics may have their hypnotic moments, but the uncertain rhythms and at times jarring pacing of the animations due to the pseudorandom operations creates asynchronicity. In addition, the sounds, which start as pink noise, become louder and more discordant over time, and as the work plays for hours, reach frequencies that are unpleasant. In other words, as the performance progresses over time, visual and sonic stimulation increases, testing the tolerance of the viewer. Such a strained relationship between human and computer is meant to counter the addictive lull of much of our current technologies, like the endless scroll of social media sites or the dopamine inducing pulses of games like *Candy Crush*. Moreover, *Emergent* does not merely cultivate pleasurable sensory experiences, as Salter (2022) observes in his description of sensing machines being deployed to 'reach new sensory highs' and to 'create heightened states of audiovisual vertigo and bliss' tied to direct data input from users. Instead, *Emergent* involves interconnected relational agencies where the viewer is not lulled into an intoxicating feedback loop with the work. Taking this approach, I move away from technological determinism, but instead craft aesthetic encounters that enable these actions to intermingle, which include the intermingling of differing temporal experiences.

Re-activating the data body

Throughout *Emergent*, I consider biometric data as the document or record of an action where the aesthetitisation of this data into generative animations becomes a means of

re-activating my captured performances. Philip Auslander (2018), who has written extensively on the relationship between performance and technology, argues that both documentation and live events provide experiences of performance, with the 'playback' of documentation, whether photograph, moving image, recorded sound, or written account, can be understood as the performance itself. He explains how this is possible due to the phenomenological experience of documentation as unfolding in a perceptual present. Thus performance documentation encompasses a temporal complexity in relation to live action, as documentation is intended for a future audience: 'When the future audience experiences the performance from its documentation, the audience's experience takes place in the present (which is the future anticipated in the moment of documentation) but also has reference to the past (the moment at which the performance was documented)' (Auslander 2018, 16–17). Focus is placed on the engagement with documentation as a reactivation of the performance. In *Emergent*, I take a slightly different approach where data functions as documentation, captured through the Fitbit and downloaded as JSON files, which present a series of numbers and terms in correlation with particular intervals of date and time, seeming to bear little resemblance to the actions that they record. However, by using this data as input for visual and sonic generative animations I cultivate distinctive works that use the original actions captured through data and are literally re-animated. In addition, Auslander focuses on lens-based media in his analysis. While there are some photographs animated within *Emergent*, these are not the primary means of performance documentation. For instance, the photographs used in the animations *Android Dream* and *Ferocious Patience* were captured as studio-based performance actions, which are then animated by the data (sleep state and activity-level minutes respectively), but are not representative of actions captured in the data. The other sketch that involves lens-based media is *Indeterminate System*, which involves 90 still images pulled from a performance-to-video that I created with my youngest daughter. In this performance, my toddler sat on my lap with both of us looking at the camera. Sitting together, we held hands and I followed the movements of my daughter's arms. As noted earlier, these images are played back randomly, non-sequentially, with varying levels of transparencies so movements overlay like a gestural drawing (see Figure 7). It becomes the animation of performance documentation, though each iteration provides a novel presentation of these actions in a non-repetitive sequence that is not looping, but generative. I include this animation as a direct reference to being an artist-mother. Critic and writer Michaela Cutaya describes the animation as follows:

> The staccato rhythm of the superimposed images emphasise the awkwardness of their being together – no maternal harmony here. Their co-evolution is not determined by a social or genetic causality but by random associations: these two are not autonomous and their co-dependence is far from seamless, yet it opens up a new set of possibilities for them both. (Cutaya 2022, 9–10)

Cutaya may be speaking about the co-dependence between myself and my daughter presented through this specific animation, but her statement also relates to the co-dependence between performance and its documentation as performed in *Emergent* through generative animation.

Figure 7. *Indeterminate System* from *Innovative Freedom*.

Generating ambiguity

The animations of *Emergent* are data driven, creating visual and sonic presentations that cultivate an aesthetic encounter that is affective and relational. By presenting generative animations as co-created performance, I elevate emotion and embodiment (see D'Ignazio and Klein 2020), returning the body to the body of data – a body that is inevitably transformed from the COVID-19 pandemic with an outcome that is yet-to-be-known. Jason Hoelscher describes art as aesthetic information, or information that is in process that 'resists settling into stability relative to a context – information that produces (rather than resolves) indeterminacy, while sustaining (rather than merely introducing) difference' (2021, 7). Aesthetic experience is 'generative experience of information in its peculiar artistic mode: information that not only introduces a difference, but produces and sustains an operation of differencing' (Hoelscher 2021, 9). In other words, artworks introduce ambiguity, but also make ambiguous information generative.

While Hoelscher emphasises how artists and artworks introduce difference into the art world as what comes to be defined as art changes over time (such as the introduction of conceptual art during the 1960s), but artists also introduce difference in broader contexts including our relations with technology, such as consumer biometric sensing devices like the Fitbit. In *Emergent*, I appropriate this device not as a means of coming to know myself better, but use it for the capture of data and creation of generative animations that perform differently with each iteration. The outcome cultivates a relational aesthetic encounter with technology and others that generates and sustains ambiguity. According to Ruha Benjamin, 'Derrick Bell said it like this: "To see things as they really are, you must imagine them for what they might be." We are pattern makers and we must change the content of our existing patterns' (as quoted in Crawford 2021, 227). In *Emergent*, these patterns include the literal generative animations created in the four cycling windows.

Conclusion

Programmed in p5.js, the pseudorandomness of *Emergent's* animations, some of which are based on my biometric data from a Fitbit worn during the pandemic, enable a co-mingling of performances between myself and the computer. Countering the tendency of

metrics and data visualisation to elucidate information, which grounds the Quantified Self movement, I present generative animations that are not meant to clarify, but instead confuse through shifting patterns of anxious geometries. This data tells a story, but it is not a clear narrative. Instead, *Emergent* is my data portrait of the pandemic that I share as a performance that is ephemeral and always becoming. It acts as an intervention into the networked logics of Big Data, taking advantage of these logics to create new patterns.

To note, I no longer wear the Fitbit.

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