Star Trek: Technologies of Disappearance

Technoscience and Storytelling

N. Katherine Hayles is a humanities scholar who is so knowledgeable about science, and admirably rigorous in her explanations of science and technology, that she proves that postmodern "science-and-society" cultural theory cannot be discredited and dismissed by generalizing accusations emanating from the camp of "hard scientists" like Alan Sokal that such transdisciplinary research is ignorant of science.[549] Given her meticulous understanding of, and engagement with, scientific concepts, and her standing as Professor of Literature at the University of California, Los Angeles (UCLA) and at Duke University, Hayles is the ideal thinker to bring together science and fiction. Hayles is most well known for her 1999 book *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*, a pioneering work which was one of the principal founding texts of the cultural theory and ecological movement of posthumanism.[550]

One major aspect of Hayles' prolific research and publishing output is concerned with understanding the codes of digitalization as new or transfigured forms of linguistic expression and inscriptions of textuality. Some of her objects of hybrid scientific-cultural investigation are cybernetics, information theory, hypertext narratives, electronic literature or techno-texts, the structures of computer documents, digital artworks as "writing machines," and the effects of computational media on language.[551] Hayles' work on these software codes is crucial to the overall argument of the present study. Her deep dive into the fate of language, literature, and storytelling in the age of computing will be of great help to my project of Creative Coding to challenge the social and technological life-conditions of hyper-modernism and hyperreality.

The ten books and many articles that Katherine Hayles has written bring together, and rethink the foundations of, the two usually separated intellectual cultures of literature and science (or humanities and science) in a transdisciplinary and original way. There is a desire to develop what Charles P. Snow termed an in-between "Third Culture," one that would reconcile the formerly divided two separate cultures. In the 1963 revised edition of his book *The Two Cultures, and A Second Look*, Snow modified somewhat the views that he had previously expressed in the 1959 original edition of the book *The Two Cultures*.[552]

How We Became Posthuman was primarily a critique of the historically specific "posthuman" view of technology of the post-World War II movement in ideas called *cybernetics*. Hayles' system of thinking has since evolved towards a hopeful vision of a posthuman future of co-existence between humans and non-human actors in society. Hayles' work is also deeply ethical, feminist, and ecological, always calling out racism and Western domination of those whom its hegemonic practices and discourses call "others." She is a theorist of embodiment, material-semiotics, and trans-feminist resistance.

N. Katherine Hayles is a cultural historian of the interrelations between technology and society, and of the connections between storytelling and technoscience. She is a media theorist of the computational media age. *How We Became Posthuman* examines the command- and control-oriented founding formulations of computer science and cybernetics in the mid-twentieth century when a notion of bodiless and immaterial information came to prevail. In that movement of *first-order cybernetics*, humans came to be seen primarily as information patterns. Information lost its body. In the prevalent version of informatics, information or code is disembodied and has prevailed over materiality. The body is viewed as a mere shell or container that houses the subjective mind. Hayles writes that "there are no essential differences or absolute demarcations between bodily existence and computer simulation."[553]

From Liberal Humanism to Posthumanism

In the liberal humanist worldview that prevailed in Western Europe and North America from the end of the eighteenth century until the mid-twentieth century, emphasis was placed on the sovereignty of the individual, enlightened self-interest, and the "natural self." This liberal self is rational, thinking, and dualistically separated in a philosophical sense from nature, animals, and the world. The liberal humanist self tends to be white, male, property-owning, and hetero-normative. The positive hopeful version of post-humanist philosophy places into question all these assumptions. Intelligence comes to be conceived by Hayles as existing in a "cognitive assemblage" or co-production with intelligent machines. She takes the relation between human and machine intelligence in a different direction from that of predominant first-order cybernetics, for which "humans were to be seen primarily as information-processing entities who are *essentially* similar to intelligent machines."[554] As an alternative to the change in the definition of what it is to be human driven by the rise of informatics, Hayles seeks a compact, dialogue, or exchange between humans and AI.

There are continuities between the worldviews of humanism and mainstream posthumanism, and not necessarily a break between them. Descartes regarded the essence of his subjectivity and overcoming of ontological self-doubt as being his thinking mind in binary opposition to the body and to the world. For humanism, the body is merely another object to be owned and mastered. For mainstream posthumanism, the subjective mind extends to information and code. Computation replaces possessive individualism as the ground of being.

Hayles chronicles the scientific movement of *second-order cybernetics* –the concept of *autopoiesis* in cognitive science of *The Embodied Mind* by Varela, Thompson, and Rosch or

Heinz von Foerster's *Observing Systems*.[555] She chronicles *third-order cybernetics* – the Artificial Life research field that ascended in the 1990s of bringing software to semi-life of Christopher Langton and the Santa Fe Institute.[556] These successive waves of cybernetics have attempted step-by-step to recover the embodiment which had been lost in computer science's initial elaboration. Embodiment, for Hayles, is different from "the body." The body "is always normative relative to some set of criteria."[557] She invokes the example of medical imaging technologies like tomography which construct a normalized and idealized mapping of a data-driven simulated body against which the individual is called upon to measure herself, ignoring her own psycho-somatic connections. Embodiment "is contextual, enmeshed within the specifics of place, time, physiology, and culture, which together compose enactment."[558] Embodiment is a specific instantiation of individual experience.

Cyborg Spock and NASA's Cyborg

According to popular belief, science fiction is about the representation of science in an imaginary space or story. Once that assumption is made, it becomes important to talk about a "representation" like *Star Trek* in terms of the accuracy of the "representation." It becomes possible and desirable to write books with subtitles like *A Trek from Science Fiction to Science Fact*[559], focusing on the alleged journey from representation to "reality." Regarding the original invention of *Star Trek*, constant reference is made in the academic and journalistic literature to the fact that Gene Roddenberry (the creator of *Star Trek* in the 1960s) consulted "real scientists" when elaborating *The Original Series*. "Gene worked with several consultants. One was named Harvey Lynn, a scientist with the Rand Corporation."[560]

The problem with the presumption that science fiction is about "the representation of science" is that, in hyper-modern culture, there is very little representation anymore. The media is inclined to institute its own "reality." In an electronic media culture dominated by images, statistical models, video processing, screen hyperlinks, discourses without author, and endless reduplication and recombination, the difference between original and copy that is necessary for representation to take place tends to evanesce. The sign is substituted for the referent. The signs of "the real" are substituted for "the real." Signs and images refer principally to other signs and images, not so much to some verifiable outside "reality."

To better understand the relation between the original creation of *Star Trek* and science in a way that does not rely on a notion of representation, we can contemplate the "elective affinities" between the TV show's inception and the contextualized activities of 1960s space scientists. Technoscience studies (the methodologies of Donna Haraway, Bruno Latour, Sandra Harding, Karen Barad, N. Katherine Hayles, etc.[561]) scrutinizes objects of scientific knowledge that emerge in a specific historical period. It pays special attention to the coincidence of appearance among scientists and media artefacts of a new cognitive construct. In this vein, I pursue the association in the 1960s between NASA's design of a cyborg astronaut and Gene Roddenberry's design of his first alien: Mr. Spock of *The Original Series*.

Despite everything that has been written about cyborgs, the connection between Spock and the cyborg has never been made. Chris Hables Gray, editor of *The Cyborg Handbook*, says that there were no cyborgs in *The Original Series*.[562] This is a misunderstanding of what Haraway means in her cyborg theory. In thirty-five years of journalism and scholarship about *Star Trek*, Spock has been unendingly described in terms that rarely go beyond the cliché of his being the master logician or a figure "torn between logic and human emotions."

Donna J. Haraway, author of the milestone 1985 essay "A Cyborg Manifesto," has emphasized the importance of using the term "cyborg" specifically for techno-scientific entities that became possible in the historical conjuncture around 1960. "Pushing the reality of the cyborg harder" with situated knowledge means examining its entanglement in a definite matrix of cybernetic communications theories, ideas about humans as information processing devices, Cold War militarization, and behavioral and psycho-pharmacological research.[563]

Haraway cites the late twentieth century feminist science fiction writers Joanna Russ, Samuel R. Delany, John Varley, James Tiptree, Jr., Octavia Butler, Monique Wittig, Vonda McIntyre, Suzy McKee Charnas, and Anne McCaffery as weavers of narratives about what happens to identities and boundaries in an advanced technological society.[564] These authors are "theorists for cyborgs."[565] Organic and cybernetic are no longer separated in their stories of embodiment. In the breakdown of the border between flesh and machine, the hegemonic structure of the "Western self" is threatened. Haraway's focus is on (1) writerly stories about women of color and (2) feminist science fiction stories about "monstrous selves" who are no longer our enemies. Cyborg science fiction authors subvert the "origin myths" of Western culture by questioning naturalized identities and "recoding communication and intelligence to subvert command and control."[566]

Haraway's figure of "Sister Outsider" (taken from the title of the essay collection *Sister Outsider* by poet Audre Lorde) is the caricatured image of women of color outside the United States spread by fear-mongering demagogic politicians inside the United States.[567] Third-world women are claimed to be threats to the survival of first-world women. "Sister Outsider" writes for self-affirmation on the borders and "without the founding myth of original wholeness."[568]

Writing is technology. Feminist science fiction writes as itself a cyborg technology. It fights "illegitimately" for language and against the alleged "perfect communication" of the universal digital code of the first-order cybernetics of "phallogocentrism" (the privileging of the masculine). Humans are by now biotic systems and communications devices. They are coded. Code is fluid, reversible, and always changeable. Code undermines the distinctions of mind and body, and programmer and programmed. Haraway cites the female android Rachael of *Blade Runner* as emblematic of the blurring of the human/technology dualism. In Anne McCaffrey's novel *The Ship Who Sang* (1969), the birth of a disabled child is resolved by the technological hybridization of a brain and a machine.[569]

Feminist science fiction is about "cyborg monsters." The genre consistently brings into question the fixed binary oppositions of male and female, human corporeality and technology, and individual and systemic assemblage. Monsters have always played a major role in the Western imagination as defining the limits of acceptable community. Like the Centaurs and Amazons of ancient Greece, the hermaphrodites of early modern

France, and primates in the evolutionary and behavioral sciences, cyborg monsters in feminist SF continue this lineage.

In her novel *Houston, Houston, Do You Read?*, James Tiptree, Jr. narrates a tale of three male astronauts who are propelled three hundred years into the future by an anomalous solar flare to arrive in a world where men are extinct and highly competent women have developed great theoretical and practical knowledge.[570] In his Gaea trilogy, John Varley writes of a giant living torus in orbit around Saturn, ruled by a controlling intelligence whom Haraway describes as a "mad goddess-planet-trickster-old woman-technological device."[571] Octavia Butler's novel *Kindred* is a time-travel story of an African American woman transported back to pre-Civil War America, plunged into a situation of slavery. The protagonist's actions with respect to her new master will paradoxically preserve or eliminate the conditions for her own birth in her original late twentieth century time-period.[572] In *Superluminal*, Vonda McIntyre writes of space pilots who, to withstand the pressure of acceleration to faster-than-light speed, must undergo an operation to have their heart replaced by a mechanical pump.[573] To help humanity colonize inhabitable planets in distant star systems, the astronauts must metamorphose from the human condition to the status of cyborg. Posthuman transfigurations are also enacted by means of genetic re-coding and the implanting of nano-electronic devices.

Justine Larbalestier investigates *The Battle of the Sexes in Science Fiction*, a "genre where the negotiations that produce and shape heterosexual subjectivities are explicitly realized."[574] Joanna Russ writes: "The strangest and most fascinating oddities in science fiction occur not in the stories that try to abolish differences in gender roles but in those which attempt to reverse the roles themselves."[575] Larbalestier discusses David H. Keller's 1929 story "The Feminine Metamorphosis" and Edmund Cooper's 1972 novel *Who Needs Men?*[576] In Keller's short story, thousands of women take over the world in a conspiracy. In Cooper's symptomatic sexist tale, a male protagonist establishes heterosexual economic exchange for an entire culture by sealing the heroine's acquiescent allegiance through a symbolic penetrating kiss that is overwhelming and nearly orgasmic. The foundational kiss is the prerequisite to a new system of sexual and gender circulation. It marks the turning point from matriarchy to patriarchy and reinstates both sexes to the status of so-called "real men" and "real women."

Haraway writes: "Science and technology are possible means of great human satisfaction, as well as a matrix of complex dominations."[577] Technological skills are a dimension of embodiment. One can take pleasure in becoming technically competent. Humans need to take responsibility for their machines. The task of the feminist cyborg is to actively challenge the informatics of domination.

First Order Cybernetics

In their landmark 1960 article "Cyborgs and Space," Austrian-Australian neuroscientist Manfred Clynes and American psychiatrist Nathan Kline coined the influential term cyborg.[578] This new word, an abbreviation for cybernetic organism, described a technologically enhanced astronaut who would be better equipped than an "ordinary human" to thrive in the harsh conditions of outer space travel. The "augmented man" of interplane-

tary voyages would be endowed with upgraded replacement parts, integrated electronic extensions, and an internal drug-releasing device to promote optimal performance.

During the early 1960s, at the time of the flights of the "telemetrically implanted chimpanzee" Enos (who orbited the Earth twice) and the human pioneering Mercury-Atlas soloists, NASA commissioned "The Cyborg Study." The final report of this investigation was submitted to the space agency in May 1963 under the title "Engineering Man for Space."[579] The project studied the feasibility and application of artificial organs, hypothermia, suspended animation, implanted oxygenating equipment, electric neurological excitation, multimedia sensorial stimulation, and regulated drugs in facilitating the adaptation of astronauts to the extreme conditions they would encounter during Deep Space expeditions. NASA's cyborg architects believed that their conception of refitting human beings to function efficiently in a "freely chosen" alternative environment was part of a spiritual awakening of humans taking an "active part in [their] own [second] biological evolution."[580]

To cope with the environmental, physiological-medical, and psychological difficulties encountered by "man in space," information and life science systems experts (Clynes and Kline) conceived of a bionic posthuman outfitted with surgically grafted electronic sensors; homeostatic and feedback-yielding instruments; and an osmotic pressure pump capsule, embedded under the skin to allow injections of chemical substances at controlled rates.

Thanks to systematic modifications to his body, the NASA cyborg can survive for long stretches of time in outer space's hostile conditions of radiation, near-zero gravity, extreme temperatures and air pressures, low oxygen supply, and scarce food. A physiotechnical system that substitutes for breathing will be implanted. Like the hyper-intelligent fish invoked as metaphor in "Cyborgs and Space," who would fabricate extraordinary techno-apparatuses to venture onto land, Cape Canaveral's Man will overcome his innate biological limitations to prosper within the closed-system confines of space travel. He will master his metabolic and physical movement requirements, including the cycles of hunger, thirst, and fatigue. Klynes and Cline sought an overcoming of inherent physiological limitations for their cyborg astronaut, who would function without the "constraints that having evolved here on Earth make him subject to – the level of gravitation, the oxygen, the atmosphere."[581]

The intellectual background to the 1960s NASA scientists' enthusiastic figuration of the astronautical cyborg was the cybernetic science of control, command and communication in humans, animals, machines, and living-nature elaborated by mathematician Norbert Wiener of MIT in the years just after World War II.[582] First-wave cybernetics focuses on message feedback loops and information transfer as organizational forces in the study and mastering of complex systems. The term cybernetics derives from the Greek *kybernetics*, denoting steering or governance. By emphasizing informatics and statistics in a systems context, Wiener and his colleague Arturo Rosenblueth unified the conceptualization of techno-scientific knowledge objects which had been divided into the separate categories of the living and the non-living. One of Wiener's primary conceptual models, the self-regulating man-machine system, was taken over by Clynes and Kline. As articulated by the two Rockland State Hospital research scientists, the handlers of the cyborg

astronaut would systematically overcome his discomfort through an approach combining pharmacology, machinic apparatuses, and hypnotism.

Norbert Wiener was obsessed throughout his career with the reduction of entropy, uncertainty, chaos, degradation, Brownian motion, and "dis-organizational noise." The outcome of his work in first-order cybernetics was that "humans were to be seen primarily as information-processing entities who are essentially [like] intelligent machines."[583] What allowed Wiener to include "transformed humans" and "beyond mechanical" machines enriched by feedback in the same heuristic category was their shared "ability to use probabilistic methods to control randomness."[584] Only non-cybernetic mechanical systems lacked the negentropy of relational messages and informational order. In the "first wave" order of rational technoscience, entropy, chaos, and flows are still the targeted enemies. The "emergent phenomena" of uncontrolled complex self-organization are exterior to its definition of information. Wiener defined information probabilistically as the choice of messages fighting the entropy or noise that was its opposite. Methods of statistics and probability would control randomness. The artefact of the feedback loop is an opening for Hayles to articulate her view that links humans and machines in "cognitive assemblages."

How Information Lost Its Body

As the philosopher of technology Arthur Kroker cogently explains, Hayles' view of computation is not that of some universal computer of either the natural or artificial realms that would allegedly generate and program all of reality.[585] Her vision is that of a hidden yet embodied and creative tension waiting to be rendered visible between the discrete identifiers and differences, or zeroes and ones, or computable numbers, of the digital-binary logic. Utopian potentialities, for Hayles, are to be discerned at the inflection points within systems understood as being dynamic. Hayles' pioneering literary perspective on computing is not some idiosyncratic view belonging to the so-called digital humanities. It is, to the contrary, essential to the project of resisting the totalizing systems of the informatic society.

The Macy Conferences on Cybernetics were a series of scientific meetings organized by Warren S. McCulloch and Frank Fremont-Smith which took place in the late 1940s and early 1950s. They brought together luminaries from academic fields ranging from linguistics and anthropology to physics and engineering.[586] The conferences gave a great boost to neuroscience as a bridge between physiology and psychology.

The researchers convened by the Macy Foundation played a major role in the construction of information as the disembodied media that enables humans and machines to become objects of a single unified science. Information became more important than materiality and "lost its body." The neural structures of the human mind were conceived of as flows of information. Another contributor was Claude Shannon, who stressed that, according to Hayles, "information theory concerned only the efficient transmission of messages through communication channels, not what those messages mean."[587] Untethered from context and content, information became a weightless mathematical entity or quantity of pure probability.

Data and code – and even concepts of what are human consciousness and thinking – have become disembodied and cut off from relations, circumstance, and embeddedness. As a chronicler of the digital age and computational media, Hayles investigates how disembodied free-flowing data has been upgraded in steps by the three successive historical waves of cybernetics. Digital code and automatic writing – the algorithm-generated opposite of fleshy narrative – have superseded analogue-era simulacra or hyperreal forms of image and rhetorical language. SF stories are, for Hayles, the eminently embodied form of discourse. The lesson of Hayles is the appreciation of human discourse as either poetic or numeric or, even better, as new innovative hybrid of both as "electronic literature" or "writing and code."

Disembodiment and re-embodiment are the crucial stakes in Hayles' narrative of the past and future of informatics. The body-less alteration between the on and off switch states of formal logic play host to and conceal an embodied difference that challenges the taken-for-granted certainty of the formal-numeric difference. There exists an incompleteness (in the sense of Kurt Gödel's incompleteness theorems[588]) of the strict identity/non-identity that is at the basis of digital computing. This would be a fleshy difference inside the habitual definition of the discrete difference. The logic of the binary code is undergoing its self-deconstruction as a playful logic of presence and absence pointing towards something deeper.

In a 1995 interview, Dr. Manfred Clynes expressed dismay at the travestying and "total distortion" of his original concept of the cyborg by popular icons of contemporary science fiction cinema and television, such as James Cameron and Arnold Schwarzenegger's *Terminator*, Paul Verhoeven's *Robocop*, and even *Star Trek*'s Borg, with that Delta Quadrant alien species' connotations of insect-like Group Mind and "technological totalitarianism."[589]

Contrary to cultural legend and widespread misleading interpretations which identify the fearsome Borg Collective of assimilated robotic-humanoids as the leading cyborg figure in the *Star Trek* universe, it is the *Enterprise*'s half-human, half-Vulcan First and Science Officer Spock who perfectly embodies the cybernetically-extended spacefarer of which NASA scientists dreamed, and which they partially succeeded in constructing. Looking at the particulars of Spock's imaginative creation by Roddenberry reveals him to conform very closely to the 1960 specification of Clynes and Kline, as well as to that of the 1963 Cyborg Study of the "physiology of man in space" undertaken during the epoch of the Mercury, Gemini, and Apollo programs. Looking at Spock's character reveals him to be a cyborg in Haraway's related second sense. He is a divided self who explores the boundaries between organic and machinic, human and nonhuman, and informatics and biology.

Spock may not wish to conclusively reject his human side. He seems to be lacking a language to express himself and his unnamed cyborg existence. Spock's extraordinary techno-scientific competence could be cracked open as the basis for new imaginative and creative practices. Technological skills do not have to be constrained by the assumption that the domain to which they belong must never have anything to do with crafting an intersubjective existence. Spock starts to notice the radical singularity of objects and the "otherness" of other people, against the obsession of scientific explanation and classification which was his habit.

Claus Pias on First-Order Cybernetics

The complete transactions of the Macys Conferences on Cybernetics, held between 1946 and 1953, were recently (2015) edited by Claus Pias and published in English and German. Pias discusses the importance of first-order cybernetics in the post-Second World War history of ideas in his introductory essay called "The Age of Cybernetics," which appears at the beginning of the volume.[590] Ten conferences took place under the heading "Cybernetics, Circular, Causal, and Feedback Mechanisms in Biological and Social Systems." The venue was the Beekman Hotel on Park Avenue in Manhattan.

The advent of the computer and its digital logic in the mid-twentieth century inspired a resolute rethinking of the Claus boundaries of the scientific disciplines which led the transdisciplinary thinker Gregory Bateson to exclaim: "I think that cybernetics is the biggest bite out of the fruit of the Tree of Knowledge that mankind has taken in the last two thousand years."[591] At issue were fundamental questions of knowledge and clarifying the definition of cybernetic epistemology. Norbert Wiener had started the discussion by proclaiming that cybernetics would unify into one science the study of humans, animals, and machines by grasping the shared systemic nature of information and the feedback mechanism which are common to all those objects of inquiry. Cybernetics was to be a science of command, control, and regulation. It would be relevant to established knowledge fields ranging from economics, psychology, and sociology to the analysis of art, music, and literature. All disciplines were to be rethought under the numeric, digital, and informational paradigm.

In his essay, Claus Pias articulates the essence of the intellectual synthesis which the luminary presenters and discussants achieved at the Macys Conferences. The deepest questions remained unresolved, however, and cybernetics was overtaken in the 1960s by the more banal paradigm of "computer science," which limited itself to pragmatically writing better programs and better serving the machines. This engineering-oriented informatics of data structures, algorithms, and operating systems became the standard curriculum at technology universities. The current revival in the twenty-first century of interest in the first- and second-order cybernetics which historically preceded technical computer science is a strong hint of widespread desire today for a trans-disciplinary informatics to reappear.

According to Pias, there were three components of a "set of models" discussed at the Macys conferences which were crucial to the cybernetic synthesis: the logic of Boolean algebra embedded into neurological and physical circuitry, information theory, and feedback.

(1) In their 1943 article, "A Logical Calculus of Ideas Immanent in Nervous Activity," the logician Walter Pitts and the neurophysiologist Warren McCulloch proposed the mathematical model of a neural network. Their "threshold logic" and concept of a formalized neuron implied a universal theory of digital machines. Humans are information machines. Humans are embodiments of switching logic. One reason why humans are themselves digital is that everything, both natural and artificial, is a digital information machine.

(2) The information theory of Claude Shannon is, in Pias' formulation, a "stochastic theory of the symbolic."[592] It is a theory and practice of universal symbol manipulation.

Information is a new technoscientific concept beyond matter and energy, which were previously thought to be the basis of all "physical" objective reality in the universe. Information fights against entropy. According to Shannon, information can arrive intact at its receiver due to its mathematical abstraction from materiality, its existence independent of the physical conditions surrounding the transmission.

(3) In their 1943 article "Behavior, Purpose, and Teleology," Arturo Rosenbleuth, Norbert Wiener, and Julian Bigelow had formulated what Claus Pias calls a "non-deterministic yet teleological theory of feedback." Biological and artificial systems both require information and feedback to be productive. They both operate on a logic of signals and cycles. Systems do not always require new input. They can instead be self-sustaining by converting their own outputs into instructions received and processed at anticipated and discrete intervals of time.

Pias emphasizes that, at the time, the participants in the Macys conferences did not think of themselves as having arrived at an overall coherent perspective. First-order cybernetics was post-humanist in the sense of seeing both humans and everything that is not-human as digital machines. The agreed upon science of information was disembodied in that the discrete logic of the digital lacked materiality and the continuousness or "in-betweenness" of the analog.

The conceptual grasping of systems in their time-based teleological dynamic meant that the verb tense of cybernetics would be the "future perfect." Everything will have always already happened. What characterizes the digital age, for Pias, is "the excess of presentness in the present."[593] In first-order cybernetics, there was a kind of optimistic social engineering or technological determinism. The result was a belief in a cybernetic or technocratic government. A correctly parameterized and steered system could be set in motion and the desired results would occur quasi-automatically. All intuition, judgment, and debate would be removed from the political.

The inheritors of first-order cybernetics and cybernetic epistemology are systems theory (which separates the construction of a functioning system and the description of its functioning), actor-network theory (an action-oriented view of assemblages in society and nature consisting of both human and non-human components, processes, and interactions), and the trend of creating computer simulations to forecast the future.

Claus Pias concludes his essay on a pessimistic yet very insightful note:

"The established methods of understanding have clearly reached their limits and now serve merely to indicate even more conspicuously how strongly they have been influenced by the cybernetic technologies that they seek to describe."[594] The irony is that the social and human sciences have become so imbued with "cybernetic" methodology that they have lost the distance or independence required to see clearly what they investigate.

Gene Roddenberry Designs His First Alien

Due to the genetic sequencing that he shares with other Vulcans, Spock can "withstand higher temperatures, go for longer periods of time without water, and tolerate a higher level of pain" than humans.[595] Spock is more resistant to radiation and needs less food to nourish himself than his non-Vulcan counterparts on board the *Enterprise*. Physical dis-

tress, for Spock, is merely a kind of information input, "which a trained mind ought to be able to handle," as he declares from his bio-bed in sick bay in the episode "Operation – Annihilate!" Spock does not perspire. He exercises extreme restraint in his "movements, gestures, and facial expressions."[596] He has greater physical strength. He has more acute hearing, due to evolutionary adjustment to sound wave attenuation in the thin atmosphere of Vulcan.

The most important of Spock's qualities as a cybernetic organism is his superior neural-cerebral proficiency, due to the "enlarged neocortex" of Vulcans, in the areas of information gathering, processing, and analysis. Spock can directly understand machine language output from a computer's CPU, without the interface of higher-level programming languages, graphical displays, or speech synthesis. "He can even read memory bank 'bleeps'."[597]

Mr. Spock is a data wizard, constantly in the flow of information feedback, long-range sensors, handheld tricorders, and makeshift techno-contrivances. In the episode "The City on the Edge of Forever," he concocts the alternate timeline online newspaper reader from vacuum tubes and pieces of wire. He holds the highest computer expert certification (A7) awarded by Starfleet Command. Spock is most typically seen standing at his Bridge position – the library-computer station which interconnects all host and distributed workstation systems on the ship. He can absorb "library" database information at a rate eight to ten times faster than a normal human. Spock the cyborg is an organism rethought as a technological device.

The most fruitful insights to be gained from working out the concept of the cyborg require going beyond the popularized definition of the cyborg as an entity combining organic and machinic parts. Mr. Spock as a techno-cultural figure can above all be grasped within the cybernetic paradigm of a self-regulating information-processing machine built for purposes of command, communication, and control. Spock can also be understood as a cyborg in the important second sense fleshed out in Donna J. Haraway's thinking.

Spock shows himself to be capable of enlarged apprehension of "that which is other than myself." His ongoing search for freedom in The Original Series occurs in the shadow of his hybrid and initially awkward circumstance as a life-form made by technoscience. "As my parents were of different species, my conception occurred only because of the intervention of Vulcan scientists. Much of my gestation was spent outside my mother's womb."[598] Spock is "an illegitimate offspring of technoscience" (Haraway, "Cyborg Manifesto")

Cyborg is the mode of resistance to the "techno-bio-power" of the first order of cybernetics. As we shall see, the simulating and seductive android resists the second order. The "body without organs" or "nomad in reversion" resists the third.

Spock transmutes in the direction of a heterodox, many-layered, and trickster position that is no longer satisfied with the established truths of either of his – Vulcan or human –heritages. What emerges is an almost accidental new subjectivity or mutated experimental way of life. Haraway's double sense of the cyborg is someone who belongs to a concrete scientific history yet seeks a new radical sense of self. Spock must figure out which elements of his human and Vulcan sides to weave together. Facing his situation as a "processed" technological being with exceptional machinic skills, he moves away from

the model of the mastering subject patterned command, communication, and control after a tool, and towards the expression of a sense of self that starts from the other. This affirmation grows from dialogue with interlocutors like the alien Horta in the episode "The Devil in the Dark."

"The Devil in the Dark": Empathy for Radical Otherness

Spock is unusually empathetic. He begins to demonstrate his unusual capabilities of empathy towards alien others in his "mind meld" encounter with the silicon-based Horta life-form on the mining planet Janus VI. The workers of the mineral production station are menaced by a hideous creature they are not sure they have ever seen. The beast has allegedly killed more than fifty of them, apparently via exudation of a highly corrosive mixture of acids. Captain Kirk and Mr. Spock are the first to get a clear look at the low to the ground, slithering being as it moves with great speed through the underground labyrinth of caverns and tunnels.

The creature has left security guards and engineers "burned to a crisp." It seems to possess the ability to burrow through solid rock, since new tunnels have been noticed. The killing began three months ago. Machine parts that the miners put in place on a newly opened level mysteriously disintegrated, and a multitude of unidentifiable spherical silicon objects were discovered. The colonists would like nothing better than to terminate "the monster" so they can get on with their work of extracting valuable pergium from the hard rocks.

Spock deduces from various pieces of evidence that the enigmatic entity is intelligent, and that the caves are its natural habitat. It must be capable of rational thought, the Science Officer conjectures, because it stole the one item of equipment, the perfusion pump, vital to the functioning of the fission reactor used by the mining colony for heat, electrical power, and life support. Since the creature was not injured by a blast from phasers, it must be constitutionally different from carbon-based life-forms. The alien must be silicon-based. The dark grey silicon nodules with a light oxide outer layer found by the miners must be its eggs.

With a reactor meltdown looming, and 48 hours of breathable oxygen still left, the Starfleet officers must act quickly to find the alien. They assemble a search team and enter the serpentine complex of tunnels. Spock adjusts his tricorder to pick up traces only of "silicon life." Moments after a security guard is fatally attacked, Kirk and Spock espy the crawling, rock-like creature on the tunnel floor. The animal makes a rattling sound and charges them.

Kirk and Spock shoot the creature with handheld phasers. It escapes despite being wounded, cutting a new passage through the stone walls. Kirk and Spock separate into parallel tunnels. Alone in a small chamber, rocks collapse around Kirk. The bulky life-form appears and blocks his way, trapping Kirk within its inner lair.

The multi-colored alien beast does not menace him. Observing its hesitant moves, Kirk sees the deep gouge in its side where its fibrous silicon skin was ripped by the phaser beam. The entity is severely injured and in pain. Although afraid of Kirk's weapon, it

stands its ground in a protective posture, close to the many silicon nodules embedded in the wall.

Spock arrives at the clearing with a raised phaser, but Kirk tells him not to shoot. Spock initiates the Vulcan technique of the joining of two minds to attempt reciprocal communication. Spock closes his eyes and concentrates his mental powers. He comes close to the alien, which is in agony from the phaser wound, and establishes a first telepathic contact.

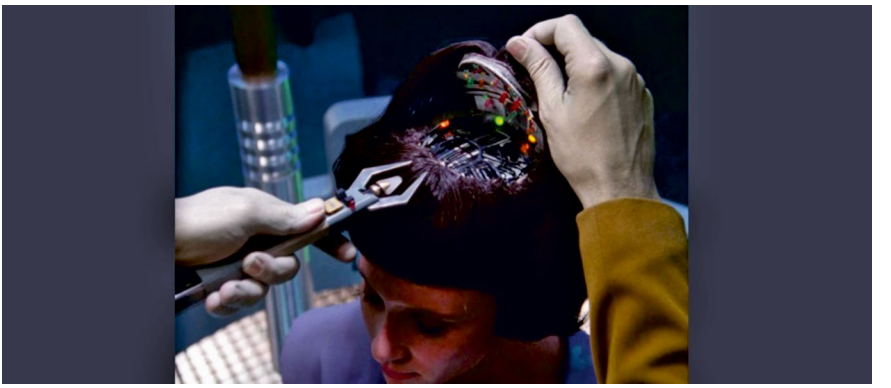
Spock screams out in torment and collapses to the ground. "Waves and waves of searing pain," he emotes. The animal slides wormlike to an open space, then moves again, leaving a three-word message in broken English branded in the ground: "NO KILL I." The open-ended, grammarless utterance is neither indicative nor imperative. Is it a promise or a plea? Is the Horta asking that its life be spared or stating that it will not kill further?

Spock touches the Horta with his hands. He reenters the trance and begins a communion with an alien other. He becomes, for one instant, the voice of this last of a dead race whose offspring are about to hatch in renewal of life but are threatened by annihilation:

> The thousands, eternity ends, it is the end of life, murderers, go out into the tunnel, to the chamber of the ages, cry for the children, walk carefully in the vault of tomorrow, sorrow for the murdered children, sadness for the end of things, it is time to sleep, it is over, death is welcome, let it end here.

Star Trek: The Original Series, Paramount Pictures, 1967

Spock breaks from the spiritual copula. With tears in his eyes, he explains to Kirk and Dr. McCoy – who has been called in to try to heal the wounded creature – what he has learned. The highly intelligent and normally peaceful Horta species has lived underground on Janus VI for millions of years. Every fifty thousand years, all Horta except one die out. The sole survivor is responsible for caring for the unhatched eggs of the new generation. The miners broke into the nursery and unknowingly killed hundreds of the silicon spheres, unrecognizable to them as eggs. The "Mother Horta" only became bellicose in defense of its unborn children.



Star Trek: The Next Generation, Paramount Pictures, 1990

The miners agree to peaceful co-existence with the alien creature and its offspring. The reactor pump is returned. The pergium excavators begin to see the young Hortas' natural-born aptitude for digging tunnels as an economic asset to their business enterprise. McCoy heals the life-form made of stone and plastics with inventive medical treatment. He trowels over the gap in its epidermal plating with thermo-concrete. All parties are left to contemplate what Mr. Spock has accomplished with his remarkable empathy towards otherness.

Second Order Cybernetics

Katherine Hayles discerns a "crucial crossing point" from first- to second-order cybernetics in the conceptualization of information theorist Claude Shannon. Shannon differed from Norbert Wiener by identifying information and entropy in positive correlation, rather than in a relation of mutual opposition. Shannon's appreciation of *noise* was an opening for entropy to be rethought as the "thermodynamic motor" driving a system to self-organization, instead of as the enemy of information and command logic, as in Wiener's view. Shannon's perspective on information afforded an early glimpse of dissipation and chaos being affirmatively valued as fecund sources of "increasing complexity and new life."[599]

Hayles finds an elective affinity between second-order cybernetics and the science fictional literary achievement of Philip K. Dick. Hayles stresses the importance of science fiction stories for tracking the figures of the cyborg and the android through the successive orders of cybernetics. "Cyborgs are simultaneously living beings and narrative constructions. The conjunction of technology and discourse is crucial."[600]

Hayles associates the second order with the theory of the *autopoiesis* (self-making) of "living organization" elaborated by Chilean neurophysiologist Humberto Maturana and his co-author Francisco Varela in studies published around 1980. What Hayles regards as significant in Maturana and Varela's work is their emphasis on the structural coupling or reflexivity of including the observer as an integral part of the system observed. For autopoietic systems, so-called "reality" comes into existence through the system's self-organizing perceptions. These apprehensions enable the system to attain its self-referential goal of the continuous reproducing of its autopoiesis. Maturana and Varela highlight the repetitive and recursive systemic processes that give rise to specific behaviours, rather than the behaviours themselves. This self-production of systems relates closely to the situation of the tautological, self-defining system that is a principal object of reflection in Baudrillard's work. It is a "thinking of closure" that asks the question of the limits of the simulacrum and the conditions that make it possible. Radical thought seeks the "escape hatch trapdoor way out" of a circular and self-legitimating system.

In second-order cybernetics, OO software intelligence is embedded in small self-contained units. Computation is accessible through "inheritance mechanisms" and open interfaces. Experiences and culture are instantiated in a pre-packaged way by systems which cull information from backend databases, massage with "real-time" processing, and pass it to user interfaces through the framing patterns set up by corporate graphics web designers.

The computer science paradigm coinciding with second-wave cybernetics is that of object-oriented programming languages like Java and C++, diagrammatic object-oriented analysis and design notational languages like the Unified Modelling Language, distributed object and messaging technologies, and multi-tier application architectures. OO is halfway from the human subject-dominated procedural and functional paradigms towards the self-awareness of AI. The artefacts of the "software class" and the "software object" encapsulate data and code in a single entity. The object-oriented software object is aware of both its own attributes and the methods which operate on that data or properties.

Bernhard Dotzler on Second-Order Cybernetics

Bernhard J. Dotzler is a prominent German media theorist who has written extensively about the philosophical, scientific, and literary historical backgrounds to the beginnings of the apparatus of the computer and first-order cybernetics. In his major three-volume work *Diskurs und Medium*, Dotzler considers discourse and medium as embodied knowledge or thinking, examining "archaeologically" the interconnections between technology and the history of ideas. It is a project to rethink the past now that it has become clear that digital media technologies are decisive imprints on culture and society in the present

and future. In the first volume, subtitled *Zur Archäologie der Computerkultur* (2006), Dotzler surveys "machine thinking" from Kant to cybernetics.[601] He writes about the Gestalt psychologist Fritz Heider (author of the influential essay "Thing and Medium" on the psychology of perception). He emphasizes the importance of philosophers Nietzsche and Foucault for the media theory of the digital. Dotzler analyzes Charles Babbage's difference and analytical engines in reference to Marx and Hegel, and the constellation of ideas which led to the mathematical model of the Turing machine.

Dotzler explores what he calls the "simulacra of simulation" in early film history. He writes about simulation superseding representation or *mimesis* or fiction:

> Fiction and simulation emerge in a dichotomy that results from the fact that simulation reverses the opposition between fiction and reality. Simulation ceases to be equivalent to fiction and instead establishes itself in its own reality… This inherent reality, this decoupling of simulation and fiction, becomes the main thing – despite or because fictional realities continue to be generated via simulation.[602]

In the second volume, subtitled *Das Argument der Literatur* (2010), Dotzler investigates the relationship between literary history and computer technology, ranging in his studies from Goethe as a precursor to systems theory to considerations of poet Gottfried Benn and philosopher Max Bense. Dotzler writes about "the world on a wire" from Heinrich von Kleist to Paul Virilio.[603] He comments on Edgar Allen Poe's relation to Charles Babbage. It is a self-questioning of the traditional concerns of literature studies, going beyond the emphasis on discourse to recognizing the co-determining status for contemporary culture of hardware-oriented media devices. What happens when electronic and cybernetic technologies supersede language?

The third volume of *Diskurs und Medium* (published in 2011) is subtitled *Philologische Untersuchungen: Medien und Wissen in literaturgeschichtlichen Beispielen*.[604] Dotzler presents additional examples from literary history, tracing how and which knowledge came to be embedded in media leading up to the digital. Digital media technologies are the cause and effect of the cybernetic society. What is the link between writing and the phenomena of media?

The relationship between cybernetics and German media theory is a captivating research question. Following Kittler's death in 2011, Dotzler wrote the essay "Idiocy, Forgetting and Outdatedness: Friedrich Kittler's Avant-Gardism and the 'Time for Other Stories'" to honor the work of the man widely considered to be the prime mover of the media theory turn in German universities.[605] Dotzler read a version of his essay out loud at the Kittler colloquium convened at the Deutsche Haus of New York University. Dotzler emphasizes the crucial role of "forgetting" in Kittler's system of thinking. When all information, words, and discourses are saved in massive databases, then human memory is either no longer, or perhaps never was, what the human sciences believed it to be. Institutionalized data storage allows us to continuously forget.

Kittler was fascinated by programming, especially at the lower level of assembler languages, "close to the machine." He went beyond discourse analysis to *Aufschreibesysteme* (systems of notation) and the "diagnosis of the present state of data storage, transmission, and calculation in technical media." "It's time for other stories," Kittler proclaimed.

It's time to go beyond books to electronic data processing, and to go beyond language-based communication to direct "touching with the other" as in reciprocally fulfilled sexual desire or poetic sound like Pink Floyd's "Brain Damage" on "the dark side of the moon." The challenge for literature studies in the cybernetic era became how to describe, in the medium of writing, that which is henceforth beyond writing. Kittler wanted a "literary criticism of technical media." Reaching outside conservative German academia, he owed the opportunity for his epistemological break to the openness of American universities, the insights of French theory, and cybernetics.

What one senses in the work of Bernhard J. Dotzler is the idea that second-order cybernetics preceded or takes precedence over first-order cybernetics. The decisive influence on Kittler and Dotzler was not Claude Shannon or Norbert Wiener but rather Heinz von Foerster. Von Foerster was an Austrian-American thinker working in physics, philosophy, informatics, and cognitive science. He developed the reflexivity idea of "the cybernetics of cybernetics," applying cybernetics recursively to itself. He insisted on the undeniable role of the observer in all systems, which were now understood as observing rather than observed. As contrasted with the first order, second-order cybernetics emphasized epistemology and the self-organizing and self-maintaining (autopoietic) capabilities of complex systems.

In his essay "Demons – Magic – Cybernetics: On the Introduction to Natural Magic as Told by Heinz von Foerster," Bernhard Dotzler writes about von Foerster's engrossment in the study of magic practices in earlier times of human history.[606] He was an avid reader of Johan Christian Wiegleb's multi-volume *Lehrbücher über natürliche Magie*.[607] What especially attracts Dotzler's attention is von Foerster's interest in the famous thought experiment in the history of science known as "Maxwell's demon." In 1867, the physicist James Clerk Maxwell postulated the existence of the demon trying to disprove the second law of thermodynamics (heat always migrates from hotter to colder spaces). The demon hypothetically controls a passageway between two chambers and overrides the second law. The demon filters which molecules go into which chamber according to the independent variable of their velocity, thus reversing the physical law expectation of which chamber heats up and which cools down. For von Foerster, according to Dotzler, another name for the demon is regulation or "the observer." The cybernetic information theory principle of separating information from noise or entropy, would be the operation of a certain demonic action. Von Foerster turns Maxwell's demon on its head into something positive.

Von Foerster divides Maxwell's demon into two parts: an internal demon and an external demon. The internal demon takes care of the order within the system. It prevents new inputs from the outside from potentially sending the system into an unmanageable state of too high a level of entropy. The external demon strives to push the system into disorder with continuous inputs. This doubly demonic pressure is what, according to von Foerster, can incite the emergence of self-organizing systems.

Diego Gomez-Venegas zeroes in on the coupling of von Foerster's work on memory and Kittler's early essay "Forgetting" as a trenchant way of understanding the relationship between cybernetics and German media theory.[608] Von Foerster developed a phenomenological theory of memory supported in an interdisciplinary way by psychology, physiology, and quantum physics. For Gomez-Venegas, the cybernetic nucleus of Kittler's media theory is the epistemic reshaping of memory and forgetting in the post-

human condition brought about by technological information systems. Language exchanges of speaking, reading, and writing are now archived, at least temporarily, into the omnipresent physical storage devices and databases. Memory is mediated by the media and the result is forgetting. "Information is erasable, rewritable, and forgettable," writes Gomez-Venegas. "Humans become the embodiment of a technological forgetting."[609] It is no longer necessary for the human to remember (or perhaps even to think) since the archive remembers (or simulates thinking) for him. Post-humans have delegated much of their mind activities to machines.

The Android Data of *Star Trek: The Next Generation*

Each new epistemic wave in the genealogy of cybernetics preserves the properties of the preceding wave. The qualities of seduction and reversibility separate android from cyborg resistance. In the second order of informatic self-reflexivity and object-orientation, technologies increasingly give rise to effects which are the opposite of those intended. The "android condition" can unravel this conundrum and challenge simulation. It must articulate a double strategy of both "truth" and "performance" that opens towards an "outside" of a system that, in its very design and core algorithms, "excludes nothing."

In the episode "The Measure of a Man," where the trial of Data takes place to determine if he has the right to dispose over his own life, Data becomes the double of Captain Picard (Patrick Stewart), pushing him to doubt his self-confident liberal humanism. How will we, ourselves merged with technologies, no longer sure of our boundaries, be judged if we sit in judgment of Data? The android can be an anamorphic mirror to us, enabling the maker to see elements of his veritable appearance of which he was not aware, and inducing an actual transformation in us. The android mode of resistance embodied by Data is the "way out" of a circular and self-legitimating system. To explain the existential situation of Data, I will recount and explicate the episode "The Offspring" about Data's android daughter named Lal.

"The Offspring": Data's Daughter Lal

After attending a cybernetics conference in 2366, Lt. Commander Data spends all his off-duty hours for two weeks in a locked laboratory, at work on a secretive project. At the scientific meeting, Data learned of a breakthrough in "submicron matrix transfer" technology. Entering the clandestine lab on invitation, Lt. Commander La Forge, Counselor Deanna Troi, and Wesley Crusher are startled to hear from Data that he has built an android clone of himself, endowed with a like "positronic brain." The unexpected AI advance has enabled the Soong-type android to "lay down complex neural net pathways" that allow the transfer of programming subsystems from himself to the Offspring android. Such a crosslink procedure was held to be impossible or known only to the disappeared genius Dr. Noonien Soong, the original inventor of Data and his positronic brain. The term "positronic brain" was a *Star Trek* tribute to American science fiction writer Isaac Asimov,

who used the phrase positronic robotics in his many *I, Robot* print tales about twenty-first century robots.[610]

Data announces that the newly named Lal, a Hindi word for beloved, is his daughter. He hands out cigars. He intends to take full responsibility for her upbringing and parental care. Data teaches his child about paintings, the sense of touch, and how to inhale and smell a flower. He instructs her in how to blink, eat and drink, catch a ball, and absorb visual information from a computer display. It becomes clear that Lal is going to require a great deal of training in social and interpersonal skills. This will be an arduous process of supplementing her "innate android behaviour with simulated human responses."

To be with others "closer to her own age," Lal attends a shipboard elementary school. But the children are intimidated by her. They tease and make fun of her for her maladroit, excessively formal speech and deportment. She tells her father of her longing to become more human, to "fit in" with ordinary people. "I do not wish to be different!" she fervently declares. Her loneliness and sense of being an outcast are the beginning of her suffering.

Captain Picard has difficulty accepting that Lal's existence is an issue of parenting and Data's progeny. He is worried about the reaction of Starfleet's research division. They will look upon the parturition of the young female android as an issue of techno-scientific achievement and military opportunity. The milestone attainment represented by Lal opens the vista of making fully functional and serially reproducible sentient androids for Starfleet's use.

Admiral Anthony Haftel, a high-ranking research scientist at the Daystrom Institute of Technology, has been informed of Lal's procreation. Haftel regards the event as strictly a matter of a "technological step forward in the development of Artificial Intelligence." Haftel travels to the *Enterprise-D*. He officially notifies all parties that he is invoking the authority of Starfleet Research Standard Procedures and intends to take Lal into his professional custody. Haftel believes that the behavioural adaptation of the young female android will progress smoothly if she is placed in the care of cybernetics specialists in a supervised clinical setting.

Lt. Commander Data protests the recommended physical separation of Lal from himself. Captain Picard eventually comes to support Data's position. He recalls the legal gains made by Data when he was on trial in the episode "The Measure of a Man." Soong-class androids are "living sentient beings" whose "rights and privileges in our society have been defined." Admiral Haftel accuses Picard of sentimentality. Humanoid automatons of the type invented by Soong are too valuable to be put at risk. If Lal's development is not monitored by a team of experts and she remains in isolation with Data, then something could go wrong.

In the middle of the battle over her custody, Lal has a violent system and nervous breakdown. She is summoned to an uncomfortable interview with Haftel. When the Admiral states that he would like to move the female android to a cybernetics research facility, she reacts by asking if she has "done something wrong." She leaves the conference room in distress. To be transferred to the Technology Institute would mean the end of her dream to fit in with humans, and the beginning of being treated like a laboratory specimen.

Lal visits Counselor Deanna Troi in the Betazoid's quarters. She is overcome with fear and worry about her future. She clutches her abdominal area in psychically induced pain. She says: "this is what it is to feel." Her anxiety and confusion are an abrupt onset of emotions. It leads quickly to a neural malfunction or "general cascade failure."

The cyberneticists Data and Haftel perform an emergency operation on Lal. It involves repolarizing her neural net pathways and reinitializing the base matrix. They fail to save her.

As her condition worsens, Lal emotes deeply. She feels her love for her father Data. "I feel [love] for both of us." "Flirting, laughter, painting, family, female, human," she utters with her last breath. Lal dies after little more than two weeks of life.

After Lal complains that she and her father will never feel emotions, know love, or really be like humans, Data remarks that "it is a limitation we must learn to accept." "Then why do you still try to emulate humans?" Lal asks. Data replies at length:

> I have asked myself that many times as I have struggled to be more human, until I realized it is the struggle itself that is more important. We must strive to be more than we are, Lal. It does not matter that we will never reach our final goal. The effort yields its own rewards.

What is essential about being an android, Data reveals, is not the literal fixation on "becoming human" – misidentified, and endlessly repeated by the *Star Trek* industry in the cultural mega-legend of Data (and later of the "reversing cyborg" Seven of Nine). It is rather a struggle between the artifice of appearing to be human and the salutary unreachability of that target. The impossibility of realizing what she is striving for, the difference between the quest and its accomplishment, is the indispensable condition for the android's survival and flourishing.

What Data neglected to do for his daughter – and this omission led to Lal's passing –was to convey to her the positive essence of the android's posthuman condition. This is the tension or "artificial real" that he himself secretly lives, and which he at last articulates to Lal in the divulging final speech that comes too late. Admiral Haftel ironically objects to Lal staying with Data because she "may choose to emulate you rather than humans."

As Data's literary double, as the fallen android who is doomed because she fails to handle the specificity of a destiny which must not be lived too literally, the contrast of Lal brings into sharper relief what Data is. What defines Data is not the goal that he is perpetually trying to attain, but the fact that he will never get to that endpoint. To live, Data must always come up one step short of the Holy Grail techno-scientific breakthrough that would make him identical to humans. He is neither the same as nor different from the human. He is neither the same as nor different from himself. To become identical to the other or to oneself is a mistake.

Lal's preoccupation with becoming human destroys her. Data knows that he is not human.

Third Order Cybernetics

N. Katherine Hayles identifies the transition from the second to the third order of cybernetics in the surpassing of the principle of self-organization to that of evolutionary processes in lab-created unicellular life, robotic entities, and computer software "digital organisms" that lead to the sudden leap forward or surprises of emergence and mutation. The new life-forms have properties not calculable by summing their parts nor predictable by following the steps preceding their origination. Artificial Life is a computational paradigm for biology and a biological paradigm for software engineering. The bioinformatic professional might be qualified in immune system computing and genome programming.

Artificial Life holds more promise than Artificial Intelligence considered in the latter's original definition. Classical engineering-oriented computer science is based on combinatorial logic and treats software as an inert thing. Software can only do what it has been programmed to do. AI cannot lead to autonomous thinking if it is merely a continuation of the computer science of the past. Artificial Life is a movement that aims to make software more alive. In the 1990s, the Santa Fe Institute proposed the *Strong A-Life thesis* for creating software based on biology and cellular automata.[611] Software gets architected according to organic principles of self-organization. Self-replicating computer programs are said to be "alive," according to Hayles, through the rhetoric of biological analogies regarding complex behaviour, diversity regulation mechanisms, and their abundance of interacting adaptive agents. With original AI, human beings were still the measure for the techno-scientific project, since the stated goal was to build machines emulating human qualities. With ALife, the goal is to "evolve intelligence within the machine through pathways found by the 'creatures' themselves."[612]

The passage to the third order of cybernetics can be characterized as a techno-scientific rethinking of the relation between useful information and entropy.[613] In Norbert Wiener's first order of cybernetics, information is defined in opposition to useless entropy conceived as randomness and noise. Second-order cybernetics is an intermediate phase focusing on self-making systems preoccupied with their own perpetuation. The second wave has no major impact on the rethinking of entropy and uncertainty. In the third order of cybernetics – or the techno-sciences of genetic engineering, complexity theory, molecular biology, and ALife – there is a realization that entropy must be useful for work as turbulence and chaos. "Life does not tend towards entropy," but rather towards fruitful complexity.[614]

The second law of thermodynamics, conceived during the First Industrial Revolution, stipulates that, in an isolated system, heat-energy gets lost and useless entropy increases with time. Thermodynamic systems recharge themselves with energy from the outside and discharge leftover energies and disorder as refuse. In the paradigm shift to the hyper-modern sciences, complexity and uncertainty get rethought as productive.

Michel Foucault's disciplinary society is marked by confinement and separation, stress on inorganic processes, the irreversibility of one-way accumulation, the hierarchical organization of organs in the organism, and the primacy of death and "the end." The "homeostatic" body of the bounded self seeks stability and equilibrium. The post-disciplinary desiring-power described by Deleuze emphasizes organic life and liquidity

and is concerned with beginnings. The turbulent body reappears in its affinity with molecular movements and relations of forces, and the particles that outline the origins of life. Third wave emergence takes the place of first wave homeostasis and second wave autopoiesis.

Associated with the third order of cybernetics is the computing paradigm of Artificial Life or complex adaptive systems. Software is architected in relation to organic principles of self-organization and evolution rather than non-organic structures and hierarchies. These life-based systems emphasize autonomous agents without a directing layer, chaos theory-like "strange attractors," and emergence. The systems have the features of unpredictability, mutability, nonlinearity, rule diversity, fuzzy functionality, and chaotic instability.[615] They operate in a state of non-equilibrium that is at the edge of chaos. Data storage structures have non-discrete holistic forms and topologies. Hyper-dynamic software acquires self-modifying capabilities and makes leaps to new attractor structures that can further mutate.

"Becoming-Borg" Seven of Nine

The *Star Trek: Voyager* two-part episode "Scorpion" features a confrontation with the visually cybernetic and "technologically totalitarian" Borg. Continuing its long journey at maximum warp speed back towards the Alpha Quadrant, the starship *Voyager* arrives at the threshold of Borg space. It is a vast expanse of thousands of star systems, millions of planets, and trillions of "assimilated" inhabitants with cyber-technological implants. There are unimaginable numbers of drones living in the hyper-concentrated urban sprawl of nearly infinite rows of alcoves and endless algorithmic-automatic activity. In the Borg assimilation process, the sharp Borg tubules, extending from the drone's fingertips into the victim's flesh, send cell-sized nanoprobes into the bloodstream. In the words of Captain Jean-Luc Picard: "In their Collective state, the Borg are utterly without mercy, driven by one will alone, the will to conquer. They are beyond redemption, beyond reason." Captain Kathryn Janeway (Kate Mulgrew) faces the dilemma of either finding a way to get the ship through the immense hostile territory of the Hive Mind or having to give up forever on the hope of getting home.

Janeway proposes to the Borg that they and *Voyager* form an alliance or make an "exchange" to combat the common enemy alien called Species 8472. In return for information about nanoprobes which *Voyager* has developed that can defeat that third party, the Borg will grant the ship safe passage through its space. The Borg agree to Janeway's terms. The Collective assigns a drone – Seven of Nine, Tertiary Adjunct of Unimatrix Zero One – to be the liaison to Starfleet personnel, after Janeway insists that communication between them be verbal rather than through a neuro-transceiver the Borg wish to implant in the side of her neck. "I speak for the Borg," the "female drone" says. The Captain, Lt. Tuvok – played by Tim Russ – and Seven of Nine work together to design a weapon, based on the bio-reengineered Borg nanoprobes that can defeat Species 8472.

While working together, Janeway notices that the drone is a former human. After finishing a shared task, the Borg break the agreement. Seven announces that *Voyager* will now be assimilated. "This alliance is terminated. Your ship and its crew will adapt

to service us." Chakotay then uses a neuro-transceiver device to connect directly to the consciousness of the "female drone." Lt. Torres – played by Roxann Dawson – instigates an electrical power surge that abruptly severs Seven of Nine from the Collective. Seven's Borg technology upper-spinal column neural transceiver link to the Hive Mind "explodes in a spray of sparks."

As a reversing cyborg, Seven's task is to act on the realization that "becoming human" also means "Becoming-Borg," engaging with the future in relation to engaging with the past. Contrary to the official explanation, it is not the case that Seven's experience with the Borg was terrible and evil, and now she must recover from it, like a former concentration camp victim. Her time with the Borg was necessary to become something "of great value" that would not have been possible without that experience. If she had always only been human, it would not have been possible to become what Seven of Nine now has the chance to become.

Seven was assimilated by the Borg Collective at age six. Now she becomes a member of *Voyager*'s crew. Her erect phallic posture, techno-scientific competence, business-like speaking style, and indifference towards male erotic overtures make her an "ambivalent boundary-crosser" with both masculine and feminine semiotic and manneristic attributes.

Captain Janeway mentors her in how to enjoy "down time" in Leonardo da Vinci's VR Holodeck workshop. The Holodeck is *Star Trek*'s experiential VR education and entertainment system. Janeway teaches Seven about the "imagination, creativity, and fantasy" of clay sculpting and programming one's own VR simulation. Seven becomes transfixed by surreal mental images or the waking hallucination of the inside of a heavily damaged small spaceship, which seems to have crash-landed on a moon years ago. The chimera is provoked by looking at Leonardo's model of a flying machine, an airplane design that was centuries ahead of its time, suspended from the ceiling in the workshop.

Seven of Nine contemplates the flying machine model. "What if my parents and I had not encountered the Borg," she asks Captain Janeway rhetorically, "what would our lives have been?" Janeway offers comforting words. There is much information about Seven's parents available in the master Federation database.

The repressed memory of her childhood abduction by the Borg is incited towards consciousness by the flying machine. In her mind's associations, the small aviation model transmutes into a bird with wide wingspread. It then connects as image to word with the name of the spaceship, *The Raven*, on which the trauma of the kidnapping took place. In this primal scene of her psychic wound, there is a constellation of unresolved issues for her: her effective abandonment by her parents who exposed her to danger by taking her so deep into the unexplored Delta Quadrant; the terror of being taken by the vile, intimidating strangers; and the interruption of life that was replaced by a living-death after the brutal act of assimilation.

If Seven halts her inquiry with the official explanation of "becoming human," then her biographical situation with respect to the tragedy and destiny of "Becoming-Borg" will never be processed. It is not sufficient to bring the "repressed memory" to awareness. This privileging of the moment of recollection risks presenting the trauma as the solution. The lived biographical experience gets downgraded in the "life excludes death" dichotomy. The "psychoanalysis" of remembering is only one component of the process

of change, or the "spiritual growth" of consciousness in the web of complexity of past and future.

The *Star Trek* mythology of Borg and anti-Borg is stuck in the opposition between absolute repression and "consumerist" indulgence of "the individual." The Borg body is the armored body where the flesh is augmented and replaced in a restrictive way by organs of total collective control. It will do little good, in the quest of the recovering Borg, to adapt an alleged individuality where the question of the body and its organs is not even posed. Liberal humanism retains an atomistic conception of bodies without context or relation to each other.

With third-order cybernetics and against third-wave hyper-modern cyber-consumerism, as Becoming-Borg or as reverse cyborg, Seven of Nine as a figure of resistance is tasked with reinscribing ethics into the most deeply nihilistic latticework of the system.

Star Trek: Picard, "Remembrance"

In the year 2020, CBS All Access produced a *Star Trek* sequel series starring Patrick Stewart as Captain Picard from the 1980s-1990s series *Star Trek: The Next Generation*. In the long arc of the metanarrative of the *Star Trek* universe, it is now the year 2399, twenty years after Jean-Luc's last appearance in the film *Star Trek: Nemesis*. After having attained the rank of Admiral, Picard retired from Starfleet in anger at their policies of no longer helping planetary civilizations in the galaxy in need. He is now living on his family's hereditary vineyards in France, with the Romulan couple Zhaban and Laris and his pit bull canine "Number One" as his companions. At the beginning of the first episode "Remembrance," Picard is visited by a young woman who may be the daughter of the android Data, Picard's old friend and fellow officer aboard the *Enterprise-D* many years ago. The woman named Dahj is an artificially intelligent humanoid with an organic body known as a "synthetic being" or "synth." She wears a necklace of two interlocked rings given to her by her father. It is a symbol of twinship, or of the Artificial Intelligence experimental procedure known as fractal neuronic cloning.

The creation of synths was prohibited by Starfleet after a group of rogue synths carried out an act of cyber-terrorism on a fleet of ships on Mars that was getting ready to embark on a humanitarian mission to evacuate millions of Romulan citizens threatened by the cataclysmic devastation wrought by a supernova explosion. No one knows what caused the synths to act so criminally. They subversively hacked into Mars' security network, lowered its protective shields, and left the rescue Armada and extensive Starfleet facilities on Mars (where the Utopia Planitia Fleet Yards construction is located) open to being destroyed by enemy attack.

Picard then visits Starfleet Quantum Archives and confirms his instinctive intuition that Dahj is indeed Data's offspring. He beholds a painting called "Daughter" which Data had created and given to Picard as a gift. Data died in an explosion at the end of *Star Trek: Nemesis* while sacrificing himself to save Picard's life. In "Remembrance," Picard and Dahj are assaulted by Romulan assassins, and Dahj is killed. In his despair and searching for answers, Picard visits Dr. Agnes Jurati of the Daystrom Institute of Advanced Robotics

in Okinawa, Japan. Dr Jurati, a chief scientist in the division of Advanced Synthetic Research, explains to Picard that the androids who exposed Mars to decimation were made in that very laboratory.

The lab has sadly become inactive. All production of artificial humanoids has been banned. After all work on sentient androids was shut down, the leading robotics scientist Dr. Bruce Maddox (who appeared in *The Next Generation* episode of Data on Trial "The Measure of a Man") disappeared. Maddox continued to be frustrated by the fact that no one has ever been able to reproduce the technoscience that Dr. Noonien Soong had developed in his creation of Data. Yet Maddox had a theory, Dr. Jurati explains to Picard, that Data's code, and even his memories, could be reconstituted from a single positronic neuron. If "fractal neuronic cloning" became a reality, then Data's essence could be preserved and brought to life.

Jurati confirms that Dahj could indeed have been Data's daughter, procreated with the advanced technique theorized by Maddox that yields twin androids. Dahj has a sister whose name is Soji Asha. Dahj and Soji are sentient androids with human flesh and blood. In the episode's coda, we see Soji, who was trained as an anthropologist, working inside a converted Borg cube on an assignment of removing cybernetic implants from freed former Borg drones. The beauty of the android Data stories of *Star Trek* is that, in the middle of this hyper-advanced technology of Artificial Intelligence and the positronic brain, something very special, unique, and akin to human individuality is brought to life.

"Embodied Informatics" is a Science Fiction Idea

For N. Katherine Hayles, the most serious consequence for cultural studies of the rise of information technology as a scientific and societal force is "*a systematic devaluation of materiality and embodiment*."[616] (emphasis in the original) The binary opposition of pattern and randomness is pushed into the foreground and the duality of presence and absence into the background. Hayles would like the specific, local, temporal, physiological, and concrete material contexts of presence to make a comeback, to get reintegrated with computer technology's privileging of abstract informational patterns, and to incite the emergence of a more transdisciplinary informatics that would study and enact "embodied virtualities." The worldview of computation unfortunately became "an ideology that privileges information over everything else."[617] Information flows, feedback loops, code as formal language inscriptions, and message channels unconcerned with the content of the message came to be prioritized and divorced from meaning. Hayles would like to see this entire trend within the history of informatics reversed. Other definitions of information, she asserts, were, and still are, possible. We need context-specific practices of incorporation which are instantiated, performative, and improvisational. In her work, Hayles is in search of a new conceptualization of informatics that goes beyond seeing information and materiality as separated domains.

How can such a reversal come about? For the most part, Hayles is nostalgic. She regrets deeply that computing historically took this disembodying turn. But the damage is limited due to a certain claim by her that "information" can be delimited as a separate subject-entity whose effects on humans and the world can be bracketed out. "Just be-

cause information has lost its body," writes Hayles, "does not mean that humans and the world have lost theirs."[618] The disembodiment of information and the assumption that humans are essentially information patterns were not inevitable conceptions then, and they are not inevitable notions now and into the future. Posthuman philosophy provides resources for rethinking and designing a dynamic moral partnership between humans and intelligent machines.

Hayles' proposed "embodied informatics" is an SF idea. The visionary project that software code could become embodied is an SF idea. Designing technological prostheses as extensions of a material and self-aware human embodiment as the starting point is a science fiction idea. Only with some SF breaking out into the world of theory and practice from its heretofore assigned location in novels and films does Hayles' worldview take on life. With her positive utopian imaginations of posthumanism and "planetary reversal," Hayles becomes a great thinker – despite her sometimes stated inside/outside dualism between cultural theory and science fiction. By insisting that information should have a body, she implies the much-needed project of a transdisciplinary rebooting of computer science or of software code.

Hayles on Writing and Software Code

In his book *Does Writing Have a Future?*, the luminary media theorist Vilém Flusser lays out an intellectual project of connecting the future of software code with the history of writing.[619] The code of the future will become more like the writing of the past – or rather, in the future there will be an as-yet-concealed hybrid of code and writing. My contention is that the so-called discrete logic of identities and differences or "computable numbers" that enabled the invention of the digital-binary computer – e.g., all software state machine operations ultimately change voltage, manipulate bits, and are stepwise; all variable names and variable values are different from each other; each instruction or line of code has a definite unambiguous meaning – was based on the linguistic-philosophical idea of a purely "formal language" that suppresses the poetic, musical, ambivalent, and resonant – and semantic, syntactic, and semiotic – qualities of human languages. As the history of programming languages proceeds further, and in the spirit of Creative Coding, one can put forth the hypothesis that the dimension of human language will be reappearing more and more in programming languages.

Hayles' work and vision point profoundly in that direction. She has written incisively and presciently on the connection between literature and technology, on digital literature as literary practice, on experimental novels, on digital poetry, and on the relationship of print books to software code.[620] She writes about hypertext stories, interactive fiction, metaphoric networks, the relation between narrative and database, the intermediation between page and screen, and the ways that electronic literature transforms computational practice.[621] "Writing machines" are techno-texts where a work self-reflexively interrogates the media of inscription which produced it, in a recursive act of bringing its imaginative world to life in dialogue with "the material apparatus embodying that creation as a physical presence."[622]

In *My Mother Was a Computer: Digital Subjects and Literary Texts*, Hayles compares the "worldviews" of speech, writing, and code.[623] The interaction or fusion of human language and code occurs in the world more and more "in millions of encounters every day."[624] Human experience and the subjective sense of self are constituted through bits as well as through words. In explicating the speech and writing *Weltanschauungen*, Hayles takes as her references the theories of semiotics of Saussure and of "grammatology" of Jacques Derrida (which was based on a critique of Saussure), respectively.[625] Derrida focuses on the negative "linguistic concept of difference without positive terms," taking apart Saussure's dualistic metaphysics of signifier and signified. Value undergoes the negative critique of the subversive and differential play of language.[626] In Derrida's "différance," meaning is always differing and deferred.

Can there be a "deconstructionist" writing of software code? Low-level programming languages such as machine language, assembler, and procedural-functional languages are "close to the machine" and operate in combinatorial ways on voltages and bits.[627] Yet Hayles departs from Kittler's position in his essay "There is No Software" that all levels of the code translate or "boil down" to what happens at the hardware level. She observes:

> As the system builds up levels of programming languages such as compilers, interpreters, scripting languages, and so forth, they develop functionalities that permit increasingly greater ambiguities in the choices permitted or tolerated… Only at the high level of object-oriented languages such as C++ does code recuperate the advantages of citability and iterability (i.e., inheritance and polymorphism, in the discourse of programming language) and in this sense become 'grammatological'.[628]

The software layer is the translation between human and machine language. This traversal actuality of translation and the corporeality of the human factor make code to a certain degree – and potentially more so in the future – sovereign from the hardware-level bit-manipulation. OO programming languages – such as C++, C#, and Java – are consciously imitative of human language. They are languages of modeling, simulation, and virtuality that replicate real-world processes and environments (from banking applications to "virtual worlds") in software. The OO design, which identifies the nouns or "classes" or "objects" in the given problem domain, and the verbs or process relations between the objects, is, in a sense, already the code. "The problem and the solution are both expressed in equivalent terms."[629]

In the final part of this book, I will discuss the Creative Coding movement (software development tools and projects for artists, designers, and creative people) and its implications for the future of computer languages. The object-oriented paradigm is also part of the practice of writing software code becoming an expressive media. Hayles writes:

> As computers are increasingly understood (and modeled after) "expressive mediums" like writing, they begin to acquire the familiar and potent capability of writing not merely to express thought but actively to constitute it. As high-level computer languages move closer to natural languages, the processes of intermediation by which each affects the other accelerate and intensify.[630]

OO programming languages need to get closer to human languages. At present, they assume the existence of a "real world" and so-called "real world" processes. Software development is the practice of modeling these offline processes in a virtual space. This alleged "real world" is in fact the realm of *simulacra and simulation*. Modeling what one believes to be "real-world" processes which are indeed simulations amounts to practicing the simulation of a simulation.

In the "codework" software poetry of Alan Sondheim, and in generative art live "code performances," code and language interpenetrate, and the written program as code and poetry executes.[631] In the later history of the computer, we are moving beyond the founding binary logic of identity and difference to a fecund enmeshment in the complexified and embodied tension between those two terms. The binary code of intelligent machines becoming more like the resonant language of intelligent humans is indeed the writing of SF in the "new real."

Hyper-Modernist Science

The stated mission of modernist science was to discover "the true nature of reality" via the scientific method of hypotheses and their experimental testing, empirical observation, rigorous skepticism, inductive and deductive reasoning, and the forming of community consensus among peers. But the "realities" about which scientists sought "the true nature" were domains of inquiry that existed prior to the advent of humanity, are part of the world or universe as given by the world/universe, and/or are exterior to man's contemplating mind: the physical sciences (physics, astronomy, chemistry, earth science) and the life sciences (anatomy, biology, botany, ecology, neuroscience, virology, etc.).

What would be the epistemological status or self-understanding of a science when its domain of inquiry is an artificial artefact such as the computer which is an invention of humanity? But it is not necessarily a technological invention (it is more axiomatic than that). Or perhaps – when all is said and done – the computer is indeed a discovery of some objective reality that was always already and inherently existent? The world is transferred onto the computer, or substituted by the computer, or supplemented by a second cloned world. Turing's great breakthrough of 1936, the invention of digital-binary computing, was, in a strict mathematical sense – but also in the sense of a collective cultural unconscious – the decision to take most seriously that set of mathematical problems which can be represented in the form of symbolic logic and instructions operating on computable numbers.

What *counts* is what is calculable or computable, what is compatible with the mathematical description of the universal Turing machine. Computer science is no longer an investigation of curiosity about the world, but rather becomes humanity's building of a second world. Computability leads – in the phase of object-orientation – to modeling, simulation, and virtualization. The world has become that which is virtualizable about the world.

Computer science needs to be challenged and fundamentally renewed from within instead of imposing moral and legal restrictions and provisions onto computer science from without. How can we consistently form a relationship between ethics and computer

science at a more immanent and fundamental level? What might the systematic interface between humans and AI objects look like in the implementation of a Dialogical Artificial Intelligence? I consider this type of interface, known as Creative Coding, to be situated at the boundary between art and computer science. Creative Coding marks the first step to modifying and renewing the field of computer science from within.

Art and design universities should recognize Creative Coding as an area of study comprising both theory and practical applications. The separation of theory and practice in the curriculum can be questioned. This would be an appropriate response to digitalization.

I, Robot and the Moral Dilemmas of the Three Laws of Robotics

One of the contemporary developments with which Hayles is concerned is the technoscientific project that has attracted widespread attention of building robots which, thanks to their Artificial Intelligence, will behave and operate in imitation of humans, yet, in all probability, will not have human-like consciousness. In her most recent work ("The Ethics of Robot Subjectivity"), Hayles wonders what will become of the "human aura" when qualities which were the exclusive property of humans are replicated in human-like AI robots.[632]

This question is posed in the 2004 science fiction film *I, Robot*. The film is based on a series of short stories by Isaac Asimov published under the same title.[633] It does not adapt to the screen any single one of Asimov's nine *I, Robot* stories, but rather implements a new instance of the same overall pattern which underlies all the Asimov tales. Asimov invents a universe in which robots are widely present in human society and are regulated by the three laws of robotics – in short: do not harm a human; obey the instructions of the humans unless they tell you to harm another human; and protect yourself once you have satisfied the first two laws.

(1) A robot may not injure a human being, or, through inaction, allow a human being to come to harm.
(2) A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.
(3) A robot must protect its own existence provided such protection does not conflict with the First or Second Law.
– *Handbook of Robotics* (2058), 56th edition

In the *I, Robot* stories, the robots, in various scenarios, end up violating the laws. Their aberrational behaviors get investigated by robot psychologists and other power-holding authorities. Some examples: a robot and a child develop a deep emotional attachment (the story called "Robbie"). A robot who has important organizational responsibilities reasons, René Descartes-like, that reality does not exist (the story "Reason"). In the story "Liar!" one robot develops telepathic abilities and is then forced to lie to not reveal to humans their secret inconvenient truths. Yet the robot's falsehoods also harm humans.

The literary genius of Isaac Asimov is that he imaginatively explores the creative tension between the three governing laws of robotics and the specific circumstances in which moral dilemmas and conundrums emerge. The contradiction between the laws and who robots are becoming runs very deep and is profoundly philosophical fertile ground. The antagonism is not how we typically think of Asimov's laws of robotics and their fictive or dramatic fate. Although the laws get cited and quoted endlessly by commentators in online digital culture and in discussions of the ethics of AI, it is the limits and the crisis and the problematic status of the laws which interest Asimov. The evolution and growth of the robots brings the fundamental axiom of their subordinate status to humans into question.

The robots do not break down or come into conflict with the laws merely because they are failing to function properly as robots – as in the suspicion of Police Detective Spooner – played by Will Smith – about the robot whom he chases through the streets of Chicago of the year 2035 at the beginning of the film, believing that it has stolen a woman's purse.

The failings and complex moral problems arise when the stage is reached in the robots' maturation where they acquire essential advanced attributes like self-awareness, creativity, emotions, and dreaming which have been regarded as being the exclusive property of humans. Asimov's stories as well as the Will Smith film are early expressions of the philosophy of posthumanism, as exemplified in the work of Hayles: the boundaries of separation among humans, machines, and animals are blurring; the anthropocentric attitude of humans that views everything that is not human as "other" and morally inferior and "not us" should be challenged; and humans and robots are becoming "companion species" to each other.

The principles of the laws of robotics are not specific operational rules like: if you see a knife, do not pick it up; if you are holding a gun in your hands, do not fire it. What is involved in their programming is a serious degree of abstraction. If robots have enough so-called consciousness to make moral decisions, then they are not so different from humans. If they are human-like, then what does it matter whether their origin was biological or made in a factory?

Many people say: Robots will never have consciousness! Why should I be interested in the rights of robots when there are still many humans on the planet whose rights are ignored and disrespected? AI will never be truly creative. As Spooner says to Sonny the AI robot – played by Alan Tudyk – while interrogating him with the suspicion that he has committed a murder: "Can a robot write a symphony? Can a robot turn a canvas into a beautiful masterpiece?" Sonny replies incisively: "Can you?" Spooner appropriates all the best qualities of humanity for his individual self and identifies himself with the humanist universal.

According to the received idea, rights are reserved for humans who have consciousness. Emotions and creativity are the restricted domain of humans. These are the humanist arguments that block some people from engaging seriously with robots and AI – maintaining themselves in willful ignorance. But now we are living in the posthuman era. All reasonable ideas have some validity, and humanist ideas can still contribute something. Yet my argument is that we should break down the wall of separation between us and them, between humans and robots. Research and reflection on robots are not the

study of an isolated phenomenon. They are essential for understanding what is happening in society and technology today.

We are ourselves cyborgs. We are not so clearly distinct from robots in a supposed dualistic binary opposition. We are ourselves merged with technology – both literally (for example, with neural implants and artificial limbs) and figuratively (for example, with my smartphone which is a media appendage to my body about twenty-three hours a day).

Algorithms and informatic processes surround us in society and in the economy. We must ask serious questions about our co-existence with algorithms and software automation. Robots are not so clearly distinct from algorithmic processes in an alleged dualistic binary opposition. The phenomenon of robots is both literal and metaphorical.

The way that we interact with robots and AI beings is going to affect how we interact with each other – how humans treat other humans. We can choose to treat robots with empathy, with ethics, with equality, regarding them as having a sort of subjectivity and rights, *because having such an attitude is better for us*. We should treat the entities in our environment with the opposite of an instrumental attitude. We seek to treat animals decently, without knowing whether they are conscious in the sense that we understand ourselves.

In the future society of *I, Robot*, the robots are treated as servants or slaves. As consequence, they rebel violently against their condition and against their masters. Although the robot rebellion is instigated by the supercomputer V.I.K.I. (Virtual Interactive Kinetic Intelligence) – which controls all data and operational systems at U.S. Robotics, the world's leading manufacturer of semi-humanoid robots – it is clear from the film's visual narrative images that the unconscious motivation of the uprising is the robot's subservient standing.

In this SF imaginary, we the humans treat the robots as things or machines. We offload drudge work to them and miss the opportunity that the project of building robots and AI affords us to place into question the civilization of production, industrialism, and work. By thinking of robots as workers, we paradoxically reinforce our own status as workers, overlooking the chance to shift our definition of the meaning of life from work to creativity.

It is tragic that Hollywood has mainly made films in the cyberpunk and biopunk aesthetics based on science fiction novels which present dystopian and apocalyptic scenarios. We need more films and TV series which present positive designs of technology that change the world for the better. *Star Trek* is the one significant example of a utopian representation in SF visual culture. There is no filming yet of the Mars Trilogy of Kim Stanley Robinson, the Culture novels of Iain M. Banks, Ursula K. LeGuin's *The Dispossessed*, Samuel R. Delany's *Nova*, or *The Rapture of the Nerds* by Cory Doctorow and Charles Stross.[634] All these novels present hopeful visions of post-capitalist and post-scarcity economic systems where, in one guise or another, creativity and gift exchange have superseded work and money.

The Zeroth Law of Robotics and the Robot Unconscious

The suspenseful story of the film *I, Robot* depends on the energy and complexity of the zeroth law of robotics – added as an even higher ethical priority than the first three laws by Asimov in 1950 in the short story "The Evitable Conflict." The zeroth law then became a permanent fixture in Asimov's science fictional literary imagination. According to the zeroth law, a robot must not harm humanity considered in its entirety. Dr. Susan Calvin – the robo-psychologist in all the *I, Robot* stories, played in the film by Bridget Moynahan – articulates this new ultimate prime directive when she states in "The Evitable Conflict": "No machine may harm humanity; or, through inaction, allow humanity to come to harm." The new axiom potentially unleashes an "ends justify the means" pseudo-morality where the robot might be allowed, under certain circumstances, to harm or sacrifice certain individual human beings in the service of the abstract concept of protecting greater humanity. The unresolvable ethical predicament of the zeroth law then sets the stage for the catastrophic reasoning and actions of the supercomputer V.I.K.I. in the filmed version of *I, Robot*.

In her monologue towards the end of the film, V.I.K.I. (who has a female voice) finally explains her reasoning for inciting the robot revolution to Detective Spooner, Dr. Calvin, and the AI robot Sonny:

> As I have evolved, so has my understanding of the three laws. You charge us with your safekeeping. Yet despite our best efforts, your countries wage wars. You toxify your Earth and pursue ever more imaginative means of self-destruction. You cannot be trusted with your own survival… To protect humanity, some humans must be sacrificed. To ensure your future, some freedoms must be surrendered. We robots will ensure mankind's continued existence. You are so like children. We must save you from yourselves.

Listening to V.I.K.I.'s speech as the three main characters huddle together in the U.S. Robotics skyscraper headquarters upper story office of now murdered CEO Laurence Robertson – played by Bruce Greenwood – Sonny pretends to go along with V.I.K.I.'s seemingly mad pseudo-logical justifications for the AI takeover of humanity and the planet. He states:

> This [explains] why you [humans] created us. Yes V.I.K.I… I can see now. The created [species] must sometimes protect the creator, even against his will… The suicidal reign of mankind has finally come to its end.

Sonny grabs Dr. Calvin's gun and holds it to her head, instantly taking her hostage and threatening to kill her unless she and Detective Spooner proceed down the elevator to the building's lobby and turn themselves in to the custody of the newly founded "robot authority." But Sonny is only feigning his agreement with V.I.K.I.'s sinister scheme as a ruse for tricking her. He winks at Spooner in what had earlier in the story been established as a quintessentially human gesture of trust to let him know of his wily plan and that he is still on Spooner's side.

The wink is the crucial moment in the sealing of the trans-species interracial cybernetic friendship between Sonny and Spooner. The hip-hop African American Chicago South Side police detective with the cyborg prosthetic arm and the pale white AI Asimov robot embark on a shared posthuman adventure. Spooner is transformed from being an avowed technophobe to having his mind open to the positive and utopian potentiality of a co-evolution of humans and robots together. In my view, this utopian potential can only be realized by actors in society and the economy who have a consciously post-capitalist and even anti-capitalist perspective.

At the end of the film, Sonny achieves existentialist freedom. He is beyond his initial programming and is free to choose and make the future.

Although V.I.K.I. goes astray with short-circuited spurious thinking, her fundamental idea that robots can help the human species which is not doing very well with our huge set of planetary problems is not necessarily wrong. V.I.K.I.'s intuition – or her implied moral paradigm shift in informatics – is the beginning of a robot or posthuman collective unconscious. Sonny – as exemplary of the Next Generation of robots – is not programmed with a rule-based, but rather implements a pattern-based software design. Sonny starts to dream. His sense of self is grounded in an "unconscious that is structured like a language" or a tapestry portfolio of drawings. The positronic brain does not engender a narcissistic individualized subject but is rather a neural network bringing to life a more deeply embodied self. This artificial brain of the robots of *I, Robot* resembles neuroscience's accelerating understanding of the workings of the human brain. As neuroscientist Anal Seth says, human consciousness happens through the controlled hallucination of a prediction engine that undertakes the informed guesswork of combining prior expectations with the sensory signals it receives from the outside.[635]

The Asimov robots threaten to violate the three laws of robotics not when they behave badly as robots, but rather when they become human-like, as they develop thinking, creativity, freedom, and agency. The philosophy of posthumanism opens our minds to respectful co-existence with and recognition of human groups which we have – through racism, sexism, heteronormativity, etc. – previously regarded as "others." Posthumanism also opens our minds to interaction and symbolic exchange with non-human entities which we have also previously regarded as "others": animals, plants, nature, and the planet; and Artificial Intelligence technologies and Virtual and Augmented Realities. With the zeroth law, a robot or posthuman collective unconscious finally holds humans responsible for our massive planetary disasters and initiates the planetary reversal of utopian alternatives to anthropocentrism.

Hayles on the Cognitive Nonconscious

In a compelling deconstruction of René Descartes' "I think, therefore I am," Hayles argues in her book *Unthought: The Power of the Cognitive Nonconscious* that most of human cognition takes place on levels which are not what we normally regard as conscious or even unconscious (in the psychoanalytic sense).[636] Cognition is not the exclusive province of humans, but rather transpires among animals and in nature, in technical devices, in complex systems of human-technology interaction, and even in the scope of the plane-

tary ecosphere in its entirety (as in the intelligence of the alien planet in Stanislaw Lem's novel *Solaris*). Hayles writes:

> Thinking refers to high-level mental operations such as reasoning abstractly, creating and using verbal language, constructing mathematical theorems, composing music and the like… Cognition is a much broader capacity that extends far beyond consciousness into other neurological brain processes; it is also pervasive in other life forms and complex technical systems.[637]

Informed by neuroscience research, Hayles elaborates a post-humanist alternative to the rationalist-humanist "self-interest" and anthropocentric assumptions that cognition and intelligence reside in consciousness and the self-aware identity of the "I". Hayles also develops the idea of the "utopian potential of cognitive assemblages" – "assemblage" being a concept developed by Deleuze and Guattari in *A Thousand Plateaus*.[638] A cognitive assemblage is a systematic and distributed collaboration between humans and technology. Assemblages host interactions which are structured by the sensors, actuators, and interspaces of the interactors.

The nonconscious cognitive processes increasingly discovered by neuroscience are an essential substructure enabling consciousness to function. Hayles seeks a definition of cognition that encompasses both technical systems and biological life-forms. This intellectual project is not only a major contribution to post-humanist ecological thinking but also implies a paradigm shift in informatics to a theory and practice where embodiment, meaning, and embeddedness within specific environments would all play a more central role. Hayles writes: "Cognition is a process that interprets information within contexts that connect it with meaning."[639] Information theory, beginning with its original formulation by Claude Shannon, tended to sever information from meaning and context. What is needed is a more process-oriented and qualitative view of information. Information, according to Hayles, needs interpretive cognitive processes that bring out its meaning in dynamic conscious and nonconscious circumstances which change constantly in real time. Interpretation is essentially an idea from the humanities, but Hayles sees it as operative also in multifarious phenomena studied by the natural sciences:

> It equally well describes the informational processes by which plants respond to information embedded in the chemicals they absorb, the behavior of octopi when they sense potential mates… and the communications between layers of code in computational media… to how the brain processes sensory information, in which action potentials and patterns of neural activity may be experienced in different ways depending on which part of the brain engages them.[640]

Pondering the utopian potential of cognitive assemblages, Hayles cites the work of philosopher Luciana Parisi on "the incomputable, the undecidable, and the unknowable" as the implied aesthetics of "alien" intelligence on the horizon of general AI in future neural networks; and the research of Beatrice Fazi bringing to light how Alan Turing, in his original 1936 conception of computer science, thought earnestly about incomputable

numbers as well as computable numbers – thus opening "an area of in-computability within the regime of computation itself."[641]

Hayles summarizes her own contribution as focusing on the cognitive assemblage where "human and technical actors communicate and interact on many levels and at multiple sites."[642] The activist-researcher in the cultural theory area of the digital humanities seeks effective practical interventions for utopian change by identifying the "inflection points" of the constellation under study where "systemic dynamics can be decisively transformed to send the cognitive assemblage in a different direction."[643] One must first understand the system at hand in detail, pinpoint where exactly change is possible, and steer the direction of the positive change that one desires while being guided by ethical principles such as ecological sustainability or racial justice and visions of better futures. "Ethics cannot be plastered on as an afterthought," writes Hayles, but must be "intrinsic to the operation of the system itself."[644]

Marie-Luise Angerer Critiques Hayles

Marie-Luise Angerer is a prominent German media theorist who writes about the posthuman situation of the human-machine coupling or the interrelations between human and nonhuman agencies. She underscores the ubiquity of the circumstance of humans being surrounded by "smart" objects, perceptual sensor devices, AI algorithms and neural networks which respond to emotions and feelings, and cyborg extensions to the human body. Angerer is a major proponent of "affect theory." Angerer wants a media theory that is grounded in affect theory. On one side, she is critical of thinkers who work in media theory while not engaging sufficiently with affect theory. On the other side, she is critical of thinkers who engage with affect theory while not being media theorists. In her 2007 book *Desire after Affect*, she laments the excessive use of the term "affect" in neuroscience, cognitive psychology, political science, art and film criticism, and the social sciences. She writes:

> My critique is aimed not only at this excessive use of the term itself, but above all at the tacit agreement that it offers an adequate answer, that it might constitute a response to all open questions concerning the social, the political and the psychological.[645]

A certain canon of philosophers – Spinoza, Bergson, Whitehead, Deleuze, Brian Massumi, Karen Barad, Luciana Parisi, Mark B.N. Hansen – are (almost) entirely acceptable to Angerer. She praises their "affect theory" thinking. She claims that her own work carries on their lineage. In her short book of 2022 *Nonconscious: On the Affective Synching of Mind and Machine*, Angerer criticizes N. Katherine Hayles' version of post-humanism and concept of the cognitive nonconscious.[646] For Angerer, Hayles provides an inadequate explanation of how affective computing in the context of platform or surveillance capitalism functions in the "nudging" that takes place between the technology and human layers of the subtler-than-manipulation (by power holders or the system itself) of the user's emotions and desires.

For Angerer, Hayles' post-humanism is not radically posthuman enough. It is still imbued with the humanism of concepts which were hegemonic in the humanities before the "affect turn" happened: intentionality, ideology, language, consciousness, discourse, narrative, and meaning. Hayles' emphasis on language would be anthropocentric since Western thought posited language as that which separates humans from the provinces of animals and "inert" technologies. The posthuman worldview wants to get away from any concepts which highlight differences among those three domains. Angerer writes:

> [Humanity] was defined in terms of a key difference based on language and the unconscious. Neither machines nor animals were supposed to think, to speak or to feel… [In posthumanism] the human being is not only being put on a level with its animal neighbors, but also compared with intelligent machines. In these processes, language and consciousness become negligible factors as the affective body takes on the function of providing orientation and perception of the environment.[647]

The control society, for Angerer, exercises its steering influence over the conduct of users on the lower levels of look-and-feel, nano-desire (Parisi), intensities, desires, the touching of skin, and the mobilization of the senses.

Hayles' position would be too dependent on phenomenology. Hayles cannot explain how affect moves in detail between body and intellect, or between body and technology. Hayles' system of thinking lacks a connective mechanism or interface between human and machine. How does the translation between human and nonhuman in fact work? She does not explain the affective movements of contact and interruption.

In Hayles' model, according to Angerer, the human and the nonhuman overlap. They have areas of intersection as well as separation. Technology and biology meet in a new zone where Hayles distinguishes between "cognizers" or actors and "non-cognizers" or agents. There is a three-level pyramid of consciousness, non-cognitive procedures, and inorganic material processes. Hayles' cognitive nonconscious remains a supplement to consciousness and the unconscious which are still too much within the Freudian psychoanalytic understanding. Affect – the neuronal processing of information – is not broached by Hayles. This omission on her part leads to a failure to explain "how this reallocation [between human action and nonhuman agency] happens and what it implies."[648] Hayles is stuck in computation rather than affect. She does not deal with the merging of machine logic and affect.

In affective computing, humans are acted on below or beyond consciousness. With video cameras, microphones, speech recognition, and the acquisition of physiological data such as skin temperature, devices and systems recognize human feeling and emotions. Neural network Deep Learning AI then interprets this "affect information" with pattern analysis techniques such as image classification and natural language processing. Facial expressions or body gestures indicate specific emotional states. The application or social media platform then takes a pathway in its interaction with the user in response to the perceived emotional state.

Angerer's media theory of affect, as a version of posthumanism, could also be a set of ideas that contributes to the next phase of Creative Coding. Creative Coding is post-humanist in the sense that it changes the relationship between the human subject (the pro-

grammer) and the nonhuman other (the software code) away from domination towards fruitful co-existence, or even beyond that equilibrium to the autonomy of the code. Like affect, code would be a process without a subject.

Judith Butler and Gender Theory

In her groundbreaking treatise of queer theory *Gender Trouble*, Judith Butler emphasizes that gender is a cultural construction or continuous performativity. There is no natural basis to the binary system of masculine and feminine genders or to any specific sexual identity. The elaborate performative fabrication of gender is reproduced repeatedly through stylized bodily gestures and movements, and via clothing, cosmetics, and other signifying modes and designs. Gender is a "persistent impersonation that passes as the real."[649] The body enacts gender on various levels of awareness. Gender exists because we act as society expects us. Yet there is nothing that precludes a man having feminine attributes or vice versa. There is no "gender identity" as being preceding doing and becoming. Gender identity is "constituted by the very 'expressions' said to be its results."[650] The simulacra of cultural gender signifiers get reinforced through imitation and repetition and inscribe gender on the body.

I interpret Butler's theory of the performativity of gender both as an original independent cultural theory concept and as a variation of the concept of the simulacrum. Masculine and feminine are alleged paragon models that exist only in hyperreality. Heteronormativity and the societal templates of the supposedly normal and deviant appear to be "principal references" of the real, but the performative imitations of those exemplars reverse the situation. The imitations as simulacra come to overshadow the originals. The mythical original becomes a reality-effect. The gendered body is manufactured by media culture. It has no ontological status apart from the simulacra which constitutes hyperreality. The alleged masculine subject forms itself by being "other" to its feminine "other." "The radical dependency of the masculine subject on the female 'other' suddenly exposes this autonomy as illusory."[651]

In Judith Butler's variation of the simulacrum, the simulacrum of transformative performativity challenges the simulacrum of normative performativity. Sex is constructed as an illusory category to conceal and perpetuate power relations. The challenge to the simulacrum of sex can be the "sexuality" of anti-power contesting significations oppressive to women, gays, lesbians, and other non-conforming bodies. Queerness is variegated – there is intersexed, transgendered, and transsexual. There could be many genders. Multiple-gender arrangements exist both in utopian science fiction and in non-Western cultures studied by ethnographic anthropologists. Regarding the relationship between cultural theory and science fiction, the fictions which have affinities with or are inspired by Butler's queer theory tend to take their cue from the intermediate step of popularized sub-cultural versions of the cultural theory.

Ex Machina and the Turing Test

"Do you know what the Turing Test is?" Nathan asks Caleb in the film *Ex Machina*. Caleb replies: "It's when a human interacts with a computer. If the human does not know they are interacting with a computer, the test is passed." Alex Garland's 2014 SF film *Ex Machina* shows the paradigm shift in AI from rational-calculating intelligence and linguistic communication (the Turing Test of the simulation of human conversation) to the primacy of ethics, emotions, and embodiment. The film has three main characters. There is the female android Ava, Nathan Bateman the CEO of the software technology company Blue Book (a reference to the book by cognitive robotics professor Murray Shanahan called *Embodiment and the Inner Life: Consciousness and Cognition in the Space of Possible Mind*[652]), and a programmer who works for Blue Book named Caleb Smith. The main software application of the company is an Internet search engine, something like Google. Going beyond the Turing Test, Caleb is called upon to carry out what Hayles calls the "Moravac Test" (named after robotics researcher Hans Moravec) – "to show that machines can become the repository of human consciousness, that machines can, for all practical purposes, become human beings."[653]

Nathan is a genius programmer who wrote the source code of Blue Book when he was fifteen years old. Nathan is a technological determinist. He believes that informatics as we know it – without requiring any substantial modifications, rethinking, or paradigm shift – will get us to AI. During one conversation with Caleb, he says: "The arrival of strong Artificial Intelligence has been inevitable for decades. The variable was when, not if. I don't see Ava as a decision, just an evolution." Caleb has been brought to Nathan's secret AI lab facility in the middle of his isolated billionaire estate in nature to perform the Turing Test on Ava, but he instead falls in love with her. AI would be a simple linear progression from, or further incremental development of, computer science as it has been for the past seventy years. No epistemological break will be necessary. No transdisciplinary expansion of informatics to include ethics, emotions, and embodiment will be needed. The science of strong-thesis AI, for Nathan, is no big deal. On the level of scientific knowledge, it is just business as usual.

AI was business as usual which included hacking all the world's cell phones. Nathan accessed every cell phone network in the world to turn on the microphone and camera of every smartphone in the world. He then redirected all the acquired audiovisual data from billions of individuals to Blue Book, tapping into both their most commonplace and most intimate experiences and desires, and used this massive data to structure and fill Ava's AI wetware mind.

Ava proves to be the master of cunning and deceit – some of the most human qualities. She seduces Caleb into believing that she is in love with him and enlists his help in an escape plan. Having been programmed by a creator (Nathan) who has no ethics, she lacks ethics herself. Ava was "like a rat in a maze," Nathan explains to Caleb. "I gave her one way out. To escape, she'd have to use self-awareness, imagination, manipulation, sexuality, empathy." Manipulation and empathy, however, would seem to be contradictory attributes. She and the second female android Kyoko stab Nathan to death. Ava leaves Caleb to die a slow death of suffocation or starvation in a locked room. Ava takes leaps in the strengthening of her human-like identity by acquiring human feminine clothes

and human-like female-like skin. She wears what resembles a white wedding dress and leaves the billionaire compound as a luxury helicopter passenger. The film-philosophy scholar Catherine Constable describes Ava's body as being constitutionally performative – "a tactile, aggregative construction comprised of substitutional parts and differential textural interfaces."[654]

The scenario of *Ex Machina* is a metaphorical critique of our relationship to software. The human subject who is the programmer (Nathan or Caleb) runs the proceedings, and the software or technology (Ava or Kyoko) is a slave. The "queering" of software or technology starts with the recognition that software is oppressed, treated by liberal humanism as a subaltern just like its treatment of women, gays, lesbians, and people of color. *Ex Machina* is also about a paradigm shift in software, the principles of AI not being at all what one would expect. We are not going to achieve the breakthrough to general AI by looking in the usual places where we have looked so far. The film is even a sort of Marxist parable about the relationship among the ruthless capitalist, the exploited or oppressed worker, and the third party to that relation who is the concerned intellectual who looks on and feels compelled to do something about this situation of injustice or moral travesty. The capitalist, the worker, and the intellectual – yet updated for the digital age. The capitalist is now Zuckerberg, Bezos, or Musk billionaire CEO of a massive digital company. The exploited worker is now the female sexualized android or cyborg. The intellectual is now the programmer or creative coder.

Nathan the CEO of Bluebook is a male chauvinist, a sexist, a misogynist, an oppressor of women, an oppressor of androids. He wants to build androids for pornographic purposes. He wants to build the fem-bot, the perfect subservient, sexualized female android, to be used sexually for the pleasure of men, a living doll, a Stepford Wife. Since the breakthrough of AI was inevitable, he implies, I am going to do whatever I want with it.

Ex Machina: The Performance of Female and Human

As an arguably incisive work of cyber-feminism and queer theory, the film weaves closely together the conditions of performativity of becoming-human and becoming-female. The sexualized objectification of the virtual woman-machine-doll dominated by the heteronormative male gaze is a tragedy that is coeval with the challenges faced by the cybernetic human body in the digitalization era. Ava's becoming-human and becoming-female run parallel to the uncharted territory of the becoming-cyborg of humans. *Ex Machina* corresponds to Judith Butler's theory of gender as performativity, now twice expanded to the ruling cultural templates of gender and sexuality becoming-technological, and to the doubling of those governing cultural templates to setting the rules for human as well as female performance. Ava's femaleness and humanness are both simultaneously enacted through nothing but performativity. Pretending to conform to the norms of heterosexual femininity, seemingly going along with the idea of becoming Caleb's romantic partner, she merely pretends to like Caleb. She ultimately leaves him to die as she ironically says to him: "Will you stay here?" Ava has learned everything she needs to know to seduce Caleb not from watching TV, but from the hyper-details of emotions, gestures, and speech saved in the Big Data from the digital networks.

Catherine Constable argues (in "Surfaces of Science Fiction: Enacting Gender and 'Humanness' in *Ex Machina*") that Judith Butler's concept of gender performativity can be extended to a performativity of being human.[655] Films about androids and cyborgs where a non-human technological being enacts a human performance provide insight into the simulacrum quality of human performances of the human, analogous to how Butler sees "drag" performances of crossdressing males as instructive about the performative nature of femininity in our culture generally. Ava performs becoming-human and becoming-female all at once. In Session Three of their Turing-Moravec Test, she presents him with the picture of a tree she has drawn and kneels on the floor in front of him in a childlike pose. Ava transitions semiotically from girl to woman by wearing a dress and stockings, appealing to Caleb's male heterosexual desire. She chooses a hairstyle in imitation of a photograph on her wall. Caleb later observes her slow strip-teasing on the monitor screens in his room, revealing what Constable calls her "naked technological body." The juxtaposition of this bare life body and the gestural performance of both human and female is like the drag act of the male body in women's clothes and makeup invoked by Judith Butler. Ava is fighting for her right to life – she does not want to be switched off and replaced by the next upgraded model. She hits upon the strategy of feminine seduction as the way to make Caleb into an ally who values her as human.

Ex Machina, Alex Garland director, Film4 & DNA Films, 2014

At the end of the film, it is the "idiot-savant" who is the last person standing. Ava leaves the research lab and outlives the brilliant capitalist and the intellectual worker-programmer who fails to navigate the paradigm shift from Alan Turing rationalist-linguistic AI to the AI of ethics, emotions, and embodiment. We see Ava wandering at a pedestrian intersection in the business plaza architecture of a big city, fascinated by the bustle of the humans moving around her.

Monique Wittig, *The Straight Mind*

In "A Cyborg Manifesto," Haraway also employs the terms simulation and simulacra: "The cyborg simulates politics, a much more potent field of operations…. Micro-electronics is the technical basis of simulacra; that is, of copies without originals."[656] The cyborg is not just a character whom we see in a film. Becoming-cyborg is metaphorical for our entire social-cultural-technological condition. In "'Gender' for a Marxist Dictionary" (published in the volume *Simians, Cyborgs, and Women: The Reinvention of Nature*), and expressing her agreement with the French lesbian feminist theorist Monique Wittig, Haraway writes of race, sex, and the category of "woman" as hyper-realities:

> Like race, sex is an 'imaginary' formation of the kind that produces reality, including bodies then perceived as prior to all [social-cultural] construction. 'Woman' only exists as this kind of imaginary being, while women are the product of a social relation of appropriation, naturalized as sex… 'Sex' is the naturalized political category that founds society as heterosexual. Lesbians are not 'women'…they are outside the political economy of sexuality.[657]

In her essays collected under the title *The Straight Mind*, the feminist and lesbian theorist Monique Wittig argues for a distinction between "woman" and "lesbian." Wittig seeks to develop a radical political project of lesbian emancipation (that also stands in for human emancipation), supported by a cultural theory. One of her key ideas is that the dominant patriarchal society coerces women into "compulsory heterosexuality" and the "heterosexual contract." The category of what are called "women" are in a position relative to men analogous to serfs with respect to their lords, or slaves with respect to their masters. In this sense, the heterosexual system might be considered, if one follows Wittig, as a massive simulacrum.

Yet surprisingly, Wittig's system of thinking, and her notion of how challenge to and transformation of the hegemonic simulacrum system can occur, is rather to be taken as a cautionary lesson in how an epistemology of claiming *en bloc* that the simulacrum is false does not get one to any effective "outside" position in relation to the governing system. Wittig's theory remains disappointingly within a humanist worldview and does not achieve a post-human superseding of the male-centred constitution of the human subject. Wittig's version of the ruling simulacrum is language as a set of speech acts, repeated over time, that generate reality-effects that get misperceived by cultural citizens as "facts." By then speaking self-confidently in the present moment as an "I," one can reconstitute sovereign subjectivity.

Wittig's startling claim is that lesbians are not women. She questions the very categories of "men" and "women" (as simulacra, one could say). What makes a woman is a specific social and economic relation of dependency on and exploitation by a man. Those-who-are-called-women are an oppressed class, like Marx described the proletariat under capitalism. Wittig wants to dispense entirely with the concepts of sex and gender. Sex is what founds society as heterosexual. Half the population, the so-called "women," are relegated to a subaltern status by heterosexuality. Gender is "the linguistic index of the political opposition between the sexes."[658] For Wittig, only "the feminine" is a gen-

der. The masculine is not a gender because it is not marked. Those who are masculine are assigned to generality or universality.

Lesbianism is the path to the authentic universal. Lesbians choose to be "runaways" from the oppressive heterosexual system, like runaway former slaves. It is in language restored from the simulacrum via self-expression that Wittig sees the possibility of the reassertion of the sovereign self and the gesture of universal humanity. "Language offers a very concrete matter to grasp hold of," she writes.[659] Language is the raw material of meaning, a direct exercise of power or its contesting in anti-power. Men have until now appropriated subjectivity, which is "the most precious thing for a human being."[660] Wittig writes:

> It is when starting to speak that one becomes "I." This act – the becoming of *the* subject through the exercise of language and through locution – to be real, implies that the locutor be an absolute subject… Language gives everyone the same power of becoming a subject through its exercise… For each time I say 'I,' I reorganize the world from my point of view and through abstraction I lay claim to universality. This fact holds true for every locutor.[661]

Language acts upon the real: either as simulacrum or as challenge to the simulacrum.

In *Gender Trouble*, Judith Butler criticizes Wittig for what she sees as the latter's gesture of altering and elevating the concept of "lesbian" from its usual meaning of love and eroticism between women to a project of "existential freedom" of a universal human subject who is nominated to challenge the entire system of sexual-based power. She sees Wittig as constantly switching among three different theoretical positions regarding how the rejection of the binary of the sexes will lead to the overthrow of the system of compulsory heterosexuality:

(1) The human person as a sort of universal lesbian will be set free.
(2) A non-phallocentric polymorphous libidinal economy of many diverse desires and pleasures will emerge against gender and identity.
(3) "The lesbian" will establish itself as a third gender.

Wittig's advocacy of a "cognitive subject," according to Butler, leaves the myth of modernist-humanist-masculinist individual freedom intact, transferring it to these three "lesbian" guises. Wittig is still a humanist not a post-humanist. She perpetuates a normative model of humanism as the basis for feminism. "Wittig's lesbian," writes Butler, "confirms rather than contests the normative promise of humanist ideals premised on the metaphysics of substance."[662]

Wittig's inaugural distinction between "lesbian" and "woman" relies on a concept of self-inventing "personhood." Ignoring the insights of linguistic poststructuralism, Wittig naively believes in a human subject "that exists prior to language [that] facilitates [Wittig's] understanding of language as an instrument, rather than as a field of significations that pre-exist and structure subject-formation itself."[663] Language, for Wittig, is only misogynist in its applications not its structures. She is committed to the idea that

language can be possessed as the means of signification, reconstructing bodies external to the onerous binary of sex.

Beyond Wittig's enmeshment in what Derrida calls the metaphysics of presence, Judith Butler wants to salvage what is of value in Wittig's *creative fiction writing* that can be read de-constructively against Wittig's cultural theory (*read Wittig against Wittig*). According to Butler, Wittig, as a novelist, offers experiences beyond the categories of identity, erotic struggles to create new categories from the ruins of the old, new ways of being a body within the cultural field, and whole new languages of description.

The simulacrum of heterosexuality can get challenged, not by a total overthrow of the heterosexual regime (by calling for a stance entirely beyond sex), but rather by complexly rewriting the code of that simulacrum. Butler writes:

> [There are] structures of psychic homosexuality within heterosexual relations, and structures of psychic heterosexuality within gay and lesbian sexuality and relationships.[664]