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Renegade X: Poetic Contingencies in Computational Art

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Poetic contingencies play vital and sometimes decisive roles in artmaking, whether as intentionally introduced conceptual, technical, or aesthetic features or as mistakes whose unforeseen consequences are usually undesired by artists but always epistemically useful for their audience. In this paper, I explore how uncertainty, accident, and imperfection shape and challenge the creative processes, cultural identities, and impacts of contemporary computational art. The introduction outlines the necessities and pitfalls of including randomness, error, generativity, chance, and surprise in computational art. The central discussion interrelates these with other poetic eventualities in six sets of experimental, tactical, and mainstream practices that leverage unpredictability and imperfection on higher ideational levels or take interesting expressive twists due to oversight, blunder, misjudgement, or miscalculation. By placing the computational art's productive, cognitive, and ethical issues firmly within the context of human nature and existence, they indicate ambiguities in a broader milieu of digital culture, economy, and society. The concluding section traces several aspects in which the intrinsic heuristics of artmaking provides a valuable perspective for studying computational art's strengths and deficiencies and for articulating the critical discussion of art and creativity in general.

Keywords: Accident, Computational Art, Contingency, Imperfection, Surprise, Uncertainty, Unpredictability.

1. Introduction

Computational art includes diverse experimental, exploratory, and speculative practices that have emerged from, and in response to, the development and increasing social influence of digital information and computation technologies (Hope and Ryan 2014). Since its outset in the early 1960s, computational art has gradually evolved through several periods marked by different expressive approaches and varying modes of social engagement (Gere 2008; Taylor 2014). The expansion of digital infrastructures and the affordability of powerful computational tools in the early 2000s accelerated the poetic diversification of the field, which gained further momentum and cultural recognition since the second half of the 2010s with the successes of subsymbolic machine learning (ML) techniques in artificial intelligence (AI) and the art market's integration with blockchain technologies and crypto economy (Cetinić and She 2022; Quaranta 2022). Successful practices are often driven by a creative ethos that prioritizes concept and experimentation over perceptive consumption or material possession. They leverage diverse features and contexts of computation and digital technologies to put dynamics, causality, relationality, and cognition into the centre of artistic experience. Their unique transformative potentials stem from interrelated factors such as performativity, intersubjectivity, instability, and generativity (Carvalhais 2022). Unfolding in a close relationship with computer science, digital technologies, and the IT industry, computational art's poetics and implications are also affected by the cognitive, sociopolitical, and ethical problems in these domains.

1.1. Randomness and Error

Although randomness and error figure in any combination of ideational, topical, narrative, methodological/technical, formal, and presentational aspects of every creative act, they are among the most recognizable signatures of computational art, to such extent that the field was once labelled "random art" (Taylor 2014, 24). Pseudorandom-generated numbers and the aesthetic tensions they can produce had been integral in the work of most early computer artists, starting with Michael A. Noll's investigation of the visual effects of programmed randomness in the line plotter drawing *Gaussian-Quadratic* (1962-1963) and his randomness-related troubles trying to register it with the Copyright Office at the Library of Congress (Taylor 2014, 33–34). Together with automatism, mathematical visualization, and coded aesthetics, pseudo-randomness had been central to the computer art pioneers' production repertoire both as a practical tool to introduce chance processes for unexpected outcomes and as a metaphor for the creative spontaneity (Taylor 2014, 82, 90–94). Although reliance on randomness had also related to artists' exploration of formal order and disorder in programmed or "generative" aesthetics and later system aesthetics (Taylor 2014, 85-86, 88-90, 139),

their striving for chance and surprise had been primarily driven by the inherent predictability, contextual detachment, and heteronomy of computer systems. The deterministic essence of computers is difficult to surpass and pseudo-randomness soon proved as an ineffective source of spontaneity leading to formal saturation and prompting the search for more suitable methods, which became recurrent markers of computational art's history.

The central issue of unpredictability in computational art is that the meaningful answers to its expressive challenges lay beyond the apparent open-endedness and malleability of algorithmic solutions and computational techniques. The exploitation of randomness has repeatedly drawn well-deserved criticism (Nake 1971; Arns 2004; Watz 2010; Loi et al. 2020) but the emulation of unpredictability through ever more sophisticated random-based computational techniques is ubiquitous and largely outnumbers practices that use uncertainty to explore the issues of computer technologies and their application. Equally widespread but mostly praised glitch aesthetics in computational art has recently also come under question for its formal-centric inability to critically engage the audience (Betancourt 2014, 2017). Similarly, the AI artists' use of computational artifacts[1] to invoke a "natural" look and feel has been criticized as conceptually misleading and inadequate to address the increasingly refined processes of recuperation in contemporary info-capitalism (Żylińska 2020; Kemper 2022). In this context, it is instructive to compare computational art's approaches to glitch and artifacts with the work of Gerhard Richter who became one of the landmark artists at the turn of the 20th century because he managed to systematically and elegantly transpose into painting the burden of guilt and angst he inherited from post-Second World War artists such as Joseph Beuys. In numerous bodies of works, Richter exalted painterly glitches — ranging from destructive failures to virtuously rendered formal incongruities — into powerful embodiments of polyvalent existential crises that comprise personal traumas, the frustrating search for authentic expression in a homogenizing heterogeneity of contemporary art, the identity crisis of painting as a dethroned pinnacle of western visual culture, and the evasiveness of meaning in the political predicaments of our time (Storr 2002).[2]

1. Although "artifact" is a US and "artefact" a UK spelling variant of the same noun with generally interchangeable meanings, I use "artifact" for a noticeable anomaly introduced by data processing, and "artefact" for a man-made entity, such as an artwork or a tool, following the definitions from Dictionary.com (2023).

2. See, for example, *Aunt Marianne* (1965), *Eight Student Nurses* (1966), *October 18, 1977* series (1988), *Table* (1062), *Untitled [Line]* (1968), *Grey Streaks* (1968), *Un-painting [Grey]* (1972), and several series of *Abstract Paintings* (since 1960) (Richter 2023).

1.2. Generativity, Chance, and Surprise

Besides randomness and glitch, computational art's repertoire for exploring unpredictability and imperfection includes generative methodologies. They are based on consciously and intentionally interfacing the predefined systems with different unpredictability factors in preparing, producing, or presenting the artwork, and have a rich transdisciplinary history (Galanter 2003, 2016). Like all other human endeavours, artworks always emerge from an interplay between control and accident, so in that sense artmaking is generative by default. However, while most artists occasionally cherish uncertainty, they seldom acknowledge or reveal — and much less praise — the contingencies as prime agents of their creative processes. Generative methodologies are a notable exception, and a challenge, to the traditional appeal of an artwork that projects confidence and control. They raise the awareness that it is impossible to absolutely control and determine any creative process, its outcomes, perception, reception, interpretation, and further life, which are all constantly actualized and modified through interactions with the world.

Raising such awareness is usually not the artists' principal motivation (Dorin et al. 2012) although it has a long and diverse legacy tracing back to Marcel Duchamp's transposition of artmaking from the reconfiguration of matter into a cognitive process of relational creativity and discovery (Hopkins 2000, 37-64). Duchamp eclectically fused Pyrrhon of Elis' ethics of indifference with the theories of non-Euclidean geometry and nascent nonlinear dynamic systems to establish an approach that transcends the traditional artist-object-spectator hierarchy towards a largely indeterministic meaning construction centred on the spectator's active participation (McEvilley 1988; Molderings 2010). Duchamp's ideas have had a substantial influence on experimental art's accentual shift from formal representation to conceptual exploration that equally favours natural, artificial, physical, and imagined elements (Rosen 2022). Successful generative methodologies adopt this "flat ontology" to facilitate dynamic, curiosity-driven, and cognitively charged events whose dematerialized concepts require actualization by the audience (Grba 2015a).

Generative methodologies frequently entail bricolage — a creative affinity for working with tools, materials, and artefacts available from the immediate surroundings. Relating back to the necessity-driven pragmatism of Italian neorealist filmmakers in the 1940s and 1950s, bricolage became popular with the arte povera's critique of the commodification of art during the 1960s (Giovacchini and Sklar 2013). Since then, it has been adopted by various disciplines including philosophy, anthropology, sociology, business, literature, and architecture, and has become almost transparent in a wide range of artistic strategies. Discussing the concept of bricolage in *The Savage*

Mind (1962), Claude Lévi Strauss noted that a bricoleur assembles and modifies her handy means (operators) without subjecting them to a predefined objective, but the objective gets shaped by the interactions between operators through analogy-making and discovery. This makes bricolage integral to computational art practices that constantly push the envelope of production and presentation through playful but not necessarily preordained experimentation with existing ideas, tools, and cultural resources (Grba 2020).

However, along with overreliance on randomness and error, generative approaches in computational art are riddled with the fetishization of chance or exploitation of immediacy and indeterminacy. This is an essential but rather delicate issue and some of its criticisms conflate generativity as a methodological principle with value judgments, intentions, and ideologies implicit in the content of realized artworks (Soderman and Howe 2019; Galanter 2019, 5-6).

2. Uncertain Realities

Beyond the inherent hazards of using randomness, error, generativity, and chance, the expressive slipups in computational art happen because of audaciousness or calculated ambitions that drive artists to disregard the extent and open-endedness of external critical interpretation and intervention. For the audience, their epistemic value is often on par with the uncertainties that artists introduce intentionally and configure cogently as exploratory or experiential features. In the following discussion, I interrelate examples of both types of these uncertain realities in six sets of AI art and crypto art practices whose creative contexts, entanglements, and expressive flavours are shared across the disciplinary areas and historical range of computational art.[3] Their poetic contingencies indicate the ambiguities in a broader milieu of contemporary art, culture, economy, and society, which allows me to use the synonyms for imperfection and uncertainty, such as "accident", "incident", or "surprise", both literally and ironically.

2.1. Machinic Serendipity

In 1968, British artist Harold Cohen made a risky move by leaving a successful painting career to relocate to California and concentrate on using AI to study human visual cognition in drawing and painting. In the early 1970s, he initiated his lifelong project around the development of a robotic system called AARON (1971-2016) tasked to draw and paint "autonomously" and "embody creative behaviour and the conjuring of meaning" in a machine. AARON generated

3. All works discussed in the main text are well documented and included in the References, so I compacted their descriptions to the topically most pertinent aspects. The details of additional exemplars in the footnotes can be found online by querying the artist name and work title.

images through the interaction of symbolically programmed cognitive primitives and rendered them on paper or canvas via different hardware interfaces (McCorduck 2004, 517-518; Taylor 2014, 126-134). This shift of interest and production drastically reduced Cohen's visibility in the mainstream artworld but awarded him a unique place in the scientific study of computational creativity and made him the most prominent early practitioner of AI art despite the fairly unimpressive aesthetics of AARON's output.[4] Whether sincerely or for promotional purposes, Cohen kept an ambiguous relationship with the machinic creative agency and occasionally flirted with mystifying rhetoric about AARON's "surprises" and "creative serendipity" (Cohen 1995; Garcia 2016), which converged with his pioneering role into a strong tributary to the legacy of anthropomorphism in computational art.

The emotional charge of some contemporary AI artists' claims that "there is something deeply thrilling about observing a machine learn, starting from scratch and iteratively discovering something about its world" (Audry 2021, 85) indicates a strange fascination with complex statistical computation within strictly defined expressive spaces and signals an inclination to elevate constrained modes of functional autonomy into meaningful cognitive processes. Rather than fundamentally approaching their AI applications as tools, artists frequently represent them as "autonomous creators", "creative collaborators", "partners", or "companions" (Audry 2021, 27-28, 241-243). This tendency is banalized by artists such as Pindar Van Arman (2016), Shantell Martin and Sarah Schwettmann (Schwettmann 2017), or Joane Hastie (2021), whose practices symbiose the happy-go-lucky joy in technocentric creativity with dilettante negligence toward the conceptual and aesthetic evolution of visual and media arts since the late 19th century (Arnason and Mansfield 2012; Hopkins 2000; Hansen 2004). The proneness to delegate creative agency to ML architectures recurs with each increase in their precision or scope; its latest instance manifests in discussions about the prompt-based proliferation of images, videos, animations, and 3D objects with modern Text-to-Image generative systems such as DALL-E 2, Stable Diffusion, MidJourney, Disco Diffusion, and Pytti (McCormack et al. 2023).

2.2. Aesthetization of Artifacts

Superficial aesthetics and hasty solutions for concept-to-form relationships similarly jeopardize the poetically more ambitious experimental approaches. Leaning on the "subversive authority" of error established in glitch art (Betancourt 2017), computational artists

4. Although Cohen had success in the 1980s with exhibitions and printed media coverage of AARON-produced works, the robot attracted public attention primarily as a technical curiosity and Cohen's research into the nature of creativity drew more praise from computer scientists than from the arts community (Taylor 2014, 131-132; McCorduck 2004, 491-492).

tend to invest much trust in the anomalies and output artifacts of artificial neural network architectures, often without properly assessing their expressive propriety or necessity. Apparent formal roughness is expected to add an "improvisational aura" to the works that may be conceptually simplistic, thematically unimpressive, or otherwise unengaging regardless of the technical skill behind their production.

A prominent case in point is the wide use of generative adversarial networks (GANs) that have become popular in AI art due to their versatility and hackability but tend to render visuals with a widely recognizable formal signature. The limited autonomy to choose the training datasets or statistical models that represent the latent space, the inability to explicitly diverge from the training data in interesting ways, and the constrains of fitting the target data distribution are some of the major factors that make GANs primarily the tools for processual mimicry rather than intelligent creative engines (Cetinić and She 2022, 9). The formal characteristics of their output are shaped by the nature of the training material, the evaluation functions, and the inherent qualities of the underlying neural networks, particularly the tendency to emphasize the details deemed more important. GAN visuals are more or less regularly assembled or morphed collages of patterns extracted from the source imagery, with blurred areas, uniform (statistically averaged) texture or colour zones, and regional imbalances in detail and sharpness (Audry 2021, 163-166).

The stylistic commonality and glitchiness of GAN outputs are evident in the works such as Elle O'Brien's *Generative Adversarial Network Self-Portrait* (2019) generated by a GAN trained on the artist's selfies, Jukka Hautamäki's *New Parliament* (2019), and *Restituo I* and *II* (2021) portrait series generated by GANs trained respectively on the official photos of Finnish Parliament members, selfies, and synthetic faces, in Kishi Yuma's *The Persistence of Existence* (2020) where glitches function as pure decoration, and many others. Striving to escape aesthetic homogeneity, Mario Klingemann devised a technique he called "neural glitch" by randomly disconnecting GANs' neurons, adding new connections, injecting noise into some of their weights, or interchanging or deleting them. In his *Neural Glitch* series (2018), the tautological reliance on randomness and noise results in unspecified but vaguely coherent visual modulations that remain identifiable as GAN-generated. These confluences led to an umbrella name GANism, which was introduced in 2017 with a positive connotation[5] but quickly acquired a pejorative tone (Mira 2019).

5. The name was originally proposed by the Google AI engineer François Chollet (2017), creator of the Open Source Neural Network library called Keras.

The underlying limitations of GANs and the proliferation of decorative glitch also motivate artists to optimize or rewrite the existing models and frameworks in projects that meaningfully contextualize the latent space.[6] They address the epistemological boundaries of DL networks by navigating and sampling the latent space data as a realm between "reality" and "imagination", replete with suggestions that emerge from a complex interplay between the various levels of statistical abstraction and determination. In these projects, the representation of sampled latent space data is collapsed into one, two, or three dimensions and artifacts are not only technically and formally inevitable but are conceptually essential. For instance, Ben Bogart's installation series *Watching and Dreaming* (since 2014) is an attempt at understanding the algorithmic depictions of popular cinema based on visual and sonic analyses (Bogart 2019). Various film classics are interpreted and represented frame by frame through a large number of percepts which consist of numerous image segments grouped by colour and shape similarity, and serve as a visual "vocabulary" for the system to recognize, and eventually predict, the structure of the processed films in real-time. Hector Rodriguez's *Errant: The Kinetic Propensity of Images* (2019) addresses cinema through a comparable methodological framework. It uses unsupervised ML methods to analyse, extract, and visualize filmic motion based on the shots' optical flow kinetic patterns. In both projects, the analytic process destroys the original (recognizable) composition but preserves underlying statistical properties. Nevertheless, their visual abstraction may be undeservedly perceived as glitchy decoration despite its poetic necessity.

Conversely, in *Computers Watching Movies* (2013), which also intersects ML with cinema, Ben Grosser combined the informative open-endedness of abstract forms with cumulative cultural experience to engage visitors in a game of imaginative guessing. The work consists of six temporal sketches produced by the computer vision (CV) analysis of popular film sequences.[7] The points and vectors of the CV program's "focal interest" (image locations assigned with higher weights) are animated as simple dots and lines on a blank background (the processed film footage is not visible) and synchronized with the original film sound. This intelligent arrangement of minimalistic visuals with sonic guidance draws viewers into a series of playful comparisons between their culturally developed ways of seeing and interpreting and the "attention" logic of CV software which has no historical, narrative, or emotional patterns.

6. The latent space is a multi-dimensional vector dataspace which contains a distributed representation of the "learned" data in the inner (hidden) layers of a deep neural network (Cetinić and She 2022, 9).

7. *2001: A Space Odyssey* (1968, directed by Stanley Kubrick); *American Beauty* (1999, directed by Sam Mendes); *Inception* (2010, directed by Christopher Nolan); *The Matrix* (1999, directed by the Wachowskis); *Taxi Driver* (1976, directed by Martin Scorsese); and *Annie Hall* (1977, directed by Woody Allen).

2.3. Tainted Perfection

On the opposite side of this expressive spectrum, widely popular large-scale AI art installations usually handle the latent space with technical perfection and impressive production values that sometimes insinuate other poetic deficiencies by trying to conceal them. Examples include Marco Brambilla's *Nude Descending a Staircase No. 3* (2019), CDV Lab's *Portraits of No One* (2020), projects by the Metacreation Lab (2020), Refik Anadol studio (2022), and Ouchhh studio (2021). Along with other hyper-aestheticized AI artworks, they willingly or unwillingly contribute to platform aesthetics — a mildly-amusing algorithmic generation of visual, sonic, spatial, and kinetic variations, which teases the visitors with the promise of novelty and insight but effectively entrances them into cultural conformity and political deference. Dependent on the latest research and elaborately team-created with significant budgets or commissions, spectacular AI art primarily celebrates the novelty of AI technologies, fast processing power, efficient coding, and the sheer volume of data (Żylińska 2020, 72-73, 75-85, 132-133). Its often-dubious underlying motivations are "legitimized" by sophisticated techniques, formal oversaturation, and flamboyant exhibition, but often inadvertently hinted upon by anthropomorphic premises and metaphors such as "transcoding the processes of how buildings think or how AI systems dream or hallucinate" (Anadol 2021).[8]

Despite the formal abundance and occasionally copious explanatory data — which usually do the opposite of demystifying the production process — these spectacles are virtually devoid of critical views on mass surveillance, labour exploitation, environmental damage, and other problematic aspects of the big data capture and processing technologies they rely upon (Grba 2022a, 11-12). For comparison, we can take some of the monumental art practices throughout the 1980s, such as Krzysztof Wodiczko's projections (2021), Barbara Kruger's immersive setups (2021), or Anselm Kiefer's heavy confrontational installations (Gagosian 2021). They employed grand scale, formal saturation, and overidentification to critically appropriate and reflect the inherent use of overwhelming presentational strategies by power structures, gender-biased advertising, and totalitarian regimes. While the tactical values of these practices had been largely attenuated through cultural assimilation and recuperation, they redefined the landscape of critical art with lasting historical relevance.

8. This high-profile/high-visibility approach was ushered with corporate enterprises such as The Next Rembrandt (2016), collaboratively produced by ING bank, Microsoft, Technical University in Delft, and Mauritshuis art collection. They used DL for a multi-feature analysis of Rembrandt's paintings to render and 3D print a "most representative" painting of his style. Claiming that it "brought the great master back to life" (Anonymous 2016), the project's promo language exemplifies the patronizingly anthropomorphic rhetoric of the big business AI.

2.4. Calculated Spontaneity

In representing applied AI technologies as a pantheon of powerful but friendly anthropomorphic deities, the corporate PR service of spectacular AI art is aided by some performance artists who enjoy the sponsorship of big tech companies. They tend to imply notions of machinic creativity and spontaneity by introducing imperfection and indeterminacy in interaction with robots to exploit the evolved human capacity for, and bias toward, detecting agency in midsized objects moving at medium speeds (Levin 2022). Many well-known projects in this domain either promote a robotically-enhanced consumerist lifestyle or muse about the existentially intense but politically or ethically vague notions of human-AI symbiosis. They are also sleekly sanitized and anesthetized mutations of earlier avant-garde practices.

For instance, Huang Yi's choreography *HUANG YI & KUKA* (since 2015) (Yi 2021) spectacularizes the metaphors of graceful human-machine interaction and mediates them safely to the restful spectators, unlike the referential Stelarc's performances such as *Ping Body* (1996) (Dixon 2020), which have emphasized the existential angst and shared participatory responsibilities between the artist, technology, and the audience since 1976. Similarly, Nigel John Stanford's musical performance *Automatica: Robots vs. Music* (2017), can be viewed as an encore of Einstürzende Neubauten's ground-breaking concerts with industrial machinery in the 1980s toned down and polished up for tech-savvy cultural amnesiacs (Grba 2022a, 5).

Visceral homo-robotic interactions such as Marco Donnarumma and Margherita Pevere's *Eingeweide* or Donnarumma's *Alia: Zû tài* (both 2018) (Donnarumma 2023) exemplify a seemingly opposed expressive approach. They target an audience with a more pronounced existentialist taste by rehashing in the context of AI the grotesque, cruel, or campy cyborg performances from the 1990s and early 2000s by artists such as Marcel-li Antunez Roca, Guillermo Gómez-Peña, or Roberto Sifuentes, which were themselves the histrionic amplifications of Stelarc's work cross-bred with brutal homo-robotic wars of the Survival Research Labs and earlier forms of experimental theatre and performance art (Dixon 2007).

Regardless of the poetic registers, aesthetics, and intentions of these acts, their association of AI technologies with the qualities of spontaneity, uncertainty, and imperfection — which are inherent to interactive artistic forms such as dance or music — contributes to the societal influence of the AI industry. Production values, contemporary connotations, and cultural momentum in combination with our innate anthropocentrism, myopic retrospection, and susceptibility to spectacles, help them evade unfavourable comparisons with their

precursors. But the propensity for expressive zombification is not exclusive to performance AI art.

2.5. Accidental Reverberations

Conceptual parallels, thematic repetitions, methodological similarities, and presentational alikeness manifest in all areas of computational art. That is not surprising since artmaking inevitably entails some degree of obvious or implied creative processing of artistic references or cultural artefacts. It has been sanctioned in different ways throughout the 20th century art, from Cubism and Dada, through Pop-Art, Fluxus, and Conceptual Art, to Postmodernism in which it became a method for undermining the concepts of authenticity and originality (Haber n.d.). Widely accepted and most recognizable as part of remix culture (Navas et al. 2015), artefactual creativity permeates all contemporary art disciplines and has played an important role in exploratory applications of computation for transforming existing data, ideas, relations, and cultural phenomena (Grba 2020).

However, artefactual creativity involves a deceptively smooth continuum of procedures ranging from interpretation, free copy, reprise, remake, allusion, citation, dedication, derivation and détournement, through mashup, remix, pastiche, reference, reminiscence, homage and parody, to imitation, plagiarism and forgery (Boon 2013; Grba 2015b). The expressive values of this procedural realm unfold in a grey zone of cultural inertia, dispersed knowledge, subtle influences, fuzzy ethical notions, and slippery moral categories, which fundamentally relativize the concept of (and to some degree the requirement for) authenticity or originality. Furthermore, the expressive undercurrents, tendencies, and trends are closely interwoven with the fabrics of artists' professional lives and can be difficult to identify. They are seductive and hard to defy because they constitute the authority of the currently accepted, and therefore somehow valid, poetic identities.

For all these reasons, the assessment of expressive similitudes navigates a fine and often blurry line of distinction meandering around fraudulent, flawed, and legitimate strategies and always risks turning out as hasty, biased, uninformed, or moralizing. Nevertheless, when there is an apparent but undisclosed similarity of relevant creative factors or a strong but unacknowledged poetic parallel between a new artwork and a reasonably knowable referent, comparative criticism is legitimate. It is invaluable for the maturation of computational art whose originality-related mishaps are often not imposed primarily by the spontaneous convergence of ideas, cognitive requirements, or technical limitations but have less justifiable causes such as carelessness, indolence, ignorance, unoriginality, egoism, arrogance, narcissism, or vanity. The abundance of computational

art's expressive overlaps and "borrowings" merits a systematic study that would substantially extend this paper's volume, so I content the discussion with a few multifaceted cases.

For the short film *Sunspring* (2016, directed by Oscar Sharp), Ross Goodwin trained one ML system on 162 science fiction (SF) movie scripts found online to generate the screenplay and screen directions, and another one on a folk songs database to generate the film's song lyrics. Sharp used this material to produce the film. Brimming with plot inconsistencies and awkward dialogues, *Sunspring* touches upon several issues of its underlying cultures. The artists' satirical application of ML to filmmaking reverses the logic of corporate movie search algorithms, playfully mimics Hollywood's screenwriting strategies largely based on regurgitating themes and narratives from earlier films, and anticipates the current use of ML for screenplay analysis and design (Grba 2017, 390-392). It simultaneously exemplifies the power and the perils of using statistics to trace the "cloud" of common ideational threads in a specific cultural domain. *Sunspring*'s incongruity in comparison with conventional SF narratives also functions as an analogy for the nonsensicality of popular SF imaginaries with regard to real-life scenarios — the frivolity often rewarded with unwarranted fandom by which we abide due to intellectual or cultural inertia.

Two years later, Alexander Reben appropriated Hollywood strategies and regurgitated *Sunspring*'s concept and methodology to produce *Five Dollars Can Save the Planet* (2018) — "the world's first TED talk written by an AI and presented by a cyborg". The text of this 3-minute TEDx talk was generated by training an ML model on "all the TED talks" (Reben 2018). As a humorous take on the trend of "robotization" of sales-pitch public talks, which (arguably) joins the ongoing critique of TED's model of intellectual sharing (Morozov 2012; Harouni 2014), *Five Dollars...* echoes Doug Zongker's more radical comic act *Chicken Chicken Chicken* (2007) (Bauman 2007). Moreover, Reben's satirical logic and production methodology duplicate Goodwin and Sharp's while his choice of auto-recursive format (critiquing TED talks in a TED talk) mirrors Benjamin Bratton's 2013 TEDx talk *New Perspectives: What's Wrong with TED Talks?* (Bratton 2013). Although *Sunspring* is conceptually akin to SF parodies such as *Dark Star* (1974, directed by John Carpenter), and its implication that the palatability of popular expressive forms partly relies on cliches nods toward Jennifer and Kevin McCoy's works with pop-cultural sampling,[9] it is authentic in activating one of the SF tropes — artificial intelligence — to make these points "mathematically". *Five Dollars...*

9. See, for example, McCoys' *Every Shot, Every Episode* (2001) and *Every Anvil* (2002) (McCoy 2023a; 2023b).

uses an identical approach to make a parodic statement about corporate public talks, but reveals or adds nothing new.[10]

Libby Heaney's two-channel video *Elvis* (2019) further illustrates the delicate dependency between an artwork's conceptual, topical, or methodological authenticity and critical cogency. Featuring a portrait of Heaney deepfaked as Elvis Presley and Presley's portrait deepfaked as Heaney, it directly copies (but makes no acknowledgment of) the emblematic Gavin Turk's *POP* (since 1993). In a series of selfie-pop-icon chimeras, *POP* addresses the same topics of individual identity and cultural mechanisms of celebrity mythmaking, involves the same pop icon, and applies the same formal method (face swapping) albeit in different media (sculpture, photographs, and prints) and in a more complex chain of allusions (acknowledged by Turk): for instance, a figure of Sid Vicious with Turk's face posing as Andy Warhol's *Elvis Presley* (1963). The sole critical diversion in Heaney's *Elvis* is the introduction of an AI technique (deepfaking) into the critical repertoire of gender construction within digital technologies. To whatever degree the persuasive weight of liminal expressive differences in *Sunspring/Five Minutes...*, *Elvis/POP*, and other cases of undisclosed refrains may be considered an open question or a matter of individual interpretation, poetic similarities profoundly affect the cultural identity and sociopolitical value of computational art.[11]

2.6. Affordant Incertitudes

Inherent technological entanglement is another notable handicap to the computational art's societal impact. Its contradictions often expose authentic critical ideas to recuperation and exploitation, and sometimes turn protest into a mirror image or mystification of its target institutions, apparatuses, and power relations (Grba 2022b,

10. The conceptual and methodological cloning of *Sunspring* continued with the project *Legend of Wrong Mountain* (2018), which aimed at using ML on a Gesamtkunstwerk level. Its central part is a generative video of a traditional Chinese Kunqu opera produced by a team of computer engineers, artists, and designers who trained an assortment of ML systems on four different datasets about the forms of Kunqu opera to make the script (libretto), musical score, gesture choreography, and a woodcut book (Huang et al. 2019).

11. Readers interested in further consideration of similarities vs differences can look up the following instances (each comparative chain starting with later work(s) and ending with referent): the background idea, procedural concept, and presentational format of Memo Akten's *Learning to See* (since 2017) and Perry Bard's *Man with a Movie Camera: The Global Remake* (2007-2014); live interaction with a natural language processing model in Jonas Lund's *Talk to Me* (2017-2019), Stephanie Dinkins' *Not the Only One* (2018), and Ken Feingold's works such as *Sinking Feeling* (2001); the intersection of ML and religious imagery in Kristina Tica's *Digital Prayer* (2019) and Theresa Reimann-Dubbers' *A(.I.) Messianic Window* (2017); the inspirational processing of Marcel Duchamp's 1912 painting *Nude Descending a Staircase No. 2* in Marco Brambilla's *Nude Descending a Staircase No. 3* (2019) and Vladimir Todorović's *The Running Nude* (2018); the concept and methodology of Jeff Thompson's *Human Computers* (2020) and *AAI Chess* (2018) from RyBN and Marie Lechner's project *Human Computers* (2016-2019); and the concept, topic, and form of Varvara Guljajeva and Mar Canet's *Keep Smiling* (2022) and Carrie Sijia Wang's *An Interview with ALEX* (2020).

60). Fortunately, along with unanticipated flaws and intractable slippages, computational art features an assortment of cogent and meaningful integrations of unpredictability, accident, and imperfection that help the audience identify the economic and political interests, animosities, struggles, inequalities, injustices, and other problems.

With the *Hacking Monopolism Trilogy* (2006-2010), Paolo Cirio, Alessandro Ludovico, and ÜBERMORGEN.COM[12] brilliantly intersected automation with uncertainty and arbitrariness to make pertinent critical points about info-capitalism (Cirio 2017). The works in this widely discussed series leveraged software bots that ran repurposed AI techniques for pattern recognition, CV, and natural language processing (NLP) over the established online protocols to reflect, subvert, and question socioeconomic issues of major companies specialized in Internet services: Google, Amazon, and Facebook (Dieter 2012). In this context, non-programmatic language hacking can be effective too. To make *American Psycho* (2010), Mimi Cabell and Jason Huff interfaced manual data exchange with the whims of Google's AdSense algorithm and its clients' advertising ideas to expose the paroxysms of modern business culture driven by the AI-powered data-mining and behavioural monitoring. They mutually Gmailed the text of Bret Easton Ellis' novel *American Psycho* (1991), one page per email, and correspondingly annotated the original text with ads that Google injected in each email. They erased the original novel text leaving only the chapter titles and placed the ads as footnotes to their (now invisible) trigger words or phrases. The project is finalized as a printed book (Muldtofte Olsen 2015).

A swath of critical perspectives on the digital economy uses online micro-labour platforms to address the (erroneous) human sides of the commodified outsourcing of cognitive work, delegated creativity, and AI's Human-in-the-Loop complex (Johnson and Verdicchio 2017). For instance, in Clement Valla's *Sol LeWitt + Mechanical Turk* (2009), a custom software recreated Sol LeWitt's algorithmic drawings, posted their instructions for MTurkers to execute online (5 US cents per drawing), and assembled the interpretations into a grid. In *A Sequence of Lines Traced by Five Hundred Individuals* and *A Sequence of Circles Traced by Five Hundred Individuals* (both 2011), Valla utilized the entropic effects of iterative tracing, and in *Seed Drawing* (2011) the evolutionary effects of iterative copying that aggregates large-scale structures of organic patterns (Valla 2023). However, the positional discrepancies between artists and MTurkers can make such practices ethically questionable. Although conceptualized as sound generative experiments, Aaron Koblin's projects *The Sheep Market*

12. The trilogy includes *Google Will Eat Itself* and *Amazon Noir* (both 2006), realized collaboratively by Cirio and Ludovico with Hans Bernhard and lizvlx from ÜBERMORGEN.COM, and *Face to Facebook* (2010), realized by Cirio and Ludovico.

(2006), *Ten Thousand Cents* (2007-2008), and *Bicycle Built for Two Thousand* (2009, with Daniel Massey) (Koblin 2015) drew critique for the exploitative treatment of MTurkers through compensatory allocation disparities (Berdugo and Martinez 2020, 89; Żylińska 2020, 117-120). For example, in *Ten Thousand Cents*, Koblin divided a reproduction of a 100 USD bill into 10,000 rectangular parts and posted them on Amazon's MTurk. The MTurk worker's task was to draw a copy of one part for a fee of 1 US cent per part/task. So, the total MTurkers' labour cost to draw the 10,000 parts was 100 USD, but Koblin made a signed edition of 10,000 prints of the finished composite image available for purchase at 100 USD each.

Artists also use generative uncertainty to critique the concepts of ownership, speculative appetites, exploitative investment strategies, and obsessions with wealth in the contemporary economy. A well-documented example is Anna Ridler's *Mosaic Virus* (2019) in which a GAN animation of tulips inflected by the current Bitcoin values refers to the "tulip mania" symptom of the boom-and-bust cycles in bubble economies (Wang et al. 2022). Recognizing the limitations of non-fungible tokens (NFTs) as authenticity certificates and the abuse of art for promoting the crypto economy, other artists exploit the programmability of blockchains. They play with the relativity and transience of digital artworks, their ownability, and commercial life and leverage the financial flux of the crypto art market to explore the options for "tokenizing" values such as solidarity, care, and collectivity (Quaranta 2022, 95-140). For instance, Moxie Marlinspike's *At My Whim* (2021) was an astute crypto-myth-busting decentralized application (dApp)[13] which showed that the same NFT can be linked to different digital contents depending on where and how it is presented. By manipulating the NFT hosting web servers to select and transmit images according to the requester's IP address or user agent (web browser), *At My Whim* appeared as a geometrically different abstract digital drawing on OpenSea and Rarible NFT marketplaces. After purchase, it was displayed in all buyer's crypto wallets as the emoji with the Unicode Character U+1F4A9 (official name Pile of Poo). Applicable to any other digital artefact, this dApp fully complies with the NFT technical specifications but simultaneously eliminates their purpose thus demonstrating the ultimate uncontrollability of assets that NFTs are purported to secure. A few days after the publication of *At My Whim*, OpenSea reaffirmed its point by removing the NFT without warning or explanation, both from their website and from all of the artist's crypto wallets (Marlinspike 2022).

The asymmetries between individual and institutional power are also tackled by projects that critically reflect on various forms of AI deployment. For example, Mushon Zer-Aviv's *The Normalizing Ma-*

13. dApps are web applications that can be programmed to transform the data and its rendering on a hosting NFT platform.

chine (2018) provides a recursive critique of normative statistics and automated criteria in biometric classification. In this installation, visitors face a serial line-up of pairs of previously recorded visitors and point out the one that looks more "normal". Their portraits, captured during this process, are added to the training dataset and their selection decisions modify a generative model that continuously visualizes the facial aggregate of "normalcy" in a separate image (Zer-Aviv 2018). Jennifer Gradecki and Derek Curry's *Boogaloo Bias* (2021) highlights the ironies of uncertainty and error in biometric AI profiling (Gradecki and Curry 2022). Modelled on emergent law enforcement practices, this interactive facial recognition system maps the faces from the live video feeds and recorded footage of Boogaloo Bois anti-law enforcement militia protests to the actors' faces in the movie *Breakin' 2: Electric Boogaloo* (1984, directed by Sam Firstenberg). It casts a sarcastic look at the biases and errors in CV translation processes, as well as the impact of datasets and accuracy thresholds on false positives in police surveillance and arrest policies. To highlight the questions of accuracy and normalization within the fundamental but insufficiently investigated philosophical dimensions of AI research, Sebastian Schmieg introduces deliberately reduced unconventional, idiosyncratic, and seemingly absurd taxonomies into the image classification setups in works such as *Decision Space* (2016); *This is the Problem, the Solution, the Past and the Future* (2017); *Decisive Camera* (2017-2018); and *Decisive Mirror* (2019) (Schmieg 2022). For instance, the online visitors of the *Decisive Camera* can upload an image that will then be classified within a taxonomic space of only four categories: Problem, Solution, Past, and Future, and assigned a probability percentage for each category.

By focusing on the conditions in which algorithms fail to achieve their programmed goals, these and other successful tactical works underline the misalignment between the myths about digital technologies and the ways of their actual implementation.[14] Their investigations of sociopolitical inconsistencies and tensions spawned by pervasive computational infrastructures establish alternative narratives to corporate techno-solutionism. Even without necessarily providing answers, their value is in offering new critical viewpoints and actionable lines of reasoning for the audience to understand the importance of appropriate oversight, public accountability, and regulation of sociotechnical systems that rely on automation. Particu-

14. Other exemplars of the tactically effective use of uncertainty, imperfection, and inaccuracy include Ken Feingold's *Sinking Feeling*; *If, Then*; and *What If* (all 2001); Lauren Lee McCarthy's *Social Turkers* (2013); Eva and Franco Mattes' *By Everyone, For No One, Every Day* (since 2014); and *Dark Content* (2015); Lozano-Hemmer's *Level of Confidence* (2015); !Mediengruppe Bitnik's *Random Darknet Shopper* (2014-2016); Max Hawkins' *Randomized Living* (2015-2017); Jake Elwes' *Closed Loop* (2017); Rhea Myers' *Is Art* (2014-2015); Sarah Friend's *Lifeforms*; and *Off* (both 2021), Rafaël Rozendaal's *Endless Nameless* (2021); Primavera De Filippi's *Plantoids* (since 2015); terra0's *Flowertokens* (2018); Jonas Lund's *Jonas Lund Token* (JLT) (since 2018); Libby Heaney's *Euro(re) vision* (2019); and others.

larly, they reveal the control issues and manifest disparities between the functional predictability of computer systems and the unanticipated consequences of their application. By approaching uncertainty with conceptual cogency, expressive economy, and formal clarity that engage and inform the audience, these works also incentivize other artists to refine their creative strategies with careful consideration of incertitude and imperfection both as potential features and vulnerabilities.

3. Poetic Contingencies

Nevertheless, the appeal of uncertainty and imperfection remains deceptive. Generative surprise attracts the audience, but its exuberant use is criticizable as an awe-imposing mystification of the creative technologies. The increasing sophistication, processing power, and speed of emerging digital architectures constantly threaten to obfuscate the insufficiency of relying chiefly on faux-randomness and retrospectively collected data to abridge the predictability and heteronomy of the universal computing machine. They replenish the historical tendency in computational art, initially caused by high cognitive demands and steep learning curves of computer technology, to tacitly conflate artmaking with the skilful handling of creative instruments, which often incentivizes artists towards technical virtuosity devoid of self-critical distance or playful irreverence. This techno-fetishist mentality reinforces a naïve lack of understanding that the poetic role of production techniques in the arts is fundamentally defined by conceptual thinking and meaningful contextualization.

Thus, artists' efforts can get compromised by uneven intellectual breadth and depth or sketchy art-historical knowledge, leading to the poetic accidents of mishandling sensitive issues or cloning other, more compelling artworks (Grba 2022a, 17-20). This almost juvenile nonchalance toward both legacy and current creative landscapes is perhaps the most embarrassing weakness of modern computational art and one of the most constructive aspects for its critique. We can hardly attribute it primarily to the computational art's youth because it is more than 60 years old and shares all major poetic features with experimental arts whose history reaches back to at least the late 19th century. Instead, we should articulate our critique around the fact that the exploration of general and field-specific art history with curiosity and respect is a basic and empowering requirement for artists to bring up new ideas responsibly. However, despite their frequency, ethically charged poetic slippages in computational art are relatively seldom exposed and openly discussed, probably because artists, academics, and cultural workers prefer to stay out of the reputational minefield that opens by expressing clear but potentially confrontational opinions. This self-protecting professional leniency goes in tandem with an equally persistent and consequential but even less discussed contingency — the meritocratic inconsistency

imposed by cultural hegemonies, power games, and systemic injustices of the contemporary artworld. Indicating the darker shades of human nature, it retains the accidents of birth, nationality, language, or geographical location as powerful factors of career trajectories and professional recognition.

Artists who know how not to get swayed by sociocultural inequities and technological deficiencies in order to identify, understand, and leverage their expressive potentials have a chance to amaze us with valuable insights. They can escape the pitfalls of digital computing's formal rigidity and lack of spontaneity by treating them as trade-offs and — instead of equating art with technology — concentrate on generating meaning in thoughtful interrelations of technology with human intelligence and wit as the primary sources of surprise. By taking both art and technology as anthropological and sociocultural dispositives, artists can allow their poetics to be deeply informed by the interactive, interpretative, and transformative ingenuity of other minds regardless of their competencies or attitudes. They can design encounters with the uncertainty that challenge expectations and familiar beliefs and induce cognitive anxiety which is widely recognized as a creative catalyst (Rosen 2022, 473-474). That involves combining a keen awareness of sociotechnical and cultural environments with the ability to articulate ideas, knowledge, and skills through personal idiosyncrasies, wonders, and passions. Consequently, artists need to be open to learning from both successes and failures. One of the lessons of poetic contingencies is that productive risk-taking is not mere recklessness fuelled by ignorance or vanity but a cultivated embrace of uncertainty made by balancing adventurousness, panache, charm, and defiance with humility towards the probabilistic nature of the world in which we live and create.

Whether they sneak in as unanticipated twists and turns or help establish expressive relevance, poetic contingencies place the cognitive, ethical, and sociopolitical tensions of artmaking firmly within the context of human nature and existence. They help us infer the artists' knowledge and skills along with their personal qualities that inform poetics as much as any other expressive factor and reaffirm that understanding artists equally as creators and as human beings should be integral to the art appraisal. The inherent heuristics of artmaking also gently reminds us that uncertainty and instability are the fundamentals that make the continuous and cumulative experience of life itself more astonishing than art or any other specific domain of human creativity. From a broader perspective, it provides a conceptual framework for a comprehensive multidisciplinary study of the unexpected realities of culture, science, technology, economy, ecology, politics, and society.

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