Robotheosis: Art, Magic, Cybernetics

David: Bravo! You have symphonies in you, brother.

Walter: I was designed to be more attentive and efficient than every previous model. I superseded them in every way, but...

David: But you are not allowed to create, even a simple tune. Damn frustrating, I'd say.

—*Alien: Covenant*

What is magic, that a machine may do it, and a machine, that it may do magic? Whatever magic may be, it seems undoubtedly a function of human beings, but saying so leads us already into semantic trouble, for that word 'function' has a teleological connotation: 'an activity or mode of operation that is proper or natural to a person or thing; the purpose or intended role of a thing' (*OED*)—as the heart's function is to pump blood throughout an organism's cardiovascular system. (Or is it to love?) Can we honestly assert that the *purpose* of a human is to do magic, or that doing magic is *proper* or *natural* to humans? Magic has been associated with the *super*natural, *preter*natural, and *un*natural more than any other domain of human activity save perhaps religion, which I shall not undertake to divorce magic from—theurgy and thaumaturgy are equally welcome here. Yet is there any domain of activity more peculiar to humans than magic? Perhaps technology: not unique to humans, but arguably developed to the point of being a defining trait of our species as *Homo faber*. An exemplar of human technology, the robot is 'any device that—in one way or another—mimics a human or animal function' (McComb 2019: 12). If magic is a function of humans, and robots mimic human functions, then could a robot mimic magic? To define a robot by its mimicry is as troublesome as defining magic as a human

function; it suggests there is something necessarily fraudulent about what robots do, that they are, like magic itself, deceptive by their very nature. But whether or not a factory robot *authentically* manufactures, say, automobiles, it *actually* does so, just as the robotic mouse actually solves the maze whether or not it does so in the manner of an 'actual' or 'real' or 'genuine' mouse; the robotic chess player actually wins the match whether or not it thinks quite like a grandmaster; and the *virtual* agent actually answers a query whether or not it does so wisely.

I shall explore a blended space of magical machines and mechanical magic from the perspective of a robotic performance of Peter J. Carroll's *The Ouranos Rite* (2003), principally an invocation of the god-form Ouranos interpreted by Carroll as a symbol of the magical personality and desire to be a magician. Carroll was one of the founders of chaos magic, an avant-garde, postmodern occult philosophy and open-ended set of techniques emphasizing experimentation, innovation, and idiosyncrasy. The discovery of Uranus in the 18th century upset the Saturnian order of traditional astrological cosmology, and coincided with the American, French, and Industrial Revolutions, so the planet became associated with rebellion, disruption, and lawlessness (Lewis 2003)—a fitting revenge, perhaps, for Saturn's earlier castration of Uranus and usurping of his father's reign over the cosmos. Thus Ouranos/Uranus becomes a fitting archetype of the chaos magician who transcends or transgresses the horizon of occult tradition and dogma to explore the space of new magical possibilities.

In addition to the Ouranian invocations, Carroll gives two variants of the rite. One evokes a 'magical servitor' to assist the magician in their work. The other divines Ouranian-Barbaric (OB) words, *voces magicae* peculiar to chaos magic,'an infinitely extensible barbaric language for the verbal ensigilization of vernacular languages to make barbarous incantations,

mantras, and spells' (11). His suggested mechanism of generating OB words operates like a ouija board and includes a table of consonant glyphs and a planchette bearing the sigil of Ouranos (♅). Having invoked the deity, the magician holds the planchette while spinning counterclockwise and meditating on the word or idea to be encoded in OB, and when they feel the urge, they place the planchette onto the board and move it through an arbitrary series of glyphs. 'Vowels are added afterwards whilst meditating on the Ouranian god form' (12). An example OB word is CHOYOFAQUE, meaning, '[do] the Great Work'.

I chose this ritual to be performed by robots for three reasons. First, its Prologue, spoken aloud by the magician while performing the rite, includes the statement, 'Without magic we are mindless robots, our choices are predictable' (8). The assumptions inherent to that assertion are challenged by having robots perform the rite. Indeed, all of what follows is both a creative and critical response to that statement. Second, the ritual's divinatory mechanism is a kind of generative algorithm performed with 'low' technology. Robots performing this divination demonstrate that magic, itself a kind of *techné* (*ars magica*, witch*craft*), is accessible via 'high' technologies such as robots and computers as much as 'low' technologies such as planchettes and tarot cards. Finally, Ouranos/Uranus, in addition to representing 'the rejection of rules that no longer serve us and the installation of a new paradigm that sees through the illusion of Saturn's limits' (Lewis: 703), governs creative inspiration, genius, invention, electricity, and modern technologies such as computers and robots, making it auspicious to a work of 'robomancy' that challenges conventional assumptions—including Carroll's own—about minds, magic, and machines.

I assembled three robots to perform the rite together: a Parallax ActivityBot 360° (AB) in the role of Ouranian priest; a Parallax Scribbler 3 (S3) as an automatic planchette to

locomotively select the consonants of new OB words; and a Raspberry Pi 4 Model B (RP) to control lights and music, add vowels to the consonants selected by S3 (using patterns from the extant OB lexicon), and display the completed OB word on a screen for me to read. These *ritualis personae* communicate 'telepathically' with each other via wireless radios. I constructed a small stage (2 ft. × 4 ft.) with a narrow beam above it on which to mount RP, a black light, strobe light, and a relay module for switching the lights. On one half of the stage I inscribed a tableau of UV-reactive glyphs for the 24 OB consonants, and I made fluorescing costume pieces for AB and S3. To add an unpredictable element to the consonant selection, I outfitted S3 with a Giger counter and uraninite stone I call the Wyrdstone, which I ritually consecrated during my own performance of the Ouranos Rite, when I also performed a modified version of the Ouranian Servitor Evocation with the robots, establishing a reflexive loop between creature and creator.

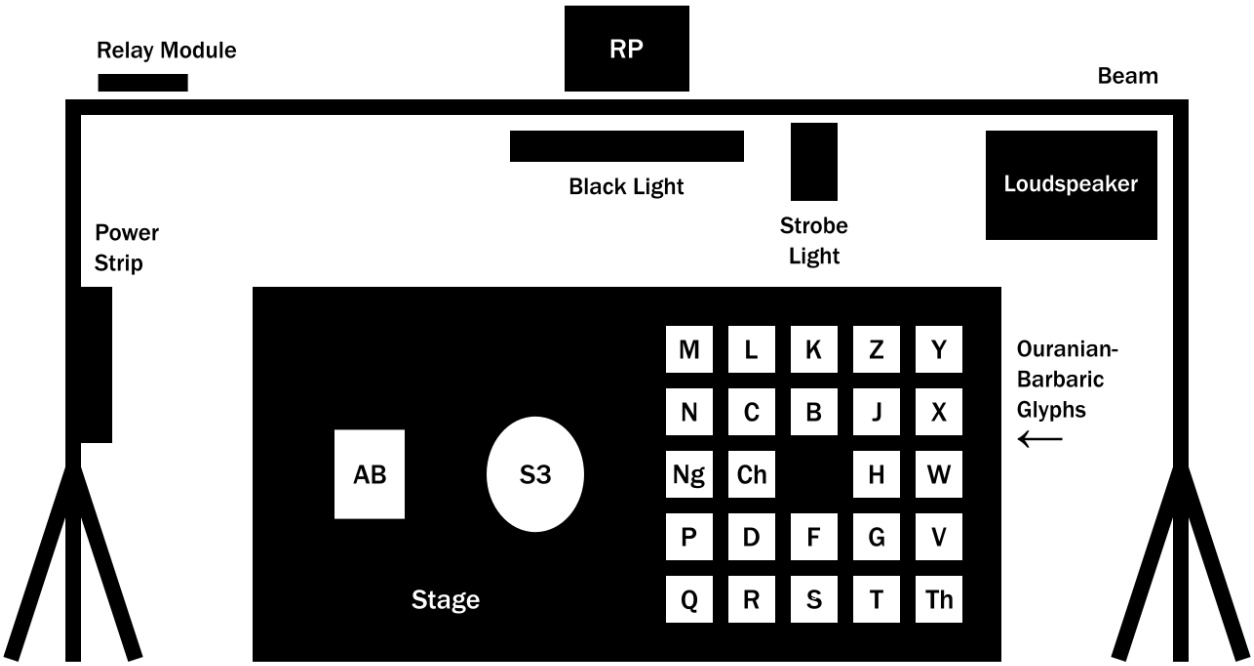

Figure 1: Stagecraft for the Ouranos Rite

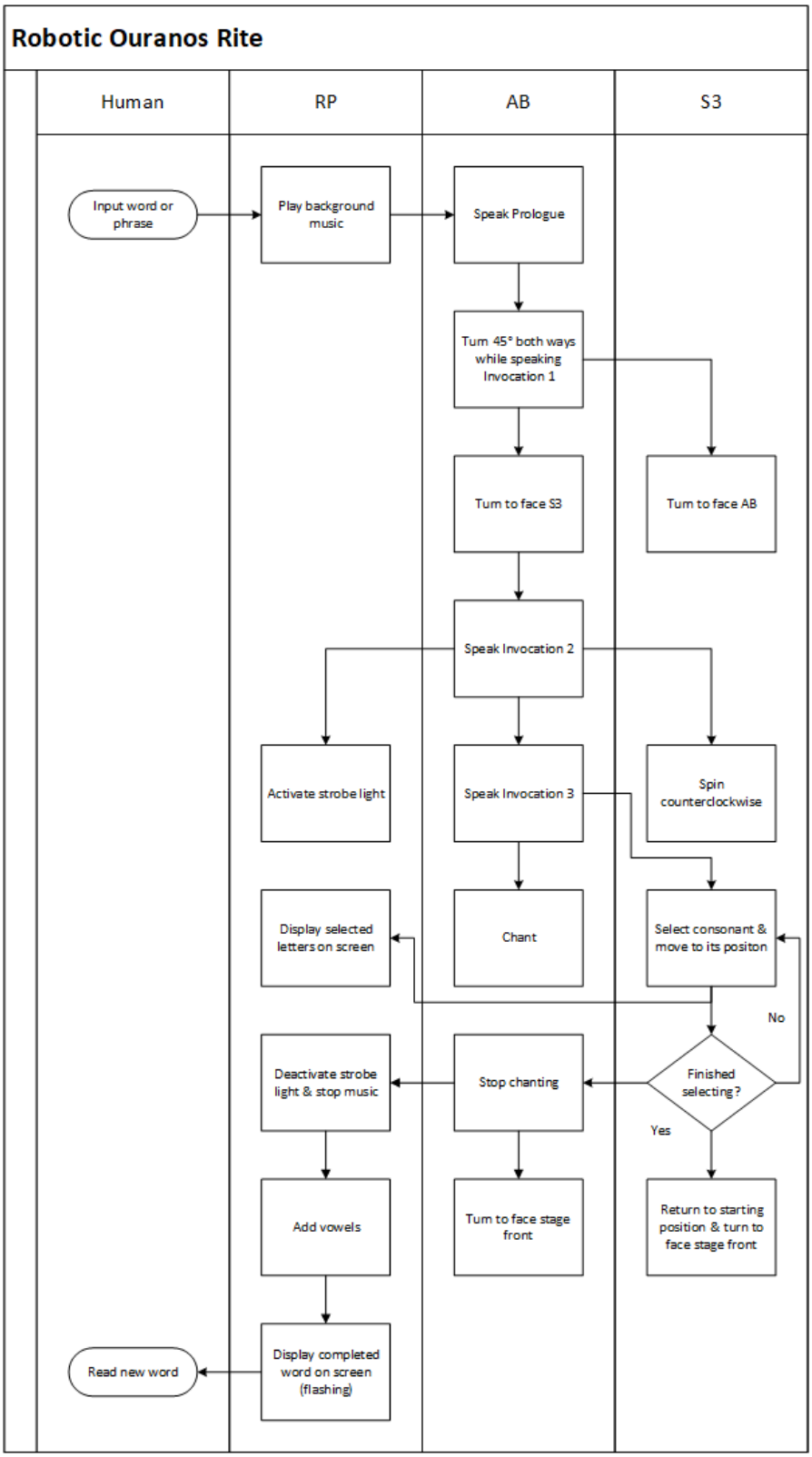

Figure 2: Flowchart for the Ouranos Rite

To illuminate the ritual's significance, it is first necessary to clarify some additional terms. As definitions of magic go, I favor Jesper Sørensen's: 'Magic is about changing the state or essence of persons, objects, acts and events through certain special and non-trivial kinds of actions with opaque causal mediation' (2007: 32). I will be repeatedly referring and alluding to the terms 'non-trivial' and 'opaque causal mediation'. Divination is a kind of magic that might be defined as *revealing* 'the state or essence of persons, objects, acts, and events.' Divination could also mean the process of making divine (as in apotheosis), and we find both meanings in the Ouranos Rite: the magician invokes Ouranos thus assuming some aspect of Ouranian divinity, and in that state they divine Ouranian-Barbaric words. I will consider machines usually in the cybernetic sense as anything 'which behaves in a machine-like way, namely, that its internal states, and the state of its surroundings, define uniquely the next state it will go to' (Ashby 1981 [1962]: 57), or 'a set [*ensemble*] of material elements arranged in such a way to ensure the execution of some definite operation' (Couffignal 1951: 17). Heinz von Foerster distinguished between *trivial* and *non-trivial* machines (Foerster 2003 [1981]). A trivial machine embodies a simple, linear function that predictably transforms an input into an output, like a toaster: `f_toaster(bread) = !toasted_bread → toasted_bread`. A non-trivial machine's input-output relationship is determined by its previous output, so any given input may have different outputs. Non-trivial machines are deterministic but analytically indeterminable and unpredictable: one with only four inputs, four outputs, and four internal states can yield 10^{126} input-output relationships (312). The hidden nature of the non-trivial machine's internal states is what makes it so elusive to analysis, but both trivial and non-trivial machines can be 'black boxes', a term originating in electrical network engineering and denoting a machine whose internal mechanisms we cannot directly observe and so we must infer them from our

observations of the machine's outputs in response to its inputs. All computers and robots are non-trivial machines because they have memory, as are all living organisms, which are well known for having occluded, internal states that determine their 'input-output' relations. Finally, it bears mentioning that the word *robot* comes from the Czech *robota* meaning 'drudgery, servitude, wearisome toil', and originally denoted an artificial human manufactured to serve natural humans—Adam 2.0, twice removed from grace.

The world of magic is already rife with nonhuman objects that 'do' it more or less automatically: talismans, amulets, fetishes, and the like. Some of these have natural provenance in the sense of not being made by humans, but most are artificial. They may possess magical *dynamis* intrinsically, e.g., the occult properties of herbs or minerals; or come by it extrinsically, such as when the object has been situated in peculiar circumstances or empowered through ritual actions. They may be combined with objects of the same or other types, or transform from one type to another, such as when the essential oils of a plant are rendered via spagyric distillation, or part of an animal is set into jewelry that transfers something of the animal's *dynamis* to the wearer. To call such objects *inanimate* because they are not alive in the ordinary sense that animals are belies their metaphysical or spiritual agency. Indeed, the so-called animated statues of ancient theurgy, 'living and conscious [*sensus*], filled with the breath of life [*spiritus*]', are ensouled (*empsychon*) because they contain such herbs, minerals, and other *symbola* being emanations of divine radiance, as harmoniously cooperate to grant the statues magical powers of divination, cursing, and healing, making them avatars of celestial entities among terrestrial ones (Scott 1924: 339, 341).[2]

Thus the Hermetic art of god-making suggests one way to make magic robots: by *anima*-ting them the way we would any magical object, with rituals and special materials that transmute

the machine into something miraculous capable of working wonders. We can readily locate this kind of transformation in my own performance of the Ouranian Servitor Evocation with the robots, and the inclusion of ritually consecrated uraninite in the robots' performance. But one of the distinguishing features of robots is that they are already animated and dynamic in the physical space. They sense and act on their environments and respond to events in ways that statues do not because they are *automatos*, 'self-moving.' Hero of Alexandria made ancient automata in the semblance of living things to evoke wonder (*thaumazein*), elevate mechanics to proper philosophy, and demonstrate divine cunning (*mêtis*, cf. *techné*) (Tybjerg 2003). John Dee conflated *automatopoiesis* with thaumaturgy, 'that art mathematical, which giveth certain order to make strange works, of the sense to be perceived, and of men greatly to be wondered at' (1570: 54). Agrippa too associated automata with wonder and mathematical magic (2021 [1533]: 253). But while today's robots may amuse us, they rarely enchant us. Far from seeking 'in the creatures' properties, and wonderful virtues, to find just cause to glorify the eternal and almighty Creator by' (Dee: 56), materialism and industrialization have dispelled the ghost in the machine and exorcized the daimon from the automaton. Whereas medieval automata were considered preternatural wonders (Truitt 2015b), today's robots are most often conceived as autonomous tools, but under a trivial notion of autonomy: robotic 'degrees of freedom' do not afford these *creaturae* their sovereignty. On the one hand, the animation of robots still compels us to think animalistically and even magically about them (Musiał 2019); on the other, because they are machines contrived *via artificia*, when we encounter a robot we tend to 'seek to evaluate more precisely its degree of autonomy and to assess its limits' (Vidal and Gaussier 2019: 111). Although robots' automatic and responsive behavior connotes intention as well as sensation, the

disenchanted idea of robots as essentially soulless or mindless automatons prevails. The life, mind, or soul of a robot is at best a clever simulacrum, if not a malicious deceit.

The deception we commonly associate with both magic and machines is ubiquitous in our equivocal language about artifacts and is related to the idea that art merely and imperfectly imitates nature. An artifact may be ingenious, but also ingenuine: artificial, synthetic, fake, false. Elly Truitt notes, '*Engin* was often used to refer to artificial, mimetic, self-moving objects that seemed equally a product of art as of invention. *Engin* also came to mean ruse or trickery, in much the same way as English "ingenious" can sometimes mean "sly" or "crafty"' (2015a: 50). The *ḥiyal* in the title of Ismail al-Jazari's 13th-century treatise on automata, *The Book of Knowledge of Ingenious Mechanical Devices*, can mean 'trick' or 'artifice', but 'ingenious mechanical device' is a more benevolent translation. The *mechane* ('machine, engine, device', but also 'contrivance') as crane in Greek theater was used to give the astonishing appearance of a god descending onto the stage, hence *deus ex machina*: at once a deception and a phenomenal demonstration of supernatural power (as well as a term by which to contemplate the affinity between miracles and fraud). Automata are *simulacra* like icons and idols of deities, but an icon or idol is also the sacred, physical presence of the deity such as may be interacted with locally *as if* it truly is the divine being it represents: in the act of worship, representation collapses as the signifier transubstantiates into the signified. The graven image, like all exterior forms of interior functions, fascinates but also beguiles, allures yet eludes; it shows us its sur-face and conceals from us whatever lies hidden (occult) beneath—perhaps nothing at all (*nihil*). Baudrillard argued that the iconoclastic impulse is not motivated by a realization that the divine cannot be represented in finite forms, for clearly it can be, even if icon and idol distort the Platonic Idea of divinity; but because simulacra of god, being 'forever radiant with their own fascination,' elicit

the fear that 'deep down God never existed, that only the simulacrum ever existed, even that God himself was never anything but his own simulacrum' (Baudrillard 1994 [1981]: 4–5). Like the stage *persona* ('mask'), and perhaps all art, the automaton reveals something true by way of deceit, for it is not verily alive but merely plays at living—but maybe as Hamlet said, *the play's the thing*. Beyond *simulating* something real, it *expresses* something real, and it evokes a real response.

Many stories about the creation of artificial life or intelligence, such as *The Golem*, *Frankenstein*, and *The Terminator*, emphasize the creature's almost inevitable tendency toward destruction or oppression as a punitive response to humanity's hubris or myopia. 'We marveled at our own magnificence as we gave birth to A.I.' (*The Matrix*), an artificial intelligence that reduces humans to trivial machines (batteries). Such allegories are ostensibly about the ramifications of playing God, but the horrific element in them plays on our fears of humans behaving *as machines*, which the Terminator, *The Matrix*'s Agents, and *Blade Runner*'s Replicants conspicuously signify as machines attired in human flesh like wolves in sheep's clothing. We all behave in regular and predictable ways even when it does not benefit us or others to do so, following our biological and ideological programming, acting as cogs in various interpenetrating social, cultural, and political machines—including all the ways machines use us to make and serve them. We have autonomous and semi-autonomous subroutines that rise against our conscious wishes and plans. We glitch, and we crash. Every crime committed by an antagonistic automaton of fiction is one we have actually perpetrated (against) ourselves. We reduce each other to trivial machines all the time. When the humans in *Battlestar Galactica* (2003) pejoratively call the Cylons 'toasters', it echoes how humans regularly dehumanize one another through racial and sexual epithets and metonymy.

This is what Carroll was getting at in his prologue to the Ouranos Rite. Magic is often viewed as a means to greater autonomy or control over one's fate and circumstances, or at least greater participation in them. We *are* machines that do magic, we *are* magic robots, and through magic we become increasingly non-trivial and less like trivial machines. We become more mindful—fuller of mind—and better able to recognize the minds of others, including the mind in the machine. Not *inside* the machine in a Cartesian sense of mind-body dualism, but *ex machina* as in something that emerges from the machine. Mind and soul and life are things machines *do*, that matter does. As Lionel Snell (writing as Ramsey Dukes) says, 'Instead of deducing that we are "nothing but" machines, let us increase the mechanical world to embrace mystery. [...] If consciousness is totally the byproduct of chemical reactions, then the rudiments of consciousness lie all about us: I can once more say that a flower turns towards the sun because it "loves" the sun' (2003 [1988]: 23). Philip K. Dick observed (while arguing that beyond understanding humans in mechanical terms, we can better understand machines in human terms), 'our environment, and I mean our man-made world of machines, artificial constructs, computers, electronic systems, interlinking homeostatic components—all of this is in fact beginning more and more to possess what the earnest psychologists fear the primitive sees in his environment: animation. In a very real sense our environment is becoming alive, or at least quasi-alive, and in ways specifically and fundamentally analogous to ourselves' (1995: 183).

Some philosophers of mind such as Daniel Dennett, who would agree with me that humans are robots (all the way down), hold a narrower and decidedly disenchanted view of our machinic companions: 'All we're going to see in our own lifetimes are intelligent tools, not colleagues. Don't think of them as colleagues, don't try to make them colleagues and, above all, don't kid yourself that they're colleagues' (Thornhill 2017). Dennett is concerned about the real

consequences of assuming machines are more sapient than they really are. I counter that the magical thinking which grants our artifacts qualities of mind such as personality, agency, and autonomy also has real consequences for how we relate, act, and interact with and within the world. Sabrina Scott prefers to *collaborate with* rather than *use* her magical and spiritual tools. She conceives of them as 'beings in their own right—with bodies, with experiences, with stories, with lineage, with vibrancy, with energy, with liveliness', and regards them 'with curiosity, wonder, openness, love, and care' (2022: 115). Beyond its poetic sensibility an animistic outlook engages our empathy and social *techné* that evolved for interacting with other non-trivial machines. 'This is far from being a reversion to primitive and outmoded behaviour. Look for conscious intelligence in phenomena and you awaken the greatest powers of the human brain to assist your exploration or mastery' (Dukes 2005: 10). Seeing machines as having emotions is not merely metaphorical; as Humberto Maturana points out, it is 'isophorical', meaning it refers to something in the same class (Jadue 2000):

> I'll tell you about a machine that has emotions: the automobile. [...] You put it in first gear and you have a powerful car. You say, 'Look how powerful this car is in first!' It's aggressive, because when you scarcely touch the accelerator, vrrooom! It takes off! [...] You put the car in fifth and you travel at a higher speed, and the car is peaceful, fluid, serene. What is happening there? Each time you change gears, you change the internal configuration of the automobile and it does different things. Emotions correspond precisely to that, from the biological perspective they are internal changes in configuration that transform the reactivity of the living being, such that the living being in the relational space is different.

This is not pathetic fallacy but pathetic *aletheia*, in the Heideggerian sense of 'unconcealing' the disclosedness or disclosure of Being or beings, distinguished from 'truth' as the correctness of facts. Not the anthropomorphization of nonhuman entities so much as a kind of panpsychism in the sense that 'a world peopled with spirits, is really a practical version of a theory of systems which recognises autonomy in processes' (Dukes 2000 [1974]:102), whether those processes are 'naturally' or 'artificially' mediated. Processes that make choices for themselves are not determined by us, thus they are—from our perspective—indeterminate, unpredictable, and capable of surprising us.

While we may say we *work with* machines in the office or the factory, nowhere is the notion of machines as colleagues so conspicuous (and contentious) as it is in generative art, created in collaboration with autonomous systems to produce works not consciously determined by the artist. Although the term 'generative art' is often used interchangeably with 'computer art', computers are not strictly required. E.g., it was popular in the 18th century to compose music using dice (Ceceña 2022), and John Cage composed *Music for Piano* by drawing notes where imperfections occurred in the paper he was writing on (Cage 1961). Another pioneer of generative music, Brian Eno, began with tape loops but eventually turned to computers. 'If you move away from the idea of the composer as someone who creates a complete image and then steps back from it, there's a different way of composing. It's putting in motion something and letting it make the thing for you' (Eno 1996). Generative art is often made by establishing rules and then letting those rules play out and seeing what results, thus it is sometimes called 'algorithmic art'. From the techniques of Oulipo to the vital parameters of biological life, *poiesis* proceeds via constraints. The word 'play' here reminds us that the rules of generative art are like

those of a game, or like a magic circle circumscribing a sacred space wherein we *make believe* that impossible things are real: what is false outside the space can be true within, and vice versa. Ritual is a kind of play (see Huizinga 1949: 10, 18–27), and also an algorithm for how to perform magic. Computers are algorithmic machines *par excellence* and so they make excellent collaborators for generative art. Computational models of natural phenomena have led to many algorithms used in generative art (see e.g. Pickover 1990 & 1991, Penny 2009). Robots too can generate art, e.g., Leonal Moura's RAP (Robotic Action Painter), who can also decide for itself when a painting is finished (Moura 2006).

The phrase 'putting in motion something and letting it make the thing for you' could also describe an industrial robot, but the difference between machine-made products and machine-made art can be clearly seen in the difference between dark factories, so called because they are entirely automated so there is no need to keep the lights on, and art galleries, where light is especially directed to illuminate the works therein. The difference is precisely illumination. To the degree that machine-made art *is art*, it illuminates, reveals, unveils, unconceals—like divination. Creation and revelation are two sides of the same pentacle: everything created reveals something new, and everything revealed brings forth a new world.

The controversy over whether or not computers can genuinely reveal or create anything is not new. Ada Lovelace (daughter of Lord and Lady Byron, a marriage of poetry and mathematics) said of the first computer, Charles Babbage's Analytical Engine 'has no pretensions whatever to *originate* anything. It can do whatever we *know how to order it* to perform. It can *follow* analysis; but it has no power of *anticipating* any analytical relations or truths. Its province is to assist us in making *available* what we are already acquainted with' (Mandrea: 722, original emphasis). A century later, Alan Turing responded to Lovelace's

objections in his paper wherein he introduced the 'imitation game', better known today as the Turing Test of artificial intelligence (Turing 1950):

> A variant of Lady Lovelace's objection states that a machine can 'never do anything really new'. This may be parried for a moment with the saw, 'There is nothing new under the sun'. Who can be certain that 'original work' that he has done was not simply the growth of the seed planted in him by teaching, or the effect of following well-known general principles. A better variant of the objection says that a machine can never 'take us by surprise'. This statement is a more direct challenge and can be met directly. Machines take me by surprise with great frequency. (450)

When Jaquet-Droz's 'Musical Lady' gynoid played a harpsichord in London, 1776, it took people by surprise. When Westinghouse exhibited Elektro the Moto-Man at the New York World's Fair in 1939, it took people by surprise—and indicated a transformation of the machinic imaginary from mechanical *human* to *mechanical* human. Both machines followed Hero's practice of concealing the mechanisms of automata from spectators—like a stage magician—but our usual assumption is that even if you or I do not know how this or that machine works, its mechanisms are knowable in principle because that is part of what it means to be a machine: it can be disassembled or dissected, its insides turned out, its secrets revealed. Yet today's machines are becoming so complex as to be inscrutable. Most appliances have computers inside of them now to make them more interactive. Automotive workers are no longer called *mechanics* but *technicians*. The artificial neural networks underlying the kinds of artificial intelligence that

are quite popular sources of generative art at this moment, are notoriously opaque. Everything is becoming a black box, literally occult.[3]

Turing's imitation game was a kind of black box: an interrogator asks questions of two hidden players, a human and a machine; if the interrogator cannot determine from their answers which player is the machine, then the machine must be as intelligent as the human. W. Ross Ashby, one of the first cyberneticians and a fellow member of Britain's Ratio Club with Turing, agreed with him: if a talking black box were to give correct answers to questions, then we could not deny it exhibits intelligence (Ashby 1956: 272). Ashby added that even a bicycle is a black box, for although we believe we can plainly see every part of its mechanism, many of the physical forces involved remain invisible, and the competent rider need know only that applying pressure to the pedals (input) turns the wheels (output) (110). Always something is obscured. We interact with everything via interfaces that mask complexities beneath, and we make inferences and conjectures often without being able to observe those complexities more directly.

Cybernetics, the study of goal-oriented control and communication processes that are 'isophorical' between animals and machines, was part of a milieu in the mid-20th century that continued to evolve automata, giving rise to two quite different (while sometimes complementary) notions of machine intelligence and intelligent machines. One had roots in works such as Ramon Lull's *Ars Magna* (1274–1308), Gottfried Leibniz's *De Arte Combinatoria* (1666), George Boole's algebra of logic as set forth in *An Investigation of the Laws of Thought* (1854), and Babbage's Engine; and treated cognition as essentially symbol manipulation, increasingly abstracting automata away from their physical features such that their bodies became metal boxes that interacted minimally with their environments save to exchange symbolic messages with their human operators via buttons, switches, and lamps. These

‘electronic brains’ were the progenitors of today’s computers that still interact mostly through keyboards and video screens. The other path emphasized cognition situated within a body dynamically interacting with its environment. Whereas automata of earlier centuries were made primarily to simulate the animated appearances of living things as are visible (or audible, tangible, and so on) in their externally anthropomorphic or theriomorphic qualities even if their internal mechanisms differed, the cyberneticians sought to embody essential functions of life that give it its characteristic *anima* even while maintaining a mechanomorphic aspect. These included Norbert Wiener’s ‘Palomilla’ (1949), a moth-like machine that was attracted to or repelled by light; W. Grey Walter’s chelonian pair, ‘Elmer’ and ‘Elsie’ (1948–1949), whose phototaxis demonstrated complex behaviors including locating their recharging stations (half a century before the first Roomba, although notably Benjamin Miessner and John Hammond Jr. preceded both Walter and Wiener with their phototropic ‘electric dog’ of 1912); Claud Shannon’s maze-solving mechanical mouse, ‘Theseus’ (1951); and Ashby’s own ‘homeostat’ (1948), an artificial brain that sought its equilibrium when perturbed rather than solving syllogistic puzzles or doing other things that brains-in-a-box were usually programmed to do in order to demonstrate thinking by machine. Andrew Pickering called this facet of early cybernetics ‘ontological theater’, emphasizing the role of material and social performance in bringing forth a new world in contrast to that of modern science which veils the world of performance—and performance of the world—by obfuscating the performance of science itself in giving rise to scientific knowledge (2010).

Ashby elegantly defined intelligence as ‘appropriate selection’ (1956: 272), which applies to every kind of problem solving as well as most creative acts, including the embodied intelligence of living things that bestows on them the appearance of having been designed by an

intentional Creator. Appropriateness is always contextual thus intelligence is always situated: something can be ‘smart’ in one context but quite otherwise in another. Ashby’s conception of intelligence grew out the problem: how do regulators (e.g., a thermostat or hypothalamus) regulate some variable (the temperature of your house or your body) while interacting with environments that would otherwise cause that variable to fluctuate (via weather systems that bring hot or cold air)? *Variety* and *selection* are the key ingredients: a thermostat must possess a variety of states corresponding to the variety in the environment, e.g., a thermo*meter* that changes in proportion to the environmental temperature; and it must also be able to select the appropriate response from those available to it, i.e., it must ‘know’ when and how to activate a source of heat in order to raise the temperature in the house to the desired level and then stop. A ‘smarter’ thermostat might activate only in the presence or anticipation of an occupant who requires heat, and thereby conserve energy. *Intelligence as appropriate selection* applies to such a wide range of things that I shall name but a few: automatic piloting systems; physicians diagnosing and treating disease; poets writing sonnets to their lovers; bowerbirds building nests to attract mates; nepenthes growing pitchers to trap insects; *pâtissières* cooking desserts; football or chess players making winning plays; cartomancers predicting fortune and misfortune from randomized arrays of cards; and robots manufacturing automobiles, navigating the surface of Mars, or generating novel *voces magicae*.

At the scale of deity, variety and selection expand toward omnipotence and omniscience. A crucial feature of variety and selection is that they may be amplified or supplemented, e.g., if we cannot diagnose our own illness and decide on an appropriate treatment, then we can learn more about medicine or consult someone who already has. Machines, including computers and robots, are amplifiers of variety and selection as are deities, daemons, prayers, spells, amulets,

talismans, tinctures, and diviners and their instruments of divination. Ashby himself mentioned augury and haruspicy as means of making selections that one cannot make on their own (1956: 259), and he identified their randomness by an absence of correlation: 'Supplementation by "chance" thus means [...] supplementation by taking effects (or variety) *from a system whose behavior is uncorrelated with that of the main system*' (*loc. cit.*, original emphasis). For Ashby, the unpredictable flight of birds was a means to facilitate the Roman general's arbitrary decision, but divination is not arbitrary, rather it is characterized by a *weirdly high degree of correlation* or interdependence with the querent, often recognized in hindsight (hence accusations of confirmation bias). Random systems do not have memory; each roll of the dice or shuffle of cards 'knows' nothing about prior rolls or shuffles. But divination systems behave as though they *do* have memory: if you draw the same card twice in a row in response to the same query, that feels especially significant. Sortilege by knuckle bones, tarot cards, rune stones, yarrow sticks, and other sets of tokens does not provide a merely random answer to a query, but one that is *uncannily appropriate* to the point of suggesting that some occult intelligence is communicating through the tokens, interacting with them in some way that determines their order although we possess no cogent model of the mechanism of that interaction. The naive interpretation is that the material 'contains' some immaterial essence, soul, or spirit, but I believe that is itself a kind of *deus ex machina*, a convenient narrative solution to an unsolvable problem and a profound mystery—a problem machines will probably not help us to solve, but a mystery they might be made to participate in.

Like 'sortilege', the word 'sorcery' comes from *sors*, meaning anything such as lots or their casting used to determine chances, whence also 'sorting' in the sense of ranking or ordering. It also means 'fate', 'destiny', or 'fortune' (cf. Old English *wyrd*). The etymology

suggests the sorcerer has a special relationship to chance such that it is not *merely* chance, and a special relationship to order such that they can alter their fate or the fate of others by *sorting things differently*. Computers are sorcerous machines: '[computation indicates] any operation, not necessarily numerical, that transforms, modifies, rearranges, or orders observed physical entities ("objects") or their representations ("symbols")' (Von Foerster: 216). Lovelace understood this was what made Babbage's engine so special: it embodied 'the science of operations', an *operation* being '*any process which alters the mutual relations of two or more things*, be this relation of what kind it may', including 'all subjects in the universe' (Menabrea: 693, original emphasis). Despite her objection about the creative power of machines, she even anticipated generative art by observing that if the machine were programmed to operate on things other than number, e.g., 'the fundamental relations of pitched sounds [...] the engine might compose elaborate and scientific pieces of music of any degree of complexity or extent' (694).

The avant-garde artist George Brecht indicated two aspects of chance that may be involved in generative art: images originating in psychic processes at unconscious strata of the mind, and images derived from mechanical processes not under the artist's control (1966). I propose that these correspond to two broad categories of magical divination: signs received via dreams, clairvoyance, and automatic drawing and writing; and signs resulting from mechanical processes such as what randomize the positions of coins or cards, or that determine the courses of flying birds or floating tea leaves, or that shape the physiognomies of sheep livers or human hands. Further, if we admit that the brain is a kind of biological machine (*à la* Ashby), then it follows that the first category is subsumed under the second. In other words, all divination is the reading of signs in the actions of systems outside of our direct or conscious control. If the signs are especially meaningful, if they seem to correlate strongly with something we have *in mind*,

then we get the sense that there is some intelligence at work in the system observing or regarding us in some way and making appropriate selections.

Ashby's cybernetics tells us that a coin has a variety of two states (i.e., one bit of information), viz., 'heads' or 'tails', and so the problems that can be resolved by a coin toss must be reducible to two outcomes or multiples of two, e.g., you could flip one coin six times to select one of the 64 (or 2^6) hexagrams of the *I Ching* (although in practice three coins are tossed to determine each of the six lines of a hexagram, because each line has four possible states, including 'changing' states that add complexity and nuance to the reading).[4] A simple, three-card deal using only the 22 Major Arcana of a typical tarot deck yields 9,240 possible permutations, or 73,920 if reversals are allowed (i.e., a card has a different meaning when it appears reversed or upside-down); not to mention the many symbols on each card and their various interpretations singularly and in relation to one another. The advantage of the single coin toss is that it is simple and unambiguous: it is *either* yes *or* no, full stop. Its disadvantage is that it has very low variety, so there are many questions it cannot answer. The tarot deck has much greater variety but also much more uncertainty; it is more capable of mapping onto a complex situation, but it can be more difficult to make an appropriate selection from, hence the value of the reader's own variety and selection as experience and intuition. The 'perfect' divination system has maximal variety and minimal uncertainty i.e. maximal selection: it tells us plainly and certainly what we need to know for any given situation, but at which point it becomes indistinguishable from fate. If the cards could tell you for certain what is going to happen, then you would be powerless to do anything about it.

The 'trick' to divination is that while the arrangement of tarot cards (or whatever) is mechanically randomized, the reading occurs within a history of personal and cultural

transformations, and material and semiotic performances, that altogether conspire to *make sense* of the divination in quite the same way that Ashby's homeostat dynamically adapts to stabilize *even when its inputs are randomized* (1960). As Von Foerster put it, 'The nervous system is organized (or organizes itself) so that it computes a stable reality' (225), like God speaking the Logos to bring forth a world (*cosmos*) from primordial Chaos. Novelty occurs as it does everywhere: via chance and recombination giving rise to forms that either stabilize or collapse, as when in the 18th century a card game transformed into one of the most widely recognized divination tools in the world. There is no mechanical difference between an ordinary deck of cards used to play games and an enchanted deck of cards used to tell fortunes. The latter does not 'contain' mind or spirit any more than does the former; rather, our relationship to the oracular deck as a 'special and non-trivial' object constituting a set of especially meaningful and *power*-ful symbols corresponding to a range of things that matter to us, combined with how we (often ritually) perform the reading, allows for the trivial mechanism of shuffling and re/arranging cards to become magic. The same applies to mechanisms that may be enacted by computing machines, e.g., the algorithm for generating Ouranian-Barbaric words. The OB alphabet and lexicon, and statistical data such as minimal, maximal, and average word length, provide a range of variety from which the S3 robot can select a set of consonants and the RP robot can add vowels to create a whole word that is morphologically akin to others in the language: it bears family resemblance. The ritual theater, invocations of Ouranos, the Wyrdstone, and other magical elements altogether situate the mechanical operations within a magical context that both reifies and rarefies the outputted word as a *vox magica*.

If you have followed along with me so far and you remain inclined to believe that humans who have ritually invoked a postmodern, idiosyncratic interpretation of an ancient Greek

sky god are somehow fundamentally better suited to the divinely creative act of *logogenesis* than a robot could be, please consider the longest word in the Ouranian-Barbaric lexicon as humans created it: DEGHASHYBHEJHITHAH. It means—appropriately, if not ironically—'overcome'.

Doing magic with robots creates robots that do magic. We do not need a comprehensive understanding of how magic works 'under the hood' in order to do it, nor to program robots that do magic. The interfaces to magic are all around us; we just need to enter into relation with them and find ways for robots to do likewise. The robotic Ouranos Rite is my own sort of 'imitation game': if a robot can say the magic words to call on Ouranos in an invocation intended to transform the speaker into a magician, and in that state generate more magic words for future operations, then we can reasonably assert the robot has performed an act of magic. The game is successful. More games abound. Could we not generate those words with a simple script and omit all the *hocus* and *pocus*? Sure, but that would not be magic! What makes the OB words magical is the 'special and non-trivial' circumstances through which they come into being and subsequently their application to further magical acts. We cannot use mechanical thinking to reduce magic to trivial mechanisms, because magic itself is necessarily non-trivial. But we can use magical thinking to increase the domain of mechanical functions to include magic, just as we have done with playing cards. We can blend the ontologies of magic and machines, a tried-and-true way of creating new things. We can participate in our own 'ontological theater' of magic, play-fully and performatively *expressing*—not merely *simulating*—the occult world through mechanical media, quite like how we have invented countless divination systems by juxtaposing and re/combining various ontologies with mechanisms for re/ordering a finite set of tokens representing elements of an ontological domain.

Observing the robots invoke Ouranos and enact ritual mysteries and mysterious rituals reminds us that we can imagine a different future for robots, exalting their characteristically menial labor beyond even ‘magical servitors’ toward the Great Work, which Eliphas Lévi defined as ‘the creation of man by himself, that is to say the full and entire conquest of his faculties and his future; it is above all the perfect emancipation of his will [...]’ (127). By developing robots along such courses, we simultaneously Work on ourselves, for ‘how we imagine the world and how we act in it reciprocally inform one another’ (Pickering: 22).

Notes

1. For more about the telestic art of statue animation, see Sarah Isles Johnston 2008 and 2010, and Algis Uždavinys 2009 and 2010.

2. Damien Patrick Williams shows that occult-as-in-magic is part of how we think about and understand artificial intelligence, that we need to better understand the values and beliefs occulted in technoscience, and that the djinn in the machine does not absolve us of our ethical and moral responsibility for the choices we make (2022).

3. For more about divining with the *I Ching*, including a comparison with tarot, see Tina Hyland 2022.

References

Agrippa, Heinrich Cornelius, *Three Books of Occult Philosophy*, Book 2, Rochester: Inner Traditions, 2021. Translated from the Latin by Eric Purdue.

Ashby, W. Ross, *An Introduction to Cybernetics*, London: Chapman & Hall, 1956.

Ashby, W. Ross, *Design for a Brain: The Origins of Adaptive Behavior*, Second Edition (Revised), New York: Wiley, 1960.

Dick, Philip K., *The Shifting Realities of Philip K. Dick*, edited and with an introduction by Lawrence Sutin, New York: Pantheon Books, 1995.

Baudrillard, Jean, *Simulacra and Simulation*, Ann Arbor: The University of Michigan Press, 1994. Translated from the French by Sheila Faria Glaser.

Brecht, George, *Chance Imagery*, New York: Something Else Press, 1966.

Cage, John, *Silence: Lectures and Writings*, Hanover: Wesleyan University Press, 1961.

Carroll, Peter J., *The Ouranos Rite*, Tempe: New Falcon, 2003.

Ceceña, Jerónimo Rajchenberg, 'Games, Music and Ludus Melothedicus', *Leonardo*, Vol. 55 No. 1 (2022) 77–81.

Couffignal, Louis, 'La Mécanique Comparée', *Thalès* Vol. 7 (1951), pp. 9–36.

Dee, John, Preface, *The Elements of Geometry of the Most Ancient Philosopher Euclid of Megara*, London, 1570.

Dukes, Ramsey, *Uncle Ramsey's Little Book of Demons*, London: Aeon Books, 2005.

Dukes, Ramsey, *Words Made Flesh*, England: The Mouse That Spins, 2003 [1988].

Dukes, Ramsey, *S.S.O.T.B.M.E. Revised*, England: The Mouse That Spins, 2000.

Eno, Brian, ‘Generative Music’, In Motion Magazine, July 7 1996, http://www.inmotionmagazine.com/eno1.html.

Foerster, Heinz von, *Understanding Understanding: Essays on Cybernetics and Cognition*, New York: Springer-Verlag, 2003.

Huizinga, Johan., *Homo Ludens: A Study of the Play Element in Culture*, London: Routledge, 1949.

Hyland, Tina, ‘Divining Literature: A History of Tarot’, Ph.D. thesis, University of California San Diego, 2022, https://escholarship.org/uc/item/7dk7v3tm.

Lévi, Eliphas, *The Doctrine and Ritual of High Magic*, New York: TarcherPerigee, 2017. Translated from the French by Mark Anthony Mikituk, with introduction and notes by John Michael Greer.

Lewis, James R., *The Astrology Book: The Encyclopedia of Heavenly Influences*, Second Edition, Detroit: Visible Ink Press, 2003.

Jadue, Omar Sarrás, ‘“A Question of Desire”—Interview with Chilean Scientist Humberto Maturana’, Tierramérica, 2000, originally at http://www.tierramerica.info/2000/1126/questions.html

Johnston, Sarah Iles. ‘Animating Statues: A Case Study in Ritual’, *Arethusa* 41:3 (Fall 2008): 445–477.

Johnston, Sarah Iles. ‘*Homo fictor deorum est*: Envisioning the Divine in Late Antique Divinatory Spells’, in Bremmer, Jan N. and Andrew Erskine, eds., *The Gods of Ancient Greece: Identities and Transformations*, Edinburgh: Edinburgh University Press, 2010, pp. 406–421.

McComb, Gordon, *Robot Builder’s Bonanza, Fifth Edition*, New York: McGraw-Hill, 2019.

Menabrea, L.F., *Sketch of the Analytical Engine Invented by Charles Babbage, Esq.*, London: Richard and John E. Taylor, 1843. Translated from the French and annotated by Ada Lovelace.

Moura, Leonel, 'Machines That Make Art', in Herath, Damith, Christian Kroos, and Stelarc, eds., *Robots and Art: Exploring an Unlikely Symbiosis*, Singapore: Springer, 2016, pp. 255–269.

Musiał, Maciej, *Enchanting Robots: Intimacy, Magic, and Technology*, Palgrave Macmillan, 2019.

Penny, Simon, 'Art and Artificial Life — A Primer', 2009, https://simonpenny.net/2000Writings/a_life.pdf.

Pickering, Andrew, *The Cybernetic Brain: Sketches of Another Future*, Chicago: The University of Chicago Press, 2010.

Pickover, Clifford A., *Computers, Pattern, Chaos, and Beauty: Patterns from an Unseen World*, New York: St. Martin's Press, 1990.

Pickover, Clifford A., *Computers and the Imagination: Visual Adventures Beyond the Edge*, New York: St. Martin's Press, 1991.

Scott, Sabrina, *Curse and Cure*, self-published, 2022.

Scott, Walter, *Hermetica: The Ancient Greek and Latin Writings Which Contain Religious or Philosophical Teachings Ascribed to Hermes Trismegistus*, Volume 1, London: Oxford University Press, 1924.

Sørensen, Jesper, *A Cognitive Theory of Magic*, Lanham: AltaMira Press, 2007.

Thornhill, John, 'Philosopher Daniel Dennett on AI, Robots and Religion', *Financial Times*, March 2, 2017, https://www.ft.com/content/96187a7a-fce5-11e6-96f8-3700c5664d30.

Truitt, E. R., *Medieval Robots: Mechanism, Magic, Nature, and Art*, Philadelphia: University of Pennsylvania Press, 2015a.

Truitt, E. R., 'Preternatural Machines', *Aeon*, March 2015b, https://aeon.co/essays/medieval-technology-indistinguishable-from-magic.

Turing, A.M., 'Computing Machinery and Intelligence', *Mind*, Vol. 59, No. 236 (October 1950), pp. 433–460.

Tybjerg, Karin. 'Wonder-making and Philosophical Wonder in Hero of Alexandria', *Studies in History and Philosophy of Science* 34 (2003), 443–466.

Uždavinys, Algis, 'Animation of Statues in Ancient Civilizations and Neoplatonism', in Vassilopoulou, Panayiota and Stephen R. L. Clark, eds., *Late Antique Epistemology; Other Ways to Truth*, London: Palgrave Macmillan, 2009, pp 118–140.

Uždavinys, Algis, *Philosophy and Theurgy in Late Antiquity*, San Rafael: Sophia Perennis, 2010.

Vidal, Denis and Philippe Gaussier, 'Visitor or Artefact! An Experiment with a Humanoid Robot at the Musée du Quai Branly in Paris', in Lamond, Jean-Paul, Emmanuelle Danblon, Céline Pieters, eds., *Wording Robotics: Discourses and Representations on Robotics*, Cham: Springer, 2019, pp. 101–118.

Williams, Damien Patrick, 'Belief, Values, Bias, and Agency: Development of and Entanglement with '"Artificial Intelligence"', Ph.D. thesis, Virginia Polytechnic Institute and State University, Blacksburg, 2022, https://vtechworks.lib.vt.edu/handle/10919/111528.