Executable Landscapes: Speculative Platforms for Ecological E-Literature

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Paper

It is no revelation to observe that the contemporary digital environment is made possible through a matrix of behemoth infrastructures that traverse the orbital, atmospheric, oceanic, and terrestrial domains. These infrastructures manifest not only in the narrowly technical sense, but encompass the manufacturing chains, regulatory interfaces, and geopolitical contexts that enable (or forestall) the development, deployment, and maintenance of digital systems at a global scale. Underpinning all these aspects are the flows of energy and materials constituting the liveable Earthly ecology. The latter comprises the ultimate baseline 'platform' on which discrete digital platforms, as more commonly expressed, are enabled—but that, being so defined, obscure these far larger structures and processes in which they are embedded. It is here that we can note something of a paradox, in that the global scale of digital infrastructure is now foundational to the charting and modelling of a rapidly deteriorating planetary ecology—as achieved through satellites, drones, remote buoys, weather stations, datalinks, supercomputers—but this comes with a recognition that it is both a product, and a critical facilitator, of economic processes that are driving the very pollution, wastage, and largely unhindered exploitation behind the calamitous signals they detect.

One concept that has been deployed, in various guises, to characterise these endlessly entangled circumstances is that of the 'Anthropocene'. Emerging as an epochal marker of the ineradicable inscriptions of global human activity, definitions of the Anthropocene have rested variously on either the technogenic geologies of nuclear residues, or the exponential geophysical shifts being picked up and characterised by electronic sensors, mathematical models, and computerised simulations. In-turn, the Anthropocene has provided a much broader vehicle for expressing a suitably grand, hubristic fable concerning the planetary conditions brought forth by human activity, and how the supreme agency of the latter, over the former, is bringing about their mutual downfall.

There are, of course, many reductionist problematics encapsulated in this latter account of the Anthropocene, and its presumptions of a unified human culpability with equally distributed consequences. We may note that even the gravely scientific emphasis on nuclear

boundary markers reveals a very particular set of contexts, with their associated political, economic, and material histories, that have instigated and are shaping the dangers of the present moment—as well as defining the forums in which it is mapped and characterised. It is in recognition of these gaping aporia that there have been many dozens of varied 'cenes' generated across the academic world, seeking either to better account for the particular histories, processes, and implications of current ecological perils, or, indeed, to suggest how these might be responded to justly (see Chwałczyk 2020, for instance, who charts no less than 80-90 distinct variations).

I have outlined previously how digital art and electronic literature have responded to some of the implications of the Anthropocene hypothesis, and, indeed, the uncomfortable relationship between the expressive richness of the digital medium and its profound entanglement with environmentally damaging paradigms (see Carter 2020). In reflecting on these aspects, I recall how early digital art sought to demonstrate (with admittedly varying success) different possibilities for computing beyond militarised technoscience, and it appears that the creative and critical challenge today is to rework and reframe digital platforms so they might perform and inspire substantive ecological critique and expression, rather than be relegated only as perpetuators of extractive, accelerationist, technocentric paradigms. Contemporary electronic literature, in its very particular fusions of data, writing, and the algorithmic, affords rich experimental pathways for just this kind of work—as deftly illustrated by the recent outputs of artists such as J.R. Carpenter (2019, 2018, 2016) and Eugenio Tisselli (2020). Raley (2011) similarly observed an 'ecological turn' in emerging digital poetic practices, and Naji (2021) has recently developed an extended critical account of the valuable role played by the 'literary algorithm', as instantiated across varied digital poetic texts, in exploring and critiquing reflexively the foundational structures and processes of digital systems, articulating their implications for both the living and material worlds.

My own creative and critical practices have centred also on exploring not only how digital writing can bring about new ways of framing and understanding its sociotechnical contexts, but also its capacity to chart different speculative futures concerning digital technologies more broadly. That is, to enact what the digital world might resemble concretely if the critical perspectives it is subjected to were adopted as a key aspect of its future design and deployment—of what kinds of activities, artefacts, and infrastructures might emerge in response, with an emphasis on the ecological impacts of digital systems. Given the challenges of the present moment, and the troubling futures ahead, the aspiration here is not to suggest a specific path forward—which would repeat the mistakes inherent to unified accounts of the Anthropocene, with its implication of unified solutions—but to help enact a range of partial, provisional investigations that catalyse an agility of thought and practice: to enact a spectrum of stories and ways of seeing that resist the destructive influence of monologic narratives.

In pursuing this speculative approach towards my research and practice, I have found resonances in the work of various theorists concerning the need for new kinds of media critique, with speculative practice affording a rich a site of enquiry and reflection. I would cite in this vein Parikka's (2015) 'speculative media archaeologies', Agre's 'critical technical practice' (1997), and Jones 'distributed critique' (2020), which forwards a need for modes of investigation that are conducted across the multiplicity of sites, platforms, practices, and ways of perceiving and knowing that constitute the digital world. Jones offers a particularly succinct expression here of the value of artistic approaches and attitudes in making possible this mode of critique-in-practice:

> Critical new media art encapsulates the "foreign entanglements" we encounter through data, updates, visualisations and other affective intensities of the Internet, and turns them into a subject of study. The demands placed on the critique of new media art practices are great, but they secondarily offer to create the communities of knowledge-making that we need, rather than the ones we have inherited from humanist and science traditions. Embracing the problem of art practice as generative puts art at the service of thought in a serious way (6).

Jones goes on to observe that digital artistic practice functions not in response to fully predetermined questions, issues, and even potential answers, with their attendant specialist disciplinary frames, but instead develops these aspects as part of their inherent contingencies and uncertainties. The act of wrestling with the complexities of digital activities, artefacts, and environments through speculative endeavours serves to both denature and reconfigure their predominant modalities, and, from this, to see what they may yet become. Such grand ambitions will never be actualised fully within the space of any one artistic process or its outcomes, but the latter functions instead as a distributed site of investigation that can catalyse others subsequently—the act of critique being always a collaborative process, than a discrete declaration.

It is in a similar spirit that my experimental practice of recent years has brought together diverse, unconventional assemblages of digital systems and scholarly reflection, with this aspect forming the core of their creative expression and critical potential. Over the course of several projects, I have developed often elaborate processes that entangle cameras, satellites, drones, web graphics, esoteric code, academic writing, and the printed codex, seeking to investigate what their complex, contingent exchanges can reveal about the structures, dynamics, and possibilities of the contemporary environment. The hybrid art-texts resulting are thus better understood as being enacted across these different platforms, and so

deriving their creative and critical force as much by encouraging reflection on these varied aspects and processes, as the actual markings they leave behind.

A particular gesture that characterises my recent investigations into digital writing is the use of technologies ostensibly focused on the capturing of images for the production of text. Across several projects, I have deployed imaging sensors and systems as a means through which different kinds of visual data are gathered and analysed about ecologically provoking scenes, before using this to actualise corpus-derived data-structures into various 'human-readable' configurations—which, nevertheless, may or may not adhere to the conventions of 'natural' language. In transforming images to text, my aim is to meditate on the performative multivalency of data itself, and, following this, how algorithmic structures are neither inherently visual nor textual in their operations, but parse a multiplicity of rapidly mutating symbols and values. Image-to-text conversions can depict the enacted (as opposed to inherent) status of all visual data, involving algorithmic routines that act not on colours, textures, and form, but on matrices of values, encoded thresholds, and filter gates.

While this might all suggest a forbidding disconnect between human and machinic ways of seeing and knowing, it also emphasis how visual data, being rendered as such and not a straightforward window onto the world, can be articulated in different ways so as to become 'prehensible', and that the predominant modes, such as colour-coded images and visualisations, are not the only such available. Moreover, textual parsing does not simply substitute one mode of representation for another, as provide a means of invoking contexts and frames of reference and understanding beyond what is suggested ostensibly by the image as a purely visual formation. Given the critical role played by ocular paradigms of sensing and knowing the world in Western technoscience, and its depiction as rendering transparencies through which to capture, rather than in-fact perform, the observable, my aim here is to express the inherent performativity of data-generating architectures, and so establish a space for formulating new stories concerning how the world is known and acted upon by human and machine alike. The ultimate aspiration behind such efforts, however tentative, is to encourage reflection on the other possible ways of knowing and being in the world that can better attend to the challenges of life in the Anthropocene, howsoever understood.

One such project I have discussed at-length in the past, and which I have had the privilege of seeing discussed by others, is *Waveform* (2017—) (see Carter 2018; Naji 2021). This project uses drone footage, machine vision routines, and generative text algorithms to produce output sequences depicting the transformation of incoming ocean waves into enigmatic, poem-like texts. This project raises questions concerning the nature and potentials of machine sensing in characterising the observable world, with an emphasis on the myriad phenomena these systems fail to prehend about life in an imperilled ecology—in terms of its myriad uncertainties, perceptual aporia, and affective tensions—but also enacting,

speculatively, an instance of how it may yet still contribute to creative meditations on these aspects.

Another ongoing project in this vein is *Orbital Reveries* (2020—). This project performs a similar undertaking to *Waveform* in its gathering of terrestrial satellite imagery, compiled from the Landsat Earth Observation programme, and sequencing it through a chain of algorithmic processes to compose generative visual 'textscapes' (see Carter 2021). As with *Waveform*, a machine vision algorithm is used to analyse and define the apparent terrain signatures of a given source image, with the data obtained being then used to mobilise a database of textual sources that variously encompass satellite imaging, geophysical terminology, and ecocritical writing. This project extends the enquiry conducted by *Waveform* into machinic modes of sensing and making sense of the world, engaging in-particular the critical role of multispectral satellite imagery in underpinning a globalised, managerial approach towards the Earth—as an expression of a geopoliticised 'whole Earth' discourse, with its emphasis upon strategies of abstraction, enclosure, and control. In transforming the multispectral, technoscientific imagery generated by the satellite gaze into consciously experimental outcomes, *Orbital Reveries* aims to resist popular conceptions of the ocular-centric transparency, objectivity, and perceptual totality of satellite sensing, which is predicated on the suggestively Cartesian outlooks of its constituent nodes: physically and functionally removed from Earthly disorder, and unreachable by anything other than the commanding interests of state or corporate actors.

I am presently writing at-length about *Orbital Reveries* as part of forthcoming work, and so I would like to dedicate the remaining balance of this paper to outlining a project that is still something of a work-in-progress, but is mature sufficiently as to depict both its key principles and where my practice will stand in the coming future—and so, it is hoped, offer fruitful points of reflection as such. The project in question is entitled *Landform* and, as its name suggests, it follows directly from my work with *Waveform*, in responding to three interrelated enquiries that emerged from conversations the latter has generated at various conferences, presentations, and public events.

The first such enquiry centred on how, in *Waveform*, the drone imagery is treated as a body of variables within a chain of algorithmic processes: a data-structure that cues the behaviour of specific operations, but does not exert any further influence. This instigated the question of whether imaging data might itself function as a means of assembling, and not simply driving, specific compositional routines—to operate algorithmically in its own right, rather than as an array of stored values. Such ideas were inspired partly by Farocki's (2004) notion of the 'operative image', in which visual data rarely exists for human prehension alone, but instead is transformed and manipulated across an array of machinic contexts for the automated fulfilment of specified operational goals. From this perspective, the source

phenomena driving these sensory routines are treated not as exteriorities to be simply recorded, but as structures awaiting execution: to be parsed and reprogrammed into a more orderly, comprehensible, and manipulable structure—an expression, indeed, of the foundational paradigm behind all digital computing and signal processing architectures, and their predominant employments subsequently. Being so deeply embedded, the challenge is to find ways of making visible these aspects that otherwise manifest far beyond the spatial and temporal scales of the human senses.

A second enquiry coming out of *Waveform* concerned what other kinds of textual formation might be enabled through an image-to-text generation process. In *Waveform*, the outputs were formatted to resemble very short poetic statements, and I initially characterised these as such, somewhat playfully. Nonetheless, while I found the image of a drone writing poetry rather appealing—in contrast to the threatening, gravely utilitarian tropes associated with drones in popular discourse—audience reactions have tended to dwell on the final output text itself as the ultimate end of the generative process, rather than it forming but only one aspect. Text resembling traditional modes of prose and poetry certainly encourage such reactions, along with their associated questions about AI routines replacing human agency. This belies the fact that drones and imaging algorithms are machinic, more-than-human formations that parse the world in ways beyond the frames of language—and the same applies to the text generating routines I have sought to connect them to. Therefore, I sought to explore how these operations might be captured better in the character of the generated outcomes, to bear out the structures and processes from which they have emerged, and so facilitate reflection on these aspects.

One last point of creative response, giving shape to the very subject matter of *Landform*, is that *Waveform* engages the most visible manifestation of a more-than-human world undergoing a continuous process of becoming, the coastline, and I wanted subsequently to depict settings, and engage themes, that are more suggestive of the multitude of ways in which ostensibly natural landscapes bear the marks of human activity—a foundational theme of much eco-critical thought around the exact status of the 'natural', especially in an age of the Anthropocene hypothesis.

It is from within these dialogues of thought and practice that the catalyst for *Landform* has emerged. This project takes the form of landscapes photographed from the vantage point of a low-flying camera drone, before having these images parsed through a program that converts its constituent brightness signatures into circuitous, diagrammatic visual algorithms. The instructions encoded within this algorithm are then executed with the aid of a specially developed interpreter routine, composing a generative textual formation that draws from the vocabularies of scholarly texts discussing ecological concerns. This formation does not manifest as a conventional block of text, but is encoded as a JSON ('Javascript Object

Notation') object, which is a simple data structure consisting of labelled attribute tags and their associated values—in this case, keywords followed by arrays of interrelated words. This JSON object is placed subsequently alongside the visual algorithm and its source to constitute a triptych of images that illustrate each stage of the creative process (see Fig. 1).


```
main: {
    δ: {
        engage: [investigate],
    },
    Φ: {
        symbolic: [linguistic,
        logical],
    },
    Ψ: {
        real: [urban, organic,
        architectural, technical],
    },
};
```
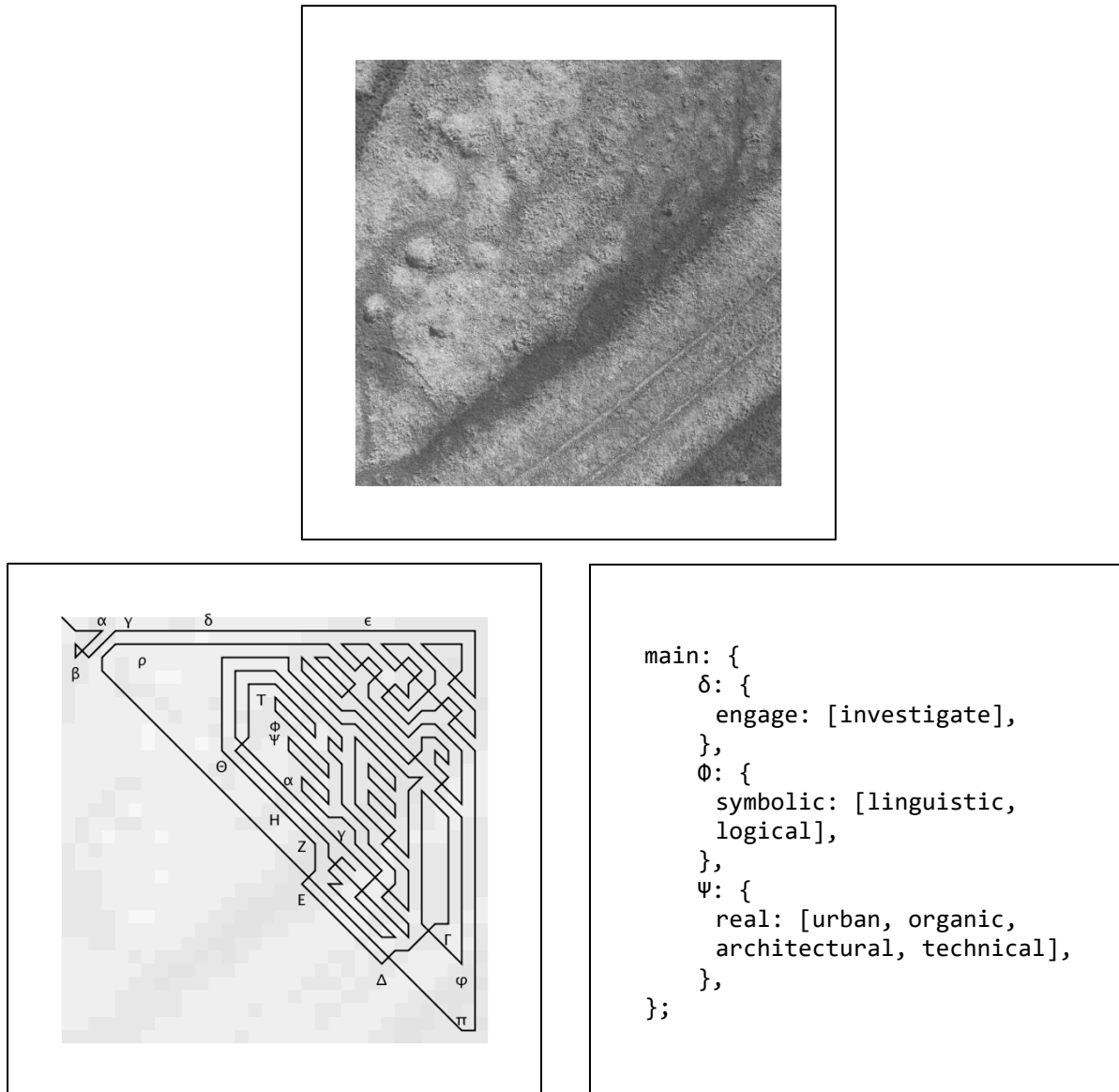
Fig. 1. A depiction of the final outputs. Note that the text in the bottom-right image is a highly abridged excerpt from the far longer sequence generated by the visual algorithm in the bottom-left. The source text for this piece was Parikka (2015).

To unpack more slowly this highly elliptical undertaking (although constraints of space prevent a fully detailed account), it can be noted firstly that in its prototype iteration, *Landform* is sourcing its imagery from a series of drone flights conducted over parts of North Cornwall, in the United Kingdom—encompassing a selection of moorland regions and coastal areas.

This footage was taken considerably before the current COVID19 pandemic and its accompanying travel restrictions, and not, initially, with the intention of it being used as part of an artistic project. Nevertheless, what is captured in the existing footage are sites inscribed by the marks of human activity in various guises—from quarries, to runways, to the ghosts of iron age communities. Despite its official status as an area of 'Outstanding Natural Beauty', with its idyllic implications, there is no area of North Cornwall that does not bear the signs of human settlement, cultivation, and extraction, and this affords an apposite opening domain for capturing the ecological entanglements driving *Landform*. Once the safety concerns of the pandemic abate, it is planned to visit other such areas across the United Kingdom, and so explore their complex status as sites that celebrate the more-than-human 'natural' world while being firmly marked and enclosed by human activity.

The transformation of the gathered landscape imagery into poetry is a necessarily complex, multistage process. Initially, the digital images are processed by a system that treats them only as an array of grayscale brightness signatures. These signatures cue a plotter algorithm that draws across the surface of this grayscale array, with the differences in brightness between individual and contiguous blocks of pixels determining its directional vectors—the only constraint being that it is not permitted to overlap previously inscribed areas. The coordinates that make up this plotter trail are then processed by another routine that treats these vectors as a series of encoded instructions—effectively, what might be characterised as an elementary 'esoteric' visual programming language. These instructions are then used to navigate and actualise a multi-dimensional data-structure generated by a separate routine that charts the detected relations between different grammatical units in a source corpus. The instructions of the visual algorithm effectively specify a series of lookup coordinates, determining which sequences of interrelated words are pulled out of this data structure for composing the final textual formation. The specific use of the JSON format, as a means of rendering this text, allows its word sequences to be grouped and displayed in a manner that adheres closely to their encoded representations in the system, and thus, their status as a data objects generated by machinic modes of textual parsing.

The source texts themselves are currently a mixture of academic works exploring ecological writing, sensory apparatus, or media materialities, such as Barad (2003), Edwards (2020), Engelmann (2021) and Parikka (2015). While none of these sources could be discerned or reconstructed by examining the final JSON object into which they are arrayed (relying instead on citations in their accompanying artist's statements) the latter nonetheless articulates a partial map of their lexical relations. The creative and critical gesture here is to concretely entangle these texts within the very systems, sensors, and digital apparatus they explore and critique, and thus, in-turn, highlight the discourses surrounding these systems concerning how they parse and render the world as perceivable and knowable.

Taken as a whole, *Landform* is an effort at developing a hybrid, visual-textual work that advances the kinds of speculative digital platforms I have outlined above, wherein the entanglements between human and more-than-human domains (whether environmental or machinic) are staged, refigured, and depicted as being materially and conceptually inextricable. What distinguishes *Landform* in-particular from my previous work with *Waveform* and *Orbital Reveries* is its deployment of sensory information not simply as a motive source of variation, but as constituting a structured schema that translates into specific compositional instructions. The landscape images are treated as executable environments in a very concrete sense, as being already-enfolded within the functioning of the machinic routines through which it is prehended, as opposed to being only visual renderings of camera data for human eyes, or topographies for analytical enclosure by machine vision. The result is the multiple interlinking of environments, sensors, software, and scholarly texts to generate a highly distributed, contingent assembly of energies and materials that renders the world in ways significantly removed from the utilitarian, regimenting imperatives associated with extent sensory regimes of automated data gathering and processing, or, indeed, the frequently delimited modes of expression that typify academic knowledge-making. These dynamics have a hand in the perils of the present moment, and their refiguration, I venture, shall become ever more necessary as the worldly formations on which their stability is predicated start to unravel and transform in increasingly unpredictable ways.

As highlighted throughout this discussion, the creative and critical potential of speculative digital art is not necessarily to be found in its articulation of explicit messages concerning the current state and future implications of the contemporary environment, as to offer suggestive conjunctions of technology, discourse, and form that denaturalise and reformulate existing structures and processes. The hazards here, of course, are its reliance on an onlooking audience being willing to think across these elements, and to understand the creative and critical gesture at work as much in terms of its enabling processes as the outcomes generated—and, for the latter, a disposition to view them outside the genre categories within which they might be associated or confined. However, on this point, the seemingly 'alien' character of such work presents its own interpretative challenges, and the intended qualities of the artworks outlined in this paper do not necessarily become apparent when their outputs are viewed in isolation. Nevertheless, I would forward that the potential for such interpretative aporia is not necessarily a failing, for the goal of speculative work, as mentioned previously, is not the production of delimited narratives and defined points reflection, but to catalyse further creative vectors of intrigue and enquiry. To borrow the evocative phrase of author Michael Joyce (1988), when characterising the hypertextual beginnings of electronic literature, these speculative platforms, I venture, represent 'versions of what they are becoming: a structure for what does not yet exist', and so are a means

towards not the realisation of definitive answers, but for instigating and developing ongoing conversations around how ecology, technology, and knowledge-making facilitate specific modes of being in the world, while, by the same turn, affording the potential for other such ways of living and understanding. It is these conversations that are the foundation of my artistic and academic practice thus far, and it is a privilege to explore where they may yet lead.

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