

SYSTEM-IMAGES

by

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ABSTRACT

System-Images capture the movements, behaviors, events and running commands of the city at any given moment; they are key software architectures to understand how machines and smart objects see and record today.

Computers aren't the only ones communicating and backing up programs and operating systems to a hard disk or cloud. In today's cities, the objects that we would least suspect—parking meters, traffic lights, navigation systems, mobile phones, airplanes, alarm clocks, wireless routers, name tags, doors, virtual private networks (VPNs), steering wheels, game consoles, and even groceries—take images of us, using hardware and software like sensors and behavioral algorithms, with human characteristics programmed into them. Whether the information logged is visual is beside the point; vital information in the form of visual cues, numbers, audio signals, colors, interaction time, computational identity and location are enough to coordinate an imprint of user and societal behavior. If collated, what kinds of narratives, philosophies and aesthetics would this data generate?

System-Images provokes questions and fictions about our new spatial configuration and the nascent language it has birthed, hastened by technologies which do can everything that we can...and more.

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Introduction

“We are now in transition from an object-oriented to a systems-oriented culture. Here change emanates not from things but the from the way things are done.”¹

-Jack Burnham, ‘Systems Aesthetics’, 1968

System-Image: Captured as the movement, behavior, interactions, and running commands of the city at any given moment. They’re the key to understanding how smart objects operate, and how the actions they witness are saved in intricate storage formats.

System-Image: Transparent, monolithic folders, which contain files, real and simulated, last-year’s cookies, downloaded to an encrypted vault, for which you are the sole gatekeeper. Navigate its tunnels—extending into horizontality forever. Colossal, interminable, terraced; your computer is a ziggurat, its floors are now walls, your own, private city.

System-Image: Behind the gray, rubbery cortex which covers the brain’s hemispheres, an exact copy of the programs which run and execute and perform and respond to the external world. Every image and every word can be accessed and restored at any time; as flashback, as afterimage, a musky scent...from a vast depository.

System-Image: The touch is an input is a data value is behavior, an insight into society as a breathing, living, palpating whole.

System-Image: Taken from the cyber-speak lexicon of William Gibson, how programmers and console cowboys remember their place in the virtual world, by “jacking in” and out of *decks* and *simstims*, or matrix simulators.²

System-Image: Any method of collating information in a spatial configuration.

System-Images, as described above, are software architectures which perform a job. Like pilots, who use flight instruments and motor skills to navigate the skies; mechanics, who reduce metals into shapes and forms by lathing, an adept skill for transforming material; and computer programmers, who crane their necks, scripting commands with few symbols, and infinite combinations. Their tasks are memorized through intensive hours of training, often through a litany of mental and physical exercises. The work these experts perform is rooted in anatomical processes; whether it is *proprioception*, or spatial awareness, the steadiness of the hand, or decision-

¹ Burnham, Jack, “System Aesthetics”, *Artforum*, vol. 7, no. 1 [September 1968] 30-35.

² Gibson, William. *Mona Lisa Overdrive*. S.I.: HarperVoyager, 1995.
Neuromancer. London: Voyager, 2000.

making. Before the *system-image*, the pilot, the mechanic, and the computer programmer recorded singular images—horizons, tools, splash pages on the Web.

Aeronautics, mechanical concepts, and human-computer interaction define images in slippery and unfamiliar ways. Flight instructors warn of fast images which move across the retina, *nystagmus*. Ask anyone who has made tools and objects by hand, and they might tell you, obliquely, that their efforts are impressed into the stone or iron or marble itself (in the same way a sculptor might claim *the sacred* with their profane drilling skills). Users glide between interfaces through links, pointing and clicking, called *hypertext*. What is a hypertext but a portal into other texts, images, content. Immense energy has been poured into the study of human factors: the scientific discipline which spreads out, fractal-like, to encompass all interactions between humans and components of other systems, in order to optimize human experience. The idea of human factors is a reciprocal concept, and so, vice versa, it necessarily includes how machines and equipment can become better by adopting human characteristics; learning, deciding, and in the case of virtual reality, even “empathizing.”

The reader is asked to download Karl Marx’s treatise on labor and capital, for the year 2020: human factors—or as is more commonly used in today’s lexicon, *human-computer interaction*—is now the universal *Stoffweschel*, or “metabolic interaction between man and nature.” “Never stop extracting the minerals of our Earth to power some new tool that we devise. Extract as much work and brainpower from our bodies so that the never-ending stream of ideas, machines to realize them, and their products will never dry up,” you can hear Marx’s emulator type sardonically.³

The factory once answered questions—about human dependence on machines, about an elite class of clever technocrats on the broad musculature, bloated hands, and sharp vision of the working class. They could be answered by a simple relationship: every worker and his mechanical station (the conveyor belt, the printing press, automotive shop, the lathing table) acted out these relationships in a way visible.

Today, industrial production has at least partially automated. There is now a push to develop faster, more stable, quieter, and precise hardware for computing and storage purposes. Random-access memory (RAM) archives frequently-repeated instructions to read and write computer programs, increasing the general processing speed of a system; an entire do system can be copied and stored in a non-volatile file, the *system image*, used later to reboot or restore a previous state of being.

Machines have now shrunk to the size of a memory disk, a computer chip. Now, specialist knowledge is required to ascertain how an object or device is put together, and which human characteristics are encapsulated within them. Might try using a microscope, or taking apart a computer. Ask an expert. Much of what is concealed in the move toward miniaturization, or micro-processes, has ushered in a new army of

³ Marx, Karl, Friedrich Engels, Ernest Mandel, David Fernbach, and Karl Marx. *Capital: a critique of political economy*. London: Penguin Books in association with New Left Review, 1991.

workers: CPU architects, optical microscopy analysts, silicon validators, CCD/CMOS inspectors, data miners, RF/over-the-air (OTA) designers, distributed system engineers, algorithm/procedural developers, SQL scientists, firmware engineers, and many other professionals whose work is inscrutable, but will be housed in smartphones, guiding users to their next destination, sometimes unbeknownst even to them.

System-Images may read like science fiction. As early as 1872, thinkers like Samuel Butler, in his fictional novel *Erewhon*, anticipated an interwoven reliance on machines, relating their adaptations to those of living species, distinct for undergoing the process of Darwinian evolution:

As yet the machines receive their impressions through the agency of man's senses: one travelling machine calls to another in a shrill accent of alarm and the other instantly retires; but it is through the ears of the driver that the voice of the one has acted upon the other. Had there been no driver, the callee would have been deaf to the caller. There was a time when it must have seemed highly improbable that machines should learn to make their wants known by sound, even through the ears of man; may we not conceive, then, that a day will come when those ears will be no longer needed, and the hearing will be done by the delicacy of the machine's own construction? — when its language shall have been developed from the cry of animals to a speech as intricate as our own?⁴

Yellow canaries once did the work of the beeping carbon monoxide detector; which is to make a common analogy between a programmed machine and its living precedent.

Human life is inscribed within complex systems, a symbiotic interdependence between technological media and living organs: consider voracious consumption of image-and-text blips, which some call "news," and read in order to appear cognizant of global events; how interfaces (mobile phones, computers and other screens) are prosthetic attachments, stimulating and entertaining the brain during its waking hours; and how bodies and brains transport its users, erecting cognitive constructions to determine which forking path to pursue.

System Images is the herculean task of trying to organize phenomena of different substances, types, and spatial/temporal scales into what might be called a *system theory* framework. *System Images* reveal the inscription of photography in larger, complex systems, like networks, cities, transport infrastructure, vehicles, the human brain, computers, cells; they might also be understood as memories or ideologies that are stored, somewhere in the back of minds, unconsciously and automatically, like the process of backing up a computer; or think of it in physical form as a rolodex, a series of handmade index cards on a rotating spindle, once used for the now-obsolete function of "storing phone numbers." Think of a camera itself. *It's everywhere where*

⁴ Butler, Samuel. *Erewhon*. Mineola, NY: Dover Publications, 2002. "The Book of Machines"

you want to be, as the Visa axiom goes: capturing, multiplying, and distributing what is seen, a record of behavior, incriminating and intimate moments, a total replication of the human point-of-view.

Legend goes the very first images were retinal, and only detected whether surroundings were light or dark. They came from proto-eyes attached to molluscs, chordates, and arthropods, during the Cambrian explosion, some 600 million years ago. The distinction between *looking around* and *looking-at* begs a question, about the parallel evolution of humans and technology. Experimental psychologist J.J. Gibson once said that to be accustomed to looking, at a page, out of a window, is to forget what it feels like to be *surrounded* by the environment.⁵ A Spanish geophysicist who works on the cryosphere—Earth’s frozen water—states in a chance encounter: the further antennae are positioned from each other, the higher-resolution images are produced about galaxies, quasars, and astrophysical phenomena in between. His exhortation: connect disparate concepts which might give a more holistic image of the systems that living organisms inhabit.

New Eyes are for more than distinguishing the presence of light from dark. They should be trained, using theories from psychology, engineering, aesthetics, and media studies, to understand how the vision system works in relation to meat bodies; to probe machine vision and the ethical questions it introduces; to formulate a protocol on the limits of automation; and to analyze patterns of photographic, cinematic and literary representation which occur throughout history—from indexical signs in the environment, to Marxist dissections of factory work and the emergence of *aerocom* culture.

The essays and fictions before you dive into technological concepts and their philosophies, pushing them to their absurd and sometimes extreme limits. Each writing questions and proposes future possibilities—however dystopian they may sound—in the hopes of unearthing narratives of technology as the end-all panacea to the problems which plague society. I am quick to confess that not all human aspirations can be understood by these ‘machine metaphors,’ but they offer a curious frame: into mechanical processes which are enumerated in terms of human capabilities (software which *reads* and *writes*) and into biological systems which are indexed using mechanical vocabulary (a marathon runner *has wheels*). These theories are by no means empirical, but eternally “up for grabs,” as they say.

System-Images are not only computational pillars which safeguard files and applications at a certain point in time; they are also a new architecture for understanding images at various scales—from the microscopic .jpgs and .txt files which comprise less than a square micrometer (μm) of any hard drive, to the closed-circuit signals which televisions transmit to their watchdogs, and entire computer clusters whose activities are monitored using webs of information architecture. The logic of the

⁵ Gibson, James J. *The ecological approach to visual perception: classic edition*. New York, NY: Psychology Press, 2015.

system-image is a disbelief in any single image operating independently. It describes a general principle of systems which records our world, a new political landscape in which technologies of all kinds are afforded—and can simultaneously aggregate—vision, using the crevices engraved onto microprocessors, corporate ID tags, near-field communication sensors in smart phones, pattern recognition, deep neural networks, Doppler radars, remote-sensing satellites, and various networked objects which can be “tapped.”

Computer science might have invented the term *system-image*, but archivists and artists long did this work of archiving and cataloguing media before the computer; testing, listening, recording, analyzing, and interpreting machines and their messages.

A scenario that these short writings construct in the imaginary and symbolic worlds should instantly appear around the reader in the real world. This syncretic textual world can be defined as one in which the bodies and labor of *Workers* are subjected to laws of *Control and Automation*, a process of input and feedback which also describes *Imprinting*, an early stage of mimicry and learning, which is required of pilots in their navigation of the atmosphere, or *Aerology*, during which they must interpret information ranging *From Symbols to Signals*, or else suffer a hallucinatory death by *False Horizon*, and even risk becoming *Phantoms of the Jaguar*, illusory animal spirits which can only survive in a virtual world, the very texture which *The Image Sleuth*, the humble narrator of this text, has exerted considerable effort to mold.

Peculiarly, technologically-advanced cultures and special economic zones (SEZs) speak using acronyms, coded language, and numbers, even when not counting: members include Cambridge, Massachusetts; Masdar City, United Arab Emirates; Bangalore, India; New Songdo City, Korea; Silicon Valley, California; Petah Tikva, Israel; and Shenzhen, China. Some say these are the most enlightened, progressive cities the world has ever seen. Others may liken them to early societies, which utilize hieroglyphs and pigeon dialects, to prevent unsolicited entry or criticism. Many of these essays attempt to interpret and synthesize knowledge overheard at a Technical Institute where the Internet was invented, and the surreality of it, in relation to different worldviews from hotter, drier countries of the Middle East and other destinations where the author has found himself alongside soot-covered plumbers, wise villagers and *boundary militias*, or armed security personnel. *System-Images* is written in slang, a technocratic jargon, a dense prose (PATENT US 66904001 B2), which gets at the very *punctum* of expertise, to borrow Roland Barthes’s delicious word. Consider it a sly take on the technical manual.⁶ However, in today’s age, accessibility must be preserved, now more than ever. You will find a glossary of selected terms at the end of this book, terminologies which elucidate concepts interlaced throughout this text.

⁶ For another, clever take on literary genre and subcultures, see Renée Green’s travel diary/bildungsroman *Camino Road*.
Green, Renée. *Camino road*. Brooklyn NY: Free Agent Media, 1994.

The reader is asked to jump between analyses, fictions, and manifestos related to these questions. It is a speculative endeavor, so be patient, as this interpretation of the world we inhabit unfolds, one that is determined by images in the broadest conception possible.

Workers leaving the Factory Redux

“The worker has spun, and the product is a spinning.”

-Karl Marx, “The Labor Process and the Valorization Process,” from *Capital Vol. 1*

The frenetic whirring of axles rotating and steam engines hissing opens Fritz Lang’s 1927 film *Metropolis*. *Schicht* (shift). Workers in black uniforms await the right set of factory gates to open. They are on their way in—and not out—which their downtrodden posture gives away. The wrought-iron gate rises, accepting a fresh batch of workers who have arrived for their shift. Simultaneously, the gates set free a tired formation of men, trudging, shifting, slowly from one foot to the other as they exit the tunnel at half-speed. Elevator 219 awaits the new workers ominously; as they load into the freight dock, this narrative masterplot, which frequently ends in death, takes shape.

The factory dances, saucers, held up by pylons, spin vigorously, and workers pull levers and monitor dials synchronously. An elder man struggles to stay standing, his knees buckling and face the color of trepidation, as he watches the mercury thermometer rise above 30 °C. His hands cling desperately to the valves which control the temperature of the factory, as he tries to prop himself up. As Gottfried Huppertz’s score thunders, almost instantly, the entire production line is engulfed in smoke. Out of the fog, a creature appears with an open mouth, swallowing up its many workers, who are ritually sacrificed and whisked away by a monolithic set of iron teeth.



Freder, the factory owner's son, witnesses this catastrophic failure, and is forever changed by the sepulchral conditions of the bleak underworld which he has been tasked to oversee. As he remorsefully confesses the day's events to his father, the manager and overlord of this futuristic German city, the reader loads Karl Marx's narration on "The Labor and Valorization Process":

He will not be caught napping again. In [the] future he will buy the commodities in the market, instead of manufacturing them himself. But if all the brother capitalists were to do the same, where would he find his commodities on the market? And he cannot eat his money. He recites the catechism: 'Consider my abstinence. I might have squandered the 15 shillings, but instead I consumed it productively and made yarn with it.' Very true; and as a reward he is now in possession of good yarn instead of a bad conscience.⁷

Freder weighs the situation: the necessity of workers against their grim labor conditions, and the product which is manufactured (energy by steam engine) alongside the *bad conscience* suppressed in order to perform the function of the overseer ("Have I myself not worked? Have I not performed the labor of superintendence, of overseeing the spinner?").⁸ An inner thought from the factory owner who denies its hardships.

German artist and filmmaker Harun Farocki noted, "the first camera in the history of cinema was pointed at a factory, but a century later it can be said that film is seldom drawn to the factory and even repelled by it."⁹ Lumière Brothers' 1895 film *Workers Leaving the Factory*, was the first film and the first factory representation. Paths cross chaotically at the factory exit, a stray dog barks at the hordes of people, a horse-drawn carriage emerges like a chariot from the mass of workers.

Farocki compiles and re-combines these scenes in his own version of *Workers Leaving the Factory*, asking what can be gleaned through pattern recognition of the worker motif in cinema throughout the century. Zooms into Berlin, 1934: Siemens workers march out of their campus to attend a Nazi rally; Riesa, East Germany, 1945: men and women pour out of a Publicly Owned Operation, or *Volkseigener Betrieb*, specializing in metal-cutting, a "nationally-owned enterprise which gives workers the right to full participation in decisions that affect their lives"; and Detroit, 1926: as shadows descend the zig-zagging staircases flanking the Ford Motor Company, an expressionless female voice: "never can one perceive better the number of workers, than when they are leaving the factory."¹⁰ Brute workforce and collective conscience in

⁷ Marx, Karl, Friedrich Engels, Ernest Mandel, David Fernbach, and Karl Marx. *Capital: a critique of political economy*. London: Penguin Books in association with New Left Review, 1991.

⁸ Ibid.

⁹ Elsaesser, Thomas. *Harun Farocki: working on the sightlines*. Amsterdam: Amsterdam Univ. Press, 2004.

¹⁰ *Workers Leaving the Factory*. Directed by Harun Farocki. Germany: Video Data Bank, 1995. DVD.

one moment, single-celled, liberated individuals in the other. So the first moving images of the factory entrance appeared.

Thanks to Fritz Lang, the Lumière Brothers, Harun Farocki, and many other photographers and filmmakers whose gazes penetrated sites of industry, cinematic representations of the factory should never tire out.

Fast-forward to factory work today. The NVIDIA GTX 1080 graphics card, or the *clean room* environments for TSMC semiconductor manufacturing, are too delicate, dangerous, or precise for the human hand. Upload Marx's theory of labor into today's market by asking how labor still *valorizes* [*verwertet* in German] humans; how the start-up and entrepreneur *realizes* [*realisiert*] the potential exchange value of a commodity; and how, through the formation of an entity, a company might *alienate* [*veräussert*] the value they provide from the hardware/software for which they have paid developers and drivers (in the case of Uber) to de-bug GPS errors and shoulder responsibility.

Work structures managed virtually are synchronized; by a geolocation algorithm which compiles and aggregates the labor of its bots and subcontractors, tallying up fares and unlocking micro-payouts. But there is no concept of a work force without a factory. One only finds distributed clues: tech loyalists with black, geometricized "U" shapes on their t-shirts; and the occasional swarm of taxi drivers which converges in a physical #UberProtest. Follow the piped lines, the channels grooved onto circuit boards, or the ones which send signals out to the digital proletariat searching for work, and a vehicle with the worker's portrait might illuminate.

The subcontracted employees of Uber remain cut off from the idea of the factory, more a disconnected database of image profiles than a body of united workers that might rally together. Their union leader is the passenger, who might convey to his or her comrades to divest, go left, toward the pink mustache, the logo of its competitor.

Desires for unionization are fraught. A Tesla employee in February 2017 publishes his concerns about unrealistic production goals and ergonomic incompatibility with machinery in an op-ed: it contradicts, "Working 60-70 hours per week for 4 years for a company will make you tired, it will also make you loyal."¹¹ Tesla is no longer a start-up company, but a thriving auto brand which accelerates the self-driving and electric car industry. Good luck purchasing a Model S, X, or 3—wait years, and then something shinier and cheaper comes along. The only panacea or remedy to this far-overreached delivery vow is longer work days; lower-than-average wages; mandatory overtime; and harsh actions against free speech. The factory as governance. High turnover, poor morale, trust, liability, injury responsibility, loss of individual voice and exploitation all relegated to the past, as workers in today's *smart* economy vie for recognition. In the new millennium, the question remains: how to represent those physical hands that make the car which claims to drive itself?

¹¹ Moran, José. "Time for Tesla to Listen." *Medium*, February 09, 2017. <https://medium.com/@moran2017j/time-for-tesla-to-listen-ab5c6259fc88#.arkws349>.

Fake artificial intelligence is outsourcing work to Turks, but turns out none of them are Ottoman sultans, Bosphorous sailors, Beyoglu gallerists, or even from Istanbul. He once participated in one of those neural studies, got a contract job doing *groupings* and *associations*, image-collating, they call it. They needed an Arabic speaker, a real-life Turk, not one of these Amazon spin-offs. Qatari culture-tracking, or something like that. "That one looks like family, those are brands, falcon sports here, others over there are lost idioms," he said. "Perfect," they replied, as they plugged his sorting sequence into the neural network. Won't be long before software can tell us how to represent personality in image profiles. "That's our work in Doha," the Turkish scientist finally slipped. Gulf countries were always big on simulation, private, air-conditioned worlds, seemingly conservative on the outside but within its networks deep and illicit online forums for sex, Western clothing, alcohol, intellectual samizdat, and other contraband. A single highway, driven by automated car could get you to Bahrain, the other island where the dirty business was exported.

The factory owners and workers are distributed; the Turkish computer scientist, punching keys in the cold business lounge of Ataturk, is different from the Mechanical Turk, not an actual Turk but close enough. Factory work today occurs without the hand; it's a service that is transmitted like liquid through geographic channels, often initiated by the client through his server, and involves some computer copying every exchange, as evidence of the interaction and as a blueprint of loopholes for the corporation to shed responsibility, should an accident arise.

An anecdote about work to conclude: an artist from the Uzbek-Chinese border, newly ascendant member of the technical ruling class, commissions South Asian men and women to complete some HITS, to cry, as work, through Mechanical Turk. They comply, for \$1.00 per tear. Through the advertisement, she rises to the status of factory owner, Baroness of Sadness, as her on-demand, scalable workforce of weepers mourns the loss of physical work, which had its downsides but could be tracked, enforced, and remunerated more handsomely.

Control and Automation

Sometimes one, more than the other, but they go hand-in-hand: control is the antidote to automation, the safety of manual oversight over the unpredictability of programmed systems.

Fears about self-driving cars going rogue or autopilot systems freezing have a certain recurrence. Natural to doubt an empty, fast-moving vessel, which is more software than hardware, without having any indication of its inner workings. On the other side of the spectrum, you have highway junkies—the prosumers, the adrenaline seekers, the Tesla salesmen—who will defend the need for a keyless, seamless, door-less SUV with Falcon Wings: so attuned to minute breakthroughs in vehicle design, that they would sacrifice themselves at the altar of technology in the name of the bleeding edge.

Meanwhile, the results of what twenty or thirty years ago was just science fiction finally surface [drones, neural networks, live video games, Virgin Galactic]. There's no choice but to constantly come to terms with the now, and hope that the fleeting visions put forward by past generations of writers might positively affect travel, conceptions of the mind, and play. Sometimes, fiction is best left as fiction, too.

Metaphors underlie daily life, George Lakoff writes, which are based on values partly determined by “a matter of the subculture one lives in.”¹² To go further, lived experience is often coded and narrated as a consequence of being participants in and end-users of the technosphere.¹³ As of 2016, our narrator lives in Cambridge [or C-bridge, which is more appropriate for the American strain]. Research center, hatching site, and production facility extraordinaire. Strange realm if there ever was one, isolated from any recognizable markers of city life, with biotech and genetic and neurological and aeronautical and offense laboratories erected in the dense shadows of steam and fog. Many know that another, better world exists out there, yet some choose to assimilate; adopting, assuming, and acclimatizing to the culture of the blue chip. Take for example, some phrases which are often repeated around C-bridge:

The mind is a machine.

She was left to her own devices.

This graphics card isn't powerful enough, I need a render farm.

A recent meme by Twitter user @bromanconsul shows Elon Musk on a zipline:

“Alright Elon, this is called a zipline.”

“And the humans, they enjoy this?”

“They enjoy it very much, Elon.”

“Then I shall enjoy it as well.”

¹² Lakoff, George, and Mark Johnson. *Metaphors we live by*. Chicago: Univ. of Chicago Press, 2011.

¹³ Hafl, Peter. *Humans and Technology in the Anthropocene: Six Rules*. The Anthropocene Review, 2014.

A new wave of cognitive dissonance, in which the human identifies as the machine which performs his work. Being left *to one's own devices* is when someone must survive with just their own organs, body parts, logic: in short, without any assistance. *Render farm* is a term used to describe multiple GPUs working in tandem to process an image or animation. While the industrial age might be over, the dot-com boom is still unfolding, and the language used reflects that transition (one can imagine “the mind is an algorithm” will reach ubiquity soon).

Consider also the many words which take the suffix, *-matic*, meaning “willing” in English, taken from *matos*, or “willing to [perform]” in Greek:

auto-matic- “self” and “willing,” or self-performing

kine-matic- “motion” and “willing,” or performing motion

zygo-matic- “yoke” and “performing,” or resembling a yoke¹⁴

You might be tempted to assume what is being described is in fact a mechanical or machine process, but as Lakoff aptly notes, “linguistic expressions are containers for [deeper] meaning.”¹⁵ *Automatic* is a term invoked frequently to express any type of involuntary reaction, whether the response is human-, animal-, machine-, or ecologically-generated. Vehicle designers might conduct an *anthropometric*, or human-measurement, study, in order to quantify the *kinematics* (the branch of mechanics that deals with pure motion apart from mass and force) of a racecar driver. And any object which might evoke the form of a yoke—the crossbow-shaped device used to join two draft animals, like oxen—might be called *zygomatic*. Use of the word conveys the similarity of shape, or the desire to herd, like a shepherd.

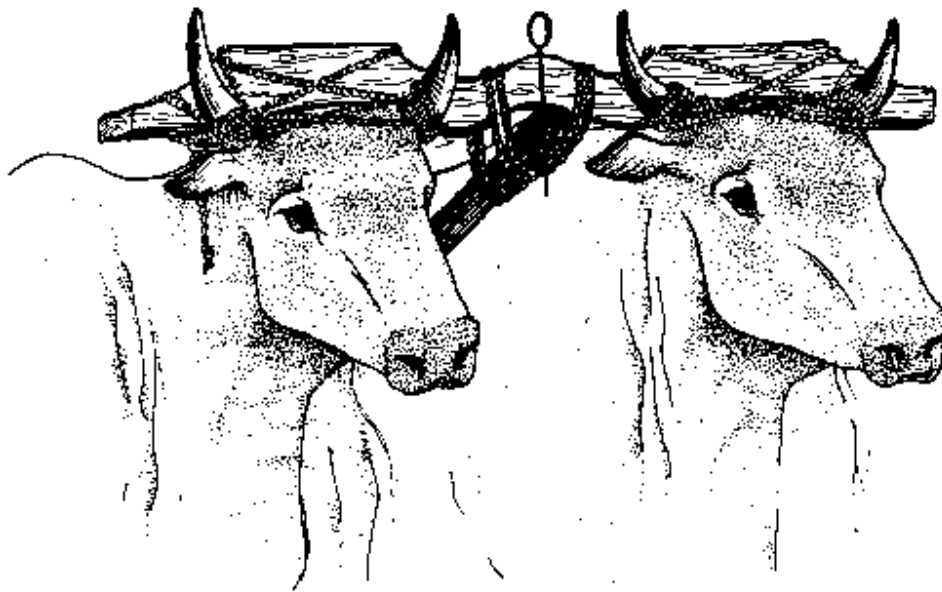
Dreams of the cybernetic man, that desire to control and communicate between animal and machine, which American mathematician Norbert Wiener and British psychiatrist W. Ross Ashby pioneered in the late 1940s, never went away.¹⁶ “The organism is seen as message,” Wiener philosophizes in *The Human Use of Human Beings*.¹⁷ When the body reaches a temperature higher than 98.6 °F, symptoms develop like overheating, achiness, delirium. Fevers brings the body into a state of excitement. Blood cells, immune systems, perspiration glands work furiously to regulate our body temperature and levels, in a process that Wiener emphasized: *homeostasis*. What is the work of negative feedback in mechanisms like the yoke, or the human body, if not the attainment of stability, resilience, to keep a vehicle on course, performing at its optimum?

¹⁴ Ballard, J. G. *The atrocity exhibition*. London: Fourth Estate, 2014.

¹⁵ Lakoff, George, and Mark Johnson. *Metaphors we live by*. Chicago: Univ. of Chicago Press, 2011.

¹⁶ Wiener, Norbert. *Cybernetics: or Control and communication in the animal and the machine*. Cambridge, MA: MIT Press, 2011.

¹⁷ Wiener, Norbert, *The Human Use of Human Beings* (London: Eyre & Spottiswoode, 1950) 95-104.



yoke

An image of a cattle-driving yoke.



Saltek ProFlight Yoke System

Plato, the ancient Greek philosopher once had a dialogue with Alcibiades, using the figure of the steersman or navigator to suggest a model for governance:

SOCRATES: For if a man, my dear Alcibiades, has the power to do what he likes, but has no understanding, what is likely to be the result, either to him as an individual or to the state, for example, if he be sick and is able to do what he likes, not having the mind of a physician, having moreover tyrannical power [135a], and no one daring to reprove him, what will happen to him? Will he not be likely to have his constitution ruined?

ALCIBIADES: That is true.

SOCRATES: Or again, in a ship, if a man having the power to do what he likes, has no intelligence or skill in navigation [*αρετης κυβερνητικης*], do you see what will happen to him and to his fellow-sailors?¹⁸

Steering and driving (ways of controlling direction), linger as central metaphors. The diplomat or tyrant directs his or her nation with skill and tact, just as the shepherd maneuvers his cattle, the pilot navigates turbulent air, and the gamer drives through an MMORPG. *Kybernetes*, or κυβερνήτης in Greek, translates to helmsman, while *aretēs kybernetikes*, or *αρετης κυβερνητικης*, is a phrase roughly meaning ‘good at steering’.

From the viewpoint of human systems engineering, the machine often mimics and learns from the human mind and body—a more impressive harmony of signals, reactions, senses, and motors. During initialization, software learns from its user, and adjusting to his or her behavior. Think about setting a radio to a desired station. The car remembers. Similarly, newly purchased laptops prompt users to enter a time zone during initialization. Memory, temporal location and spatial awareness, or *proprioception*, are human attributes, transferred onto green and copper circuit boards.

The car fits like a glove, so to speak, when the push buttons, joysticks, levers, knobs and ergonomics so effortlessly communicate with the touch of its operator (going blind is less scary than it sounds; couldn't one just as easily feel oneself around the driver's seat: the cloth, the leather, the wood, the shapes, reactions, hard and soft surfaces?). Those who are incredulous should know the inventor of cruise control was a blind man.

A HUD, or head-unit display, reads numerical and positional data, altitude, GPS coordinates, yaw and pitch. A square shard of glass with green tint, it augments the pilot's eye: information stored in a surface. These prosthetics might become anachronistic (remote drone centers save fighter pilots the vertigo), but currently, vision is augmented so that it can kill.

¹⁸ Plato. *Alcibiades I* (Tredition GmbH, 2011) 134[e]-135[b].

Her glare bore holes into his body.

[Once a figure of speech, now a reality].

Software is likely to turn into something that obscures the action that it does. A press of a button or the twist of a selector to speak to the machine, translated into a force infinitely amplifying the movement of a small finger. Controls are designed so conveniently as to not be out of reach: the literal extension of the foot and hand. But where and to whom do pedals, joysticks, and push buttons extend?

Warfare is abstracted, through a remote-operated control panel dotted with circular shapes, square keys, and hand sculptures, making it easier to stomach. Difficult subject matter is made less visceral through geometry, a condition which abstract art proves through its primetime slots in museum exhibitions. An act of processing: how to optimize the encounter of the drone operator with his screen, which builds on the color theory and reception principles which art values? "System analysts," Jack Burnham once said, "are not cold-blooded logicians; the best have an ever-expanding grasp of human needs and limitations."¹⁹ Human expression and philosophy are included within the search query of the system analyst today, who must mine all-encompassing stratagems in order to win ideological and military battles. All tactics are collected in a sieve, and artistic particles are not strained.

The invention of the 'post-structural soldier' is not a semantic coincidence. Eyal Weizman has tracked the overlapping theoretical approach between Deleuze and Guattari's 1980 text *A Thousand Plateaus* and the Israeli Defense Forces.²⁰ Both conceptualize physical spaces as *smooth* and *striated*, understanding the ability of the state apparatus to undergo metamorphosis, to become a 'war machine.' Anti-capitalist paradigms are reformatted by commanders like Brigadier-General Aviv Kokhavi, who runs the Operational Theory Research Institute and trains IDF soldiers in post-structural theory, cybernetics, and other contemporary philosophies which can be operationalized. Military tactics gain credence because they co-opt the very same philosophy which pushes art forward; the relationship of message to form, receiver to environment, and the disparity between human cognition and perception.

Note a striking difference of interpretation: for the artist who reads Gregory Bateson, cybernetics is an open system, a dynamic process, an organism, a past progression in art; and for the technocrat, it remains another means of appropriation, a path to attain power and expansion, to rule through technological means.

¹⁹ Burnham, Jack, "System Aesthetics", *Artforum*, vol. 7, no. 1 (September 1968) 30-35.

²⁰ Bois, Yve-Alain, Michel Feher, Hal Foster, and Eyal Weizman. "On Forensic Architecture: A Conversation with Eyal Weizman." *October* 156 (2016): 116-40.

Imprinting

Now: a word about image inscription and processing, or *imprinting*. Its foremost definition spawned from the fields of psychology and ethology—the science of animal behavior—and relates to some phenomenon tested by an Austrian naturalist Konrad Lorenz, in which newborn species (young birds) bond to the first moving object they encounter.²¹ Ducklings line up behind their mother, rank-and-file, exemplifying this behavioral pattern. Sightings of gliders and light aircraft tailed by a flock of geese or cranes aren't unusual: they resemble mother-like forms, albeit a different taxonomy of species of grace.

Imprinting, understood cybernetically, describes many situations that involve an animal or a human which learns the features of some stimulus. In human-computer interaction, an affliction, Baby Duck syndrome, diagnoses our preference for systems which we first interacted with, over the introduction of cumbersome, newer platforms. Ever feel nostalgic to play a Sega Dreamcast, or to send messages again to friends in The Well (the Whole Earth 'Lectronic Link)? That's called Baby Duck syndrome. Some are more comfortable with knowledge acquired from early-stage development; but scrapping old habits, Marshall MacLuhan would say, is the mandate for hot media.

Knowing is part of a psychological system which forces us to see a message through an object (e.g. the aircraft to its avian followers). *I fly, and have the instructions and components to arrive to a destination, just like your genome, which affords you wings and the ability to migrate.* Gregory Bateson remarks, in his essay *Style, Grace and Information in Primitive Art*, that "it is of prime importance to have a conceptual system...in which the art object is both itself patterned and itself a part of a larger patterned universe."²² These logical deductions, or *imprints*, extract meaning from an object first through the *senses*, and second through *knowing* it in the mind. *Connaitre* and *savoir*, two French words which crystallize these meanings, according to Bateson. The aircraft *becomes* the bird, and vice-versa, through a process of copying habits, mechanics, and flight paths onto each other. The conceptual category of flying organisms, mutually reinforced by living and electronic organisms which both fly.

Imprinting might be psychology argot for the evolutionary term *adaptation*. Bateson props up the shark as an example:

A shark is beautifully shaped for locomotion in water, but the genome of the shark surely does not contain direct information about hydrodynamics. Rather,

²¹ BATESON, P. P. G. (1966), THE CHARACTERISTICS AND CONTEXT OF IMPRINTING. *Biological Reviews*, 41: 177–217.

²² Bateson, Gregory. *Steps to an ecology of mind*. Chicago: University of Chicago Press, 2008. *Style, Grace and Information in Primitive Art*

the genome must be supposed to contain information or instructions which are the complement of hydrodynamics. Not hydrodynamics, but what hydrodynamics requires, has been built up in the shark's genome.²³

What the hydrodynamic genome contains, and how it can be incorporated into the design of ships, underwater missiles, UAV fish, and other navigable, man-made sea vessels, is of utmost value to the academic-military-industrial complex, and others searching for natural systems on which to base their research and products.

Consider Warren Weaver's all-encompassing theory of communication: taken in 1949 as "all of the procedures by which one mind might affect another."²⁴ Flash-forward to 2017, and the transmission devices which can do the job of 'influencing' its receiver today are most likely the cell phone, the web browser, the news ticker. Weaver's 'Three Levels of Communication Problems' re-interpreted in today's market language might be the 'Four Levels of Propagandistic Success': find source of information [external world]→transmit its symbols technically [system analysts and back-end developers]→convey the desired meaning [news anchors, policy tanks, self-publishers]→assess behavioral effect [critics].

How long did it take for us to grow accustomed to the prototypes, behaviors and images that dominate the world of instant communication? The more we habituate to computers and mobile phones, the more frequent trips via sea or air, the more we might know them, and the less conscious we will be of the knowledge which is required to invent them. Complex engines, fans, ventilators, lift/drag ratios, RFID chips, screens, control panels, sterns, rudders, and flaps are all housed in cases which conceal them. They become unnoticeable through repeat encounters—habit of action, perception, and thought as Bateson describes—a process through which knowledge learned retreats to deeper and deeper parts of the mind. The new zeitgeist: a branch of artificial intelligence called *deep learning*, which posits that software can mimic and simulate the neocortex's vast configuration of neurons through a *neural network*, which can detect patterns in speech, images, text.²⁵

In the current worldstate, the flick or graze of a finger or hand over a device can communicate valuable information; about its manufacturer, who designed the interaction, and what action it is performing. A hand which depresses a small circle in combination with a thin, side button takes a screenshot on an Apple product. The tightened hand, perpendicular to the screen, which brushes right, is the signature of Samsung. Developers today lay claim not to knowledge, but to a specific interaction which can be monetized. Whether the user is aware of the system of signs they have

²³ Ibid.

²⁴ Weaver, Warren, 'Recent Contributions to the Mathematical Theory of Communication' (1949), in Claude E. Shannon, and Warren Weaver, eds, *The Mathematical Theory of Communication* (Champaign, Illinois: University of Illinois Press, 1949) 3-6.

²⁵ Hoff, Robert D., "Deep Learning." *MIT Technology Review*. Accessed May 8, 2017. <https://www.technologyreview.com/s/513696/deep-learning/>.

entered, and the brand loyalty it signifies, is one observation. The other, is whether it is possible to resist the behavioral modification that user interaction (UI) carries with it: shortened attention span, intolerance for inconvenience, excessive swiping.

Photography imprints too: a static, or fixed, photograph, from which meaning is ascertained by the viewer on his or her own or by media and through accompanying text. The year is 1927, Moscow: Alfred Barr, first director of the Museum of Modern Art in New York, visits the Laboratory constructivists El Lissitzky and Alexander Rodchenko. *Faktography*, “the program of productivism and the new form of literary representation/production that accompanies it,” is the aesthetic language par excellence, thanks to concurrent industrialization in the Soviet Union and the belief that it will lead to a *new society*.²⁶ But Barr cries out, exasperated by photomontage, and the aesthetics of the printing press and the masses it suggests, “this is journalism! Not poetry but reportage!” The Soviet avant-garde artists had a direct semantic and technical objective—to convey information, with aesthetic concern, using the distribution logic which the newsreel picture, the press exhibition, and the *polygraphic* image afforded. Clear transmission of a political ideal over abstraction, their maxim could have been. Rigid combinations of style mechanics and image delivery, with psychological and emotional intent: imprinting as *propaganda*.

Media theorist Marshall McLuhan suggests that art in its most potent expression prefers space around a form, “high in participation or completion by the audience,” he notes in his essay *Media Hot and Cold*.²⁷ News, in contrast, offers no space—direct message—and has the power to reduce, galvanize, and produce incendiary combinations of images and text. What German artist Harun Farocki and Czech philosopher Vilém Flusser discovered together was that the German sensationalist tabloid *Bild Zeitung*, in its layout of a violent act, weakened the consciousness of the reader, by its blasé tone and interruption of narrative with imagery.²⁸

Imprinting in its ethological definition is an adaptation process during which younger species learn survival skills from older ones; in art, the concept of *imprinting* might be forged as the key to unlocking the message an art object conveys to its receiver, whether it is through a *mechanically-produced image* (photography), or a relief in physical form (sculpture). These two instances are the end products of a three-tiered process: the structure used to create an image (the tool), the image itself (the relief), and its lasting effects on the brain (ideology). Take for example a cow with a symbol burned into its hide. In a single instant, the shape of the craftsman’s tool, the purpose of the brand (ownership), and metaphorical associations can be learned.

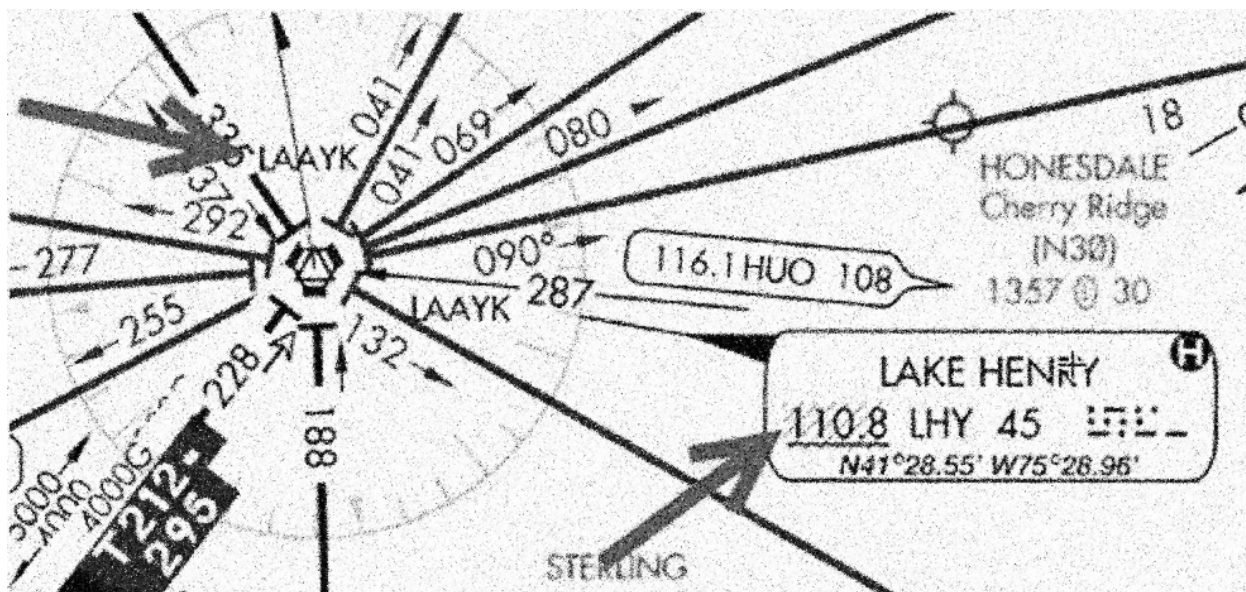
²⁶ Buchloh, Benjamin H. D. "From Faktura to Factography." *October* 30 (1984).

²⁷ McLuhan, Marshall. *Understanding media: the extensions of man*. Cambridge (Mass.): The MIT Press, 2013.

²⁸ Arantes, Priscilla , and Sergio Nesteriuk. "Programming the Visible: Conversations Between Vliém Flusser and Harun Farocki." *Flusser* 21.

Just as a closed fist motioning in an arch is a symbol for driving, so is the wing for flying, and the flick of the finger for a brand of technology manufacturer. The brain's capacity to interpret these images, associate their symbols with meaning, and to find technical ways to deliver and teach them, is the objective of human-machine interaction, and its various transmutations over time. From Claude Shannon's early theories of communication, to the systems aesthetics and media theories of Jack Burnham and Marshall MacLuhan in the 1960s, to the deep learning and artificial intelligence laboratories of Google: all are concerned with coalescing the human and machine mind into one.

AEROLOGY



BAD OPTICS

No one noticed the glaze in his eye, just a foggy prosthetic lens implanted after his time in Kandahar, they thought. He headed RF Transmission Systems at DynCorp, and was a part-time operator. Before that, an airman in the 63rd squadron. He never mentioned whether he developed his glitch here or there. Could have been Keratoconus, a rare, ocular condition where the cornea gets thin, and bulges out like an ice cream cone. Doubles and halos started as soon as he was assigned targets and PBIEDS on the screen, stuff he had to forget. The executives who scouted and recruited him were hands-off, gave him an annuity package, and a room at a capsule hotel for every shift. Somewhere in Reston, VA, he kept one of those cutout houses—flat, empty, and populated by enthusiastic government workers and decommissioned veterans. His house was little more than walls and a driveway, a subscription to a community with nothing to offer but a number on a mailbox: back to the rank and file, the comfort of his adolescence.

Florida was squalid, dead hot, muggy stretches with nowhere to go other than anonymous chat rooms and faraway environments plugged into AltaVista shapes. Inside, in the cool, conditioned house of a starter home near I-75, he felt at ease. Home was the next search result—a beach in Fiji, someone else's life, anything but his own. He jerked off on a wicker chair in front of a control screen. It wasn't bikinis or lesbians or even the authority figure of a lieutenant that did it for him; just the smell of chemicals which burned from the CPU, his ecstasy.

He managed to avert his own expiration, which would have been languishing with his high school chums, who went on to become middlemen, dealers, and ad jockeys. Instead, he enlisted at the local chapter of ROTC at River Valley 2, and attending their weekly trainings and exercises.

His turning point: being wheeled off in a Ford Econo-Van, somewhere toward Venice, after having been sentenced to Operation Straighten, a correctional deterrence program aimed at scaring juvenile delinquents. They picked him up in the parking lot of a North Shore beach on one of the barrier islands. He was walking back to his Datsun from a bonfire, and in the glove compartment was a minuscule bag of synthetic marijuana. They searched. They found. Brooding, he accepted the handcuffs around his wrists, unable to circumvent what the cruel night had dealt him.

*To endure our protagonist's brief but tragic stint in Operation Straighten, **turn to page 26.***

*To continue, **turn to page 29.***

RECITIVISM

Officer Scalia opened the winged doors, pulling the unsuspecting teens in their orange jumpsuits from their wet, cloth seats, lining them up.

“I betcha don’t know what recitivism is, do ya?” he asked.

A resounding, “no.”

“Recitivism is when you repeat a crime ova’ and ova’. Some of you will likely hit a *low* again, and I’ll see ya right back here” he smirked.

The teens shrugged, the officer flexing a lot of muscle but straining to budge in his tight, forest green uniform, adorned with a golden star and a park ranger’s hat. Unit had dropped them off in a state park, with a formidable course of walls, ropes, and devices aimed at humiliating overweight children and unsuspecting delinquents. Operation Straighten had found a place—somewhere between the jurisdiction of the city’s correctional office and the margins of state law, where they could torment tomorrow’s youth, with impunity.

“Now, get ta work!” Scalia shouted.

“But I—.” Before he could urinate or even understand how he’d been dropped into this world of wooden towers and swings, he started running. Past the hefty kids, who he felt remorse for, whose chances were written on the scale which weighed them. Up the pyramidal structure, and the six knots which punctuated the ascent, with the fluorescent orange Tyvek suit which stuck to his brown back, already a prison inmate before he could protest otherwise.

Gasping, the troubled teens arrived one-by-one to the finish line of hour one. Scalia could see the fear which rolled off their impressionable faces and onto the soil which his boots crushed mercilessly. The ten kids were his understudy. A small, dumb grin widened his expression, the realization that the control he had dreamt about was finally in his hands.

“Forgot to mention, cough up the cells,” Scalia added.

“Isn’t that illegal or some shit?”

“Nothing’s illegal here, now give me your cells.”

“What, you’re gonna look through our messages?”

“Might as well, while we’re at it.”

“They never said nothing about spying on us.”

“Tough shit...you’re gonna have your hands full, anyway.”

“Robinson!,” Scalia shouted, looking past the crumpling and misfitting uniforms, which were designed to contain large housing structures. Another green suit, retracting into an unknown car at the trailhead. “Come help me with a media search.”

He re-winded his footsteps, walking back to the first checkpoint where the group circled back to, exhausted. They looked at each other.

“First is this scum’s Nokia,” Scalia ordered.

“What am I looking for?”

“Anything suspicious—numbers, SMS, dealers.”

He waited anxiously, not knowing the exaggerated response which any deviation from the normal might trigger.

“Toto 139-909—who’s Toto?”

“Definitely sounds like a hook-up, if you know what I mean.”

“Not even seven digits, that’s alarming.”

“Kid, if you ain’t tellin’ us the fuck this guy is, we’ll be out here all day.”

He barely remembered what happened the week before, let alone some memo he notated with his thumb, one of his net journeys.

“It’s actually a product number,” he stumbled, “must have been a spare part on eBay, a Toto M139, GPU accelerator for my game system.”

They started, symmetrically, at each other and the Finnish phone.

NOKIA

“Linked to my eBay account, he added.

Scalia and Robinson’s vocational training at the Police Institute had been about a quarter of the time he spent fixing, adapting and mixing circuits for closed GSM networks and modifying his ASUS monitor to get a 288Hz refresh rate. He wanted his online and gameworld to be liquid, dripping, better than 4K. There wasn’t anything he couldn’t say that wouldn’t totally stump these dense officers. How they both Americanized his name, to prevent themselves the embarrassment of repeating any tongue which wasn’t the aggressive, slurring, and plucked sound of their Florida English. They threw his com-dev into a tin drawer, extracted from its housing unit, which sat in the passenger seat of the Econo-van.

“How much should we give him,” Robinson asked.

“Your call Robinson.”

“Twenty-five.”

“Make that twenty. Tight schedule and next stop’s the bog...he’ll be swimming in there like a manatee in an oil slick.”

He assumed the plank position, and as he grasped the sweetgrass and kissed the ground, he counted as if those numbers were codes which would unlock a more complex level—outside of Florida, with no savestate.

Discipline is necessary...but sometimes you relapse. Turn to page 28.
Team spirit—for better or worse...a lot worse. Turn to page 31.

AFTERBURN

The weight of his eyelids explained his inertia, the slow process of booting up at a dark hour. 430AM. The Braun clock squealed as he knocked it over, signals disrupting his acetylcholine, the neurotransmitter he craved, but never had enough of. He'd gone through enough mornings to know that the only numbers he trusted were stored in a plain-text batch file, kept in a floppy and taken wherever he went: Tampa, Heidelberg, Okinawa.

The room was a drab box. Off-white stucco muffled the sounds from other neighbors, leaving early for their personnel and intelligence positions, eager to secure them. His was temperature- and color-controlled (68° F, 0, 0 255); kept brisk, a saturated blue, and in the penumbra of the core light. The blanket which contoured his compact body was gray emergency wool, made rough by the DynCorp employees who had stayed there before him.

He remembered the blacklight paintings of the small apartment where he met his Brazilian supplier. A studio in Chelsea. A young Dominican woman at the foot of the stairs, trapped in the vestibule between the outer and inner doors, or maybe just waiting. The dead rat and mountains of unwanted scrap was the signpost for the entrance of the nondescript building.

He remembered exchanging cash, for something. They spoke about programming, net design, the neon saints and mirrored Catholic icons which adorned the bed. Paintings were splatterings—psychedelic stim for sure—and they were both high: called out shapes, illusions, compositions.

He raised himself from horizontal, catching a glimpse of his square jaw in the corner mirror. Walked, felt the soft, seafoam carpet on his flat feet. He had a stranger's face. Blonde, not from any particular history. Eyes pierced green, which probably got him the job.

There were tattoos—hieroglyphs, micro-glyphs, Portuguese cants—floating above the supplier's tattered, large hands. They brushed up against his leg. "Probably nothing," he thought. Between the thumb and the forefinger was a forked insignia, some Semitic epigraph, like the same ID tag he had on his left bicep. The table was leather, and as he lay there with his pant leg rolled up, he felt the supplier squeeze and wring out the eggs which were laid in his right calf, on his plantaris tendon. Larvae exits were painful (not everyone who was ex-military could afford 'em either). VA orthos thought a rare mosquito lived in River Valley 3 around Kandahar, and the open wounds gave them a portal in.

Pangs of serum shot up his leg, and then subsided, when, he figured out that the golden cross, Rio argot, and graphic interface spiel formed the trifecta of a front-image. The brown veiny hands were an encrypt, obscuring the supplier's stint as a

contracted police for the Afghan army. Everyone on the American side was tagged with this Semitic symbol, to avoid getting stung by the Reaper. VA kept medical in the family, and retired police could transitioned back into civilian life by being a bug ortho, serving the drone operators who were still clocking in.

The misty rain and polar night snapped his calf into place, as he jumped down the subway hole—a stone vault as big as a cave archive—and rode the Metro-South down to the Park-n-Ride. Caught an algorithmic pod back to Reston, but it was shared; must've been a server re-route, because he hadn't planned an assist with anyone.

He heard clawing attach to the back of the vehicle, and then matched eyes with a yellow glare: the jaundiced pupils of a cybernetic jaguar. Thing was vicious, saliva dripping from its steel muzzle. Luckily just a DARPA prototype that hadn't been set out for contract work—yet. The creature jumped off once they hit the Virginia border, using locate algorithms to find its research lab, somewhere in the Alexandria high-rise district. Before he could decipher its tag, the jaguar disappeared into the night, velvet skin camouflaging with the black, textured sky.

Waves of uncertainty mixed and relief washed over him. He was relieved to be back in RF Transmission, and not Human 7.0, the eerie lab headed by Herr H., who had suffered a torqued amputation, and found his newfound purpose in fusing animal legs, with vehicle chassis. Hope was that he could repair combat vets, optimizing them to be more perfect and godly than they were pre-amputation. So the legend goes. But Herr H. always gave him the chills, ever since he shadowed one of his crash courses back at the Institute.

He entered his drab house—02144. The kitchen's uninsulated windows let the subzero air in. He peered out onto the sharp icicles which had formed, razor-sharp and deadly. Stuck his head under the sink, gulped a little, filling his throat with liquid energy. The orange, fiberboard table had his vaporizer from the night before; he was a little drained, but all he needed to do was grind the green, ABS leaves, soak them in mineral oil, and scoop up a batch into the small funnel. Then he could sleep easier. He flicked the switch, and the green plus icon illuminated. Heated the device, and took a hit big enough to last him until the next day at work. The apartment reeked of insecticide and the fragrance of a marijuana plant. Afterburn gave the real high, the fuzzy sentient feeling he needed to feel numb. There wasn't a single DynCorp employee that operated without some help—salt, synthetics, prescriptions. Most were retired or discharged air force pilots looking for a comeback, so this was a start.

To drift, turn to page 30.

Addicted to speed? Turn to page 31.

CLIPPED WINGS

Whole center felt like simulation camp again: the long hours in front of the monochrome CRT monitors and analog RGB displays; the bloodthirsty zeal, with which the new recruits approached the information displays; the grooves of the cream, block keys. At first glance it was oversaturation—lines of fluorescent green intersecting with red circles, blips of color, text (“recalibrating...”), a triad of interfaces. There was a taxonomy, rules you had to follow, but if you could get the low-level skills down, pattern recognition, color sensitivity, response times quickened. A chalkboard with white scratch, more a residue now from the first training 10 years ago, hung on the concrete wall of the 11th floor office park which Northrop and DynCorp shared:

HEADPHONES ON WHEN:

1. MESSAGE IS EASY
2. MESSAGE REQUIRES ACTION
3. FEELS VISION DISTORTED
4. IN CONSTANT MOTION
5. MESSAGE REQUIRES TIME

Everything rested on the operator’s ability to perceive, to anticipate, to react—all under abnormal conditions. Sometimes the difference between a FFF operation and a TADS was a single tick mark, or a whining alarm gone unnoticed. Manning the aircraft virtually meant acting the real; same start-up, same communication via tropospheric scatter, like they used in the Texas Towers, and along the Emirati corridor. High stakes, but without the physical consequences—at least on this side of the Atlantic. They nicknamed the unit Clipped Wings.

It wasn’t the first time Cyan came to work high. Used to be that the buzz from the monitors were enough to tame his brain, and cyber was a promising frontier. But the new budget by the Technoc asked for a higher quota. ANSF missions went bad—went real bad—so DynCorp won a contract to fly their bugs, the MQ-1 and MQ-9, through Kabul, Kandahar, and any territory the Technoc decided was now VEO-controlled. Every morning, each operator received their names—Mustafa, Ahmad, Muhammad, Yusuf, Fahad, other guttural honorifics. Logging-in, their lists appeared, in random order assigned by a DynCorp security shuffler.

*To meet João, a new recruit from Brazil, turn to page 31.
What the hell is a bug? Turn to page 34.*

SUPERSONIC

“Whole system’s rigged,” complained one of the new Brazilian recruits who had just been transferred from Embraer São Paulo.

Cyan retorted, “Know anyone else who got employed after their pilot license was revoked?”

“Somebody’s gotta pay, and doesn’t look like your government is doing much, especially with your record.”

He was right. João was selected to test the new supersonic E4 with the 11th Infantry Brigade in Campinas, and as part of the government’s mil-civ deal with JAL, had to fly over Niemeyer’s bird headquarters in Brasilia, during an official visit by Japan’s PM. Problem was, the E4 flew at 45,000 ft., barely a speck from the parliament tower’s roof. Aerodynamics div was brought in to conduct sound tests too. He caught 0.86, then 0.94, and finally Mach 1.06, when a tiny crack was heard by the Japanese businessmen who clapped and applauded. That is, until the windows of every building of the government campus had shattered, blown out, down the swirling, modernist blue staircase, tessellating the marble floor with their sharp-edged triangles and deafening boom. Nobody could move. He would tell this story for years: how his jet made supersonic and shattered the sound barrier, one hot and fast time in Brasilia. And that was how João lost his wings.

“Foda fora,” he mumbled in Portuguese. “At least we didn’t have assassination lists in Campinas.

“I’ll take the money,” she said. “Only federal support you can get out here is through operator work, and mechanotronics. And fuck if I have to work on that jaguar again.”

His co-operator, Sara, was dykish, projected the confidence of a lieutenant, and felt a real sense of camaraderie with the guys. Reveled in the handshakes, the protocol. Talk to her for more than a few minutes, though, and her stoic expression came frontal, her eyes disappearing into a false horizon behind you.

Cyan logged in, using a password transmitted to his watch from the triple-authentication system. Wrist tracker, system-image, and fingerprints were all cross-checked; once they lined up, a 128-bit hexadecimal code separated by colons was sent by packet, on IPv6.

2020:0db8:95a3:0000:0000:9b2f:0480:6223

As soon as the code was administered, reality would have to bend. Most of the DynCorp contractors were callous by this point, and kept vaporizers in their lockers to huff during initialization. Usually the new recruits had a tougher time; metaphors had to be playful to not scare them off, so kids were referred to as *fun-size*, and targets, *specs* and *dots*.

“You surfaced?,” Cyan asked over his shoulder.

“Yes. I’m in.”

His English had a deep, melodic way of traveling, and his favorite film was *Top Gun*. He navigated the low-poly landscape around Chilzina imagining Tom Cruise, chest inflated. Banking around the jagged outcropping, down through oasis and the edges of a vast, informal city. He buzzed his Predator in circles, before exploring one of the inscriptions on the face of the mountain. Something Aramaic, to be cracked: an edict.

“Is it a game?”

“Focus on the mission,” Cyan responded, apathetically.

He started intently at the screen, looking for a white arrow to follow, trying to block out the list and the Brazilian’s questions. Metaphysical shit never worked for him, or anyone he knew, for that matter. Life was a forking waypoint—straight as an arrow—with numerical coordinates and alpha-numeric digits to calculate flying altitudes and pitch angles.

“That one is moving....can’t be a training exercise, can it?”

“It’s all training man, tranquilo.”

“Hey—if I’m gonna be working this game, you better spill.”

“Look, call it what is, it’s a job.”

“The fuck is that supposed to mean? I didn’t sign up for paired reality work. Virtual-only, those are the terms of my contract.”

“Dude, chill out. You don’t want to get our supervisor involved. He’ll be back from Guantánamo tomorrow.”

He pulled out his liquid emulator, backlit purple with an alligator silhouette, and handed it over to João.

“Got a new flavor of Afterburn.”

“No thanks,” he scoffed at the square device.

“What’s the problem?”

“Problem is...problem is you’re gonna have to explain what the fuck were doing here, and why those specs are moving in and out of houses like ants in a motherfucking colony.”

His eyes were red, and projected onto his face were miniature codes and lines, circles and arrows, green light imprinting its commands on his forehead.

“Put on your HUD.”

“HUD?”

“Head-unit display.”

“If we’re not paired with geo, why do we need glasses?”

“Just following orders, João.” He swiveled over to the Brazilian’s station. “Now, you wanna work as a team, or solo back in Brazil?”

Cyan wasn’t someone who you’d immediately trust. More of an introvert, with some strange habits, and the drug problem didn’t help. He was tasked with managing the recruits, learned to anticipate some friction—what they called ‘feelings’ in ROTC—and kept a vape nearby to take the edge off. Actually, it was a trick he learned from his instructors, back in Aircraft Systems and Automation. A Boeing exec and an ex-military professor tag-teamed the simulation, where most of his comrades continued to

DynCorp. That, or they were mistakenly stung. Orange, dry, dusty, and deadly: that was Kandahar.

*Enough language games. To consult a glossary, **turn to page 37.**
Simulacra are always rooted in the real—but where's that? **Turn to page 34.***

REAPER

Tom bred stud dragonflies and bullet fuselages in a production facility by General Atomics, on the southeast fringe of the Blue Sky Ecological Reserve.

Wasn't easy to rise the ranks to chief aircraft systems engineer; you had to be agreeable and complacent ("grub first, ethics last," was the motto), have a background in aerodynamics, and one strange catch. Catch was DARPA had learned of a new design optimization technique which they called *breeding*, and you had to accept it fully—be a loyalist or eternal outcast. One of those hybrid fields that was discovered, when a geneticist and an engineer were assigned to re-program the vision of a blind lab butterfly. Started with the splicer, hosted the DNA in an E.coli, but when it was plugged into the lepidoptera, it freaked, and grew one hundred eyes.

Accidentally, it showed allelic variation between the two species, that one could be juiced up with the features of the other. Up to factors of 100—even 1000.

A regular day was inserting the alleles of aerodynamic species from the animal kingdom—squids, rays, and most recently, dragonflies—into the NACA database of airfoils, through a combination of high-res haplotyping and phenotyping, using Symscape software. Heads looked bulbous, pale grey usually, and the bodies had thinned out over time. NACA 16 was one of their first. Boasted a lift coefficient of 0.4396, and was blended with a freshwater tadpole. The MQ-1 Predator was GA's next product: an LTA avian strain, with a 450-pound payload for its Hellfire missile. Not terribly precise, but Technoc wasn't counting. They had some funding contracts to expire, and GA had the biggest lobby in Washington.

Products were delivered, goals met, contracts honored, and Technoc was happy, until some eco-activists exposed the drone breeding program in a leak during an underground press conference in Germany. Hackers, electric frontier patrols, and some academics formed a temp coalition to figure out what the Predator really was, after some doubt had surfaced. Ads ran in Washington that the MQ-1 was a training device for birds, facilitating the migration process "across oceans and in collaboration with our allies in the Middle East."

A trio of sensor operators attended the first meeting, color stricken from their face, like they had seen a Reaper or something. B, C, S, and M declined publicity, but published a letter incriminating the Technoc.

Dear Technoc,

We are RF Transmission 62, DynCorp-contracted. As ex-soldiers, we are grateful for this opportunity afforded to us. We realized that the bugs which were communicated to us as 'virtual parasites' had parallel lives, almost like our own. The ants multiplied, turning red, with every strike, despite what you told us in training. The Corporation is opening new offices—Havana, Kabul, Sanaa, Baghdad—but the kill lists are growing and the young recruits are drug-addicted. We don't see much improvement in pay or medical, either.

The game system that we work in feels real. Distinctions between the two are blurred. In the Center, we came up with the name 'bending reality,' when we mix synthetic marijuana with insecticide, and vaporize it. Some of us see orthos regularly, which de-bug us and make sure our limbs and prosthetics are operating smoothly. But we need more meds, more drugs. Many of the new recruits suspect the Predator is something worse than it actually is. Buzzing sound has given many the shudders. It's just used for data con, right?

Please offer some clarification. For the sake of DynCorp, the Clipped Wings office, and the health of your employees.

*Sincerely,
62*

For the first time in history, General Atomic had to retract the MQ-1 to avert a publicity scandal, and K. Ann was in charge of it. She was a fierce woman with bleached blond hair, Fort-Lauderdale provenance, who denied the truth and would take it to the grave with her.

Tom's first week at GA, under the new Technoc leadership, meant flying to Washington to rendezvous with K. Ann in a cold, mahogany boardroom of a three Michelin-starred steakhouse. As soon as he arrived, he was greeted by her black-clad secretary, who escorted him to the private meeting room of *Charles*.

"Tom, we've heard so much about you," K. Ann started, "Let me just start by saying GA is an important contract for us, and we want to make sure you don't go under because of the Predator-smearing campaign."

"I appreciate that, K. Ann, it's nice to finally meet you."

"We want to work out an arrangement."

"I'm all ears."

"Breeding's not my specialty, but the bird metaphor wasn't right. Is there some other phenotyping you guys can cook up for one of our upcoming missions in Syria?"

Exasperated, Tom let out some air, but recovered.

"Look, breeding wasn't how I thought I'd be using my Aeronautics degree either, but now I'm at GA, and I want to maintain this mutual understanding we have."

"Fantastic, Tom," she grated. "We knew you were our guy. Let us know when we can expect a prototype, and our Ecological Species Protection agency will send you some samples this week."

She was stick thin, his belly hanging over his blue jeans, and before he could sink a single tooth into his 8 oz. sirloin, K. Ann gathered herself and exited politely.

Back in the California Sprawl, Tom convened a mind-flood with Flight Eng, Soft Systems, and Insect Bio. They pulled images and samples from the net, and had one of the biologists examine the suborder *Caelifera* samples that ESP had sent over from Alexandria. Forewings—*tegmina* in sci-terms—were thin, lightweight, and narrow. External sense organs meant three sensors for light detection, in addition to all-around

eyes. Even had a wing-flash to confuse predators. Three scientists voted yes for breeding, but as soon as MatSci felt a cuticle sample, they knew it would be too rigid for the Syria air. Drag was comparable to a blade run through quicksand.

“What’s this for, anyway?” one of the MatSci engineers asked Tom.

“GA is facing a small dilemma. Our mandate: develop a new line, or re-vamp the Predator, which is being attacked by the new movement against GA.”

“What are our options?”

“Recall the entire Predator line, and outfit them in an undetectable mask, or...release a modified MQ prototype, something based on the Odonata order—nothing avian, because that’s what got us into legal trouble in the first place. They can sue ESP and GA for producing biological weapons under the guise of migratory facilitation, then General Atomics, and your pretty little jobs are over.

“What about *Anisoptera*?” an eager young grad from the Insitute spurted out.

“What about it,” commented Tom, incredulously.

“Wings are a flat membrane, and use structural coloration. Six-way propulsion. Read about an infraorder that had foils so diaphanous it could they could disintegrate into visible light. Structural blue, they call it, the *Anax junius*. Plus, they’re ancient: saw a giant one from the Upper Carboinferous with a wingspan as long as a shoulder-wrist measure.

“Get a distribution chart, an abdomen x-ray, and an iridescent scan.”

“On it.”

“Meet me in the wind tunnel in 15.

As the white dusters scrambled around the sterile, glass-paneled, mind-flood room, Tom remained in his ergonomic chair, stroking the fluttering, perforated membrane, which crowned the *Anisoptera*’s wings.

*To continue to the glossary, turn to page 37.
Otherwise, **THE SIMULATED END.***

GLOSSARY

Anisoptera- dragonfly

ANSF- Afghan National Security Forces

Com-dev- communication device

Drone- the male of the honeybee and other bees, stingless, and make no honey; an unmanned aircraft or ship that can navigate autonomously, without human control or beyond the line of sight.

FFF- Find, Fix, Finish

GSM- Global System for Mobile Communication

MQ-1- General Atomics Predator Drone

MQ-9- General Atomics Reaper Drone

PBEIDS- Person-borne improvised explosive device; meaning suicide bomber

ROTC- Reserve Officers' Training Corps

Savestate- a file that contains an emulator or virtualizer's state at the moment it was saved to disk. File contains the memory, and records other data that allows the user to resume the application from the moment the file was created.

SMS- Short Message Service

Symscape- DNA editing software

Technoc- governmental leadership in *Aerology*

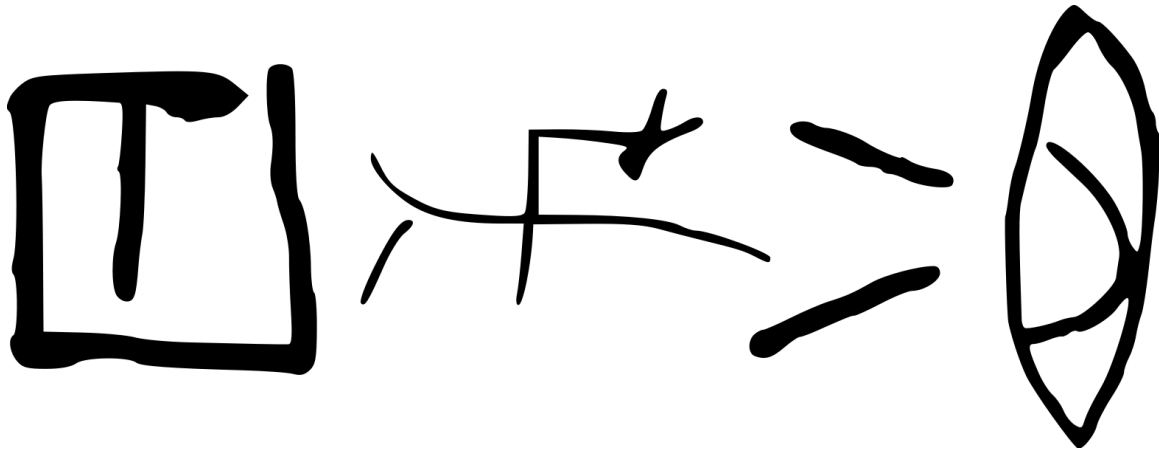
*To re-read Aerology with new eyes, turn to page 24.
At last, **THE REAL END.***

POSTFACE

The speculative narrative you just read is based on the real experiences of four unnamed drone operators, who leaked valuable and sensitive information linked to the U.S. drone assassination program. *Aerology* incorporates key concepts from the study of human factors, as well as conversations and encounters with Air Force and Army members, at the Massachusetts Institute of Technology. William Gibson's *The Peripheral* is a genre model, an oblique interpretation of the issue of remote and virtualized warfare. *Aerology* proposes a new stylistic form—*aerocom*—to understand the coded and metaphoric language that is used among pilots and military personnel today.

From Symbols to Signals

Communication began as indexical signs and pictographs. As early as 6000 BCE, proto-writing appeared in Chinese, Egyptian, Indus and Semitic civilizations (in the form of thousands of signs and hieroglyphs and inscriptions) as narrative, law, and mythical speech. Neolithic sites across China yielded the first, engraved onto turtle shells from Jiahu, a form of pottery with markings resembling a shelter, a figure, an arrow, an eyeball.



Four of the sixteen Jiahu symbols, originally found as markings on prehistoric artifacts in Henan, China, ca. 6600 BCE²⁹

Most interpretations view these and other symbols as the origins of written language. Pictographs were etched to stand for an idea [a sign], to tell folklore, teach morality, record rules and to describe complex process like eating and hunting and ceremonial rituals. A string of letters, or alphabet, combined without any intended ideological effect [a linguistic system], could be defined as pictographs [letters drawn and standing for a partial expression], yet there is a distinction. Roland Barthes counts two semiological systems inherent in the myth: the linguistic system, or *language-object*, which myth recombines in order to invent its own ideological system; and myth itself, which he calls *metalanguage*.³⁰

It is this representational riddle—between *language-object* and *metalanguage*, adapted for narrative use—that compels the Soviet filmmaker and film theorist Sergei Eisenstein to write about Japanese cinema, Kabuki theater, and its use of semiology in “The Cinematographic Principle and the Ideogram.” He theorizes:

²⁹ Pilcher, Helen R. "Earliest handwriting found?" Nature News. April 30, 2003. Accessed May 10, 2017. <http://www.nature.com/news/2003/030430/full/news030428-7.html>.

³⁰ Barthes, Roland. *Mythologies*. New York: Hill and Wang, 1972.

The point is that the copulation of two hieroglyphics of the simplest series is to be regarded not as their sum, but as their product; each, separately, corresponds to an *object*, to a fact, but their combination corresponds to a *concept*. *From separate hieroglyphs* has been fused—the ideogram. By the combination of two “depictables” is achieved the representation of something that is graphically undepictable.³¹

Eisenstein (the passionate and perceptive Eisenstein) was trying to get at something: how two symbols—when paired side by side or in sequence—could produce a third meaning. One only has to read his theories of montage (for example, “the independent ‘mouth’ and the dissociated symbol of ‘child’ to form the significance of ‘scream’”) to understand that the mind gleans information from recognizable shapes in the external world, and that the cognitive associations made between them is what gives cinema a language and literature an image.

Eisenstein bifurcates aspects of Japanese writing into what he calls *depictive*, or related to the creation of imagery, and *denotative*, pointing to a system of characters.³² Whether two images or scenes *collide*, as Eisenstein believed, or form a *linkage*, as Lev Kuleshov theorized, is a matter of semantics; in today’s hyper-saturated world of media, the ideologies behind symbols convey information, instructions, and even belief systems of the parties which inscribe and transmit them. Such is the case with the oldest of written languages, the Chinese characters which are still legible on bone and jade and tortoise shells. Capitalizing on the power of symbols, neo-Nazi political groups appropriate a Sanskrit *gammadion cross*, or *swastika*, meaning “lucky or auspicious object,” into a form which crystallizes their misguided hopes of racial purity into a universal, distributable form.

Once the hand drew and shaped these images packed with meaning; for our generation, which learned through the Internet and came of age with forms of wireless telecommunication, the *symbol*—that hand-made mark used for conventional representation—transformed into the *signal*, something less tangible, an action, sent over a network, which could serve the same purpose of transmitting information.

Agencies like the US government and military, are now charged with opening divisions such as Cyber Command, which encrypts information and conducts electronic warfare, extending its domination to the invisible communication networks which narrate life today. Two crossing lightning bolts are stitched on a Tropospheric Scatter Communications patch which reads, “Hang Loose With the Deuce.” This is not a California surf slang, but an insignia belonging to the US Army’s Signal Corps, or the newly-ushered group which develops closed channels of communication, using mountaintop-installed transmitters and receivers, and microwave radiation, which allows over-the-horizon VHF and UHF communication within a range of 300 miles. The 5th Signal Command Theater is represented by a flame-breathing dragon, while the flag

³¹ Eisenstein, Sergei, and Jay Leyda. *Film form: essays in film theory*. San Diego: Harvest, 2002

³² *Ibid.*

system associated with the US Signal Corps is called Wig-wag, and is composed of red, white, and black square flags, with various insets.³³ Waving the one flag left and right, with its punctuated dot in the center, builds up a message which can be read in International Morse Code. Waving two flags in different positions, at a rate of not less than 30 letters per minute, accelerates the message, using Semaphore Code, in order to express "rest," "attention," "cancel," "E or 5," "D or 4," "H or 8."

If the military has appropriated Eisenstein's cinematic language of the ideogram, we might ask: what will this new cinema of signals look like?

³³ "U.S. Army 5th Signal Command (Theater)." [Www.5sigcmd.army.mil](http://www.5sigcmd.army.mil). Accessed March 05, 2017. <http://www.5sigcmd.army.mil/#org-about>.

False Horizon

“What can the army do with simulators?”

-Jean Baudrillard

Dusk in the southern Caribbean was dark orange, the color of a rotting tangerine. She felt fixated by and fascinated with the curvature of the Earth which was still noticeable, at 20,000 ft, and its cerulean seas. Her new career as a commercial pilot for LMN Dutch airlines wasn't the worst placement; but ask anyone about the descent to Saba Island, and they'd call you a deadman. At best it was a rocky outcropping, white crests lapping its volcanic base, a single airstrip measuring 400m, with one, white orthogonal line marking its furthest edge.

She remembered her instructor's advice at the simulation lab (“follow the instruments”), to distrust the sloping cloud formations, the orbs of light on the ground, the double or disappearing horizon line. The variometer read 20m/s: a rate of descent that was standard for island conditions. Her eyes fixed a stable image of the world in front of her, magnificent and burning, the hot sun as its zenith, close to the equator and above the landmasses which were divided up by Dutch and French interests hundreds or thousands of years ago.

The type of humor which developed in the sim-lab was morbid, she recalled, especially tales of those night journeys (junior air force pilots shuttling new fighter jets) from plants to bases, where the fixation on anything outside the cockpit could be so dead and motionless, it had stimulated one recruit to attempt to intercept a star. It was a sad metaphor for her (even though it was his reality), an unrequited dream or purpose, something she was never going to suffer in the commercial airline industry.

The sloping runway was a parallelogram, a square reflection of the crepuscular sky. Dark were the waters she glided over, using only the instruments as she lined up her acrobatic landing, when, as she peered up to locate the runway again, she felt the horizon wash over her—wet, briny, a total engulfment.

Did the instruments fail our young heroine? Does Saba Island exist? Is such a flight descent even possible? Yes. This scenario is completely imagined, yet it demonstrates a classic example of a dangerous visual illusion, called a *false* or *artificial horizon*. Most military pilots, whether in simulators, aircraft or helicopters, will experience some form of *spatial disorientation*.

As Laurence R. Young, a professor of Aeronautics at MIT, has defined, *spatial orientation* denotes “one's perception of body position in relation to a reference frame.”³⁴ Whether that reference frame is the curvature of the Earth, a lead aircraft,

³⁴ Young, Laurence R. "Spatial Orientation." In *Principles and Practice in Aviation Psychology*, by Pamela S. Tsang and Michael A. Vidulich, 69-113. CRC Press, 2002.

or a galaxy, it serves as an external cue for the pilot, who must understand these vast objects in terms of the relative distance, altitude, and velocity at which they are approached. Curiously, the images in front of the pilot can become distorted, when she loses the correct sense of orientation, affected by the “sense of one’s angular and linear position and velocity relative to local reference coordinates.”³⁵

The eyes and ears—represented by the focal system, which determine the size, shape and perspective of objects, and the vestibular system, responsible for detecting motion and controlling posture—can behave in unexpected ways under abnormal conditions, say, 20,000 ft. in the sky. Whereas the lens and the gyroscope are the measuring instruments for the vehicle to recognize patterns and maintain balance, the pupil (along with its many rods and cones for distinguishing color) and a miniscule, pea-shaped, fluid-filled organ in the ear, achieve the same for the human, allowing her to perceive motion, altitude changes, and external visual information, in harmony....sometimes.

It is this phenomenon of visually-induced motion illusions, such as *false horizons*, *graveyard spirals*, and *The Leans*, which has proliferated a sea of virtual reality technologies and flight simulators, equipped with jerking platforms and immersive, chamber-like environments. Though Bruce Artwick, the electrical engineering student at the University of Illinois—Champaign-Urbana who built the logic circuits used in the first commercial flight simulator, was the first to sell flight software to Microsoft, simulation might have existed prior as a psychological training device. And so Jean Baudrillard, the master of simulacra writes: “Even military psychology retreats from the Cartesian clarities and hesitates to draw the distinctions between true and false, between the ‘produced’ symptom and the authentic symptom.”³⁶ We might argue that the visual illusion, experienced by the ‘sick pilot,’ might actually be the resistance the human body exerts, against the offensive missions on which they are sent. Thus, the simulator is the training which unmask feelings of anxiety, discomfort, internal stress from its operator, teaching them to subdue or suppress them for the greater value of their mission.

Rarely is the head subjected to such tilts and acceleration, backward and forward, as in the scenario of flight, where the otolith organs might fail to indicate where is the vertical—the ground below and the atmosphere above. Once infallible in maintaining human equilibrium, the otolith organs become compromised in flight; unable to distinguish between linear acceleration and inertial force, to which they are normally sensitive. Simulators can reproduce the illusion of acceleration, by forcing the head to tilt backwards (G-tilt), a minute exploitation of the head relative to gravito-inertial force (GIF).³⁷

³⁵ Ibid 70.

³⁶ Baudrillard, Jean. *Simulations*. New York: Semiotext[e], 1983.

³⁷ Young, Laurence R. "Spatial Orientation." In *Principles and Practice in Aviation Psychology*, by Pamela S. Tsang and Michael A. Vidulich, 69-113. CRC Press, 2002.

Other somatogyral illusions develop from similar malfunctions of the ear, specifically the semicircular canals, which can give the pilot an impression of a sustained constant turn after banking right at a constant angle, or worse, if the pilot responds to this turn by shifting his yoke further to the right, a “post-turn” illusion with acceleration distributed downward, along the z-axis.³⁶ Spiraling downward, as if caught in a water spout, this plot accelerates not only the mad or misguided pilot down a circuitous path, but toward his own grave, or as is appropriately titled, *graveyard spiral*.

In the simulator room, our heroine recalls as she hovers over the tiny Dutch principality and its surrounding waters, is the imaginary *spatial disorientation*, the cautionary one which felt so intense and could even produce motion sickness, but was artificial and could not happen, as reality slips from underneath her very grip. Every line, every edge is a horizon for her, dark and amorphous, as she realizes what she thought was real in training was no longer real (just an illusory image), making her numb, incredulous to her own reality. A reversal has occurred—between the affective qualities of reality, and the impossibility of low-fidelity flight software to reproduce human emotion. One only needs to re-visit Harun Farocki’s *Serious Games*, to witness this phenomena: a contractor who can follow orders to kill without remorse, but when confronted with his own actions through virtual reenactment, cannot delay his emotions any longer. The next image: a deluge of pent-up tears, something which the simulator had taught him to unlearn.

³⁶ Ibid 86.

Phantoms of the Jaguar

The promise of liberation upsets but pushes forward humanity. What is guaranteed by totalitarian regimes or formally democratic states, or vertical social structures in bland office settings, is ascension, upward mobility, fast lanes for the few. But there are regulatory structures to overcome—patriarchy, racism, bureaucracy, rule systems, social norms, conceptions of morality and ideas of inclusion. The Nordic lycanthrope (a mythological human with the ability to shapeshift into a werewolf) lends itself to this situation; only the hirsute canine from Guy Endore's 1933 Gothic fiction would seem to be able to break free of society's chains. Hundreds of years of armed rebellions and pacifist demonstrations result in incremental or only momentary realizations of freedom, which at any moment can be reversed by tyrannical power. Centralized leadership is the tragic but ultimate arbiter of what forms of dissent are possible, what life is allowed to live, and how the body can be used, intellectually, as ideological weapons, or for pleasure. Freedom is a philosophical, mathematical and illusory concept, one that carries a specific set of attributes. The following pages are devoted to this lost phantom...the phantom of the jaguar.

Let us, now, recall these ghostly figures.

Combinations of imagery and ideas, or *phantasms*, Fox Harrell defines, propagate certain asymmetrical relationships between citizens, servers and clients, governments and their subjects.³⁹ Human thoughts about appearance, what is real and objective, ethnicity, traits, behavior, and who possesses what type of knowledge, all factor into humans treatment. Computational structures construct biases and limit possibilities of expression, through objects like pull-down menus, avatar representation, and gameplay characters. Take the modified character customization menu for Saella, a Nord in Skyrim:

Sex: 1
 Weight: 1
 Scars: 13
 Eye Height: -0.88
 Hair: 9
 Hair Color: Blue Diamond
 Complexion: 0

Her azure hair, caramel complexion, tattooed skin, crystal eyes, and platinum skin suit impose certain preferences about the female body, ranking them with number values. We owe these slider values to a game hacker, somewhere, whose sole intervention was to subvert the standard Skyrim character creation software, in order to recollect

³⁹ Harrell, D. Fox. *Phantasmal media: an approach to imagination, computation, and expression*. Cambridge, MA: The MIT Press, 2013.

his fantasy of a medieval aquapunk priestess. To that, we must postulate what *other* archetypes might exist, for a more political purpose than the objectification of women.

Mental images, or *phantoms*, also confuse ethnicity and beauty with a certain innate quality, say violence, or hypersexuality, and may appear to be rooted in objective reality, Harrell has noted.⁴⁰ These unconscious images increasingly influence the structure of worldviews that are dominant, which proliferate through new legislation, executive orders, and domestic abuse protections that get rolled back in places across the United States and Russia.

How to vanquish the phantoms of identity which still linger, along with their *epistemic domains* (the abstract structures which contain those ideological ghosts)? How to invent new ones?

Philippe Descola, the French anthropologist, studied the cosmology of the Achuar people, an indigenous group who live in the Amazon river basin, between Peru and Ecuador. Upending the narrative of the docile indigene, who seeks to preserve their habitat and, as a result, the traditional and delicate customs practiced with them, he describes a completely unorthodox cosmology: about their conception of time, structure of family, and internecine disputes about territory which frequently result in fatality.⁴¹ On the highest rung of the social ladder within the Achuar ecosystem is one of their greatest predators, the jaguar. These solitary cats, whose nocturnal rustling through the rainforest elicits intense fear, act as surrogates, or “associates of shamans, who use them to spread misfortune or to oppose their enemies.”⁴²

The jaguar, which embodies perceived and actual traits such as speed, stealth, coldness, the ability to camouflage with its surroundings, yellow eyes, becomes one of the deadliest creatures within the Achuar cosmology. It is not a coincidence that the black nationalist resistance group in the United States, itself used a similar feline representative, the *black panther*, to construct ideas of fugitivity, being underground, and marginalized, through an animal metaphor. Let us imagine two individuals, one human and one jaguar, *a* and *b*, who make up the genetic type *ab*.

We would then get:

$$a * b = ab$$

Profound thinkers and runners, these blended human-jaguars might act as metaphors for the actualization of our own freedom. This process of *parabolic*, or *conceptual blending*, as Mark Turner has put forward in *The Literary Mind*, generates new inferences about human potential and experience. In children’s narratives and animated films, talking animals give us an impression of animal subjectivity, which non-humans are rarely afforded. However, it is difficult to accept these hybrids of animal

⁴⁰ Ibid

⁴¹ Descola, Philippe, Janet Lloyd, and Marshall David Sahlins. *Beyond nature and culture*. Chicago: The University of Chicago Press, 2014.

⁴² Ibid 7.

behavior and human speech as serious inquiries into the anthropocentric philosophies of environment which dominate today.

What if the world really does manifest through will, as Schopenhauer postulated? What if we were to locate our own aspirational qualities and freedoms, within the life that is afforded to some solitary and roaming animals, like the jaguar? With the jungle or rainforest as its territory, and considering Descola's enumeration of Achuar social structures, the jaguar has mapped onto it characteristics such as cunning, intelligence, the ability to hide and emerge swiftly. As a political imaginary, the jaguar or panther symbolizes the possibility of the emancipated mammal, one which is respected and undisturbed in its own ecosystem and can hurdle and escape at high-speeds. Borges once said, closing his essay *Avatars of the Tortoise*, that "we have dreamt the world...as firm, mysterious, visible, ubiquitous in space and durable in time; but in its architecture we have allowed tenuous and eternal crevices of unreason which tell us it is false."⁴³

⁴³ Borges, Jorge Luis, James East Irby, and André Maurois. *Labyrinths*. Melbourne: Penguin, 2011.

The Image Sleuth

NEW GATE

The air pierced his eyes with the intensity of D-76 fumes, trapped in an unventilated box with no egress.

"Made in U.S.A.," Aero muttered to himself. "Where did this come from?" He analyzed the cylindrical shape of the silver canister, the circumferential blue ribbon, and the variegated wiring. DIA Camp was one of the hardest neighborhoods in The Skin. Nothing interrupted a soccer game for these kids—not even Shin Bet dogs, toxin grenades, or the frequent curfews imposed after a yellow dusk.

"We turned it into a wireless node, whole quad's online now," AZ said, his grimace strained from the metal cut on his cheek.

Everyone in DIA camp was marked. Big story was a kid whose birthmark across his face was written in the name of a fallen martyr. Wasn't clear what came first—the death of B-lal or his fate inscribed into the kid's profile. He appreciated the attention, bought him some credibility among the PAF, the nationalist fighters who'd rather be remembered and lifeless than alive and peripheral. Their symbol was a giant keystone, a rusted sculpture the color of copper wire, looming above the gate to DIA Camp. The dark rays it projected onto the gateway was a reminder of a previous life, from which they had been deleted.

Aero's lungs burned. He wasn't from The Skin, and his organs weren't synthetic or acclimated. AZ was the stuff of media; acerbic wit, always turning the technologies used against him against themselves. The tear gas canister now routed his messages to other members of the PAF, jumping over point security centers. He called it the gas web. When he craned his neck, the Chinese-made metal collar he had surgically implanted refracted light, cased around his esophagus to protect his breathing cavity. Glass from the Israeli head-unit display he found, converted to augment his 20/10 vision. "First time breathing synthetic air?" AZ laughed as he massaged his knee, provoking a nervous cough which surfaced at any reminder of the world outside.

"Guess so," Aero resigned politely. "Not like you're a fucking beacon of health either." His grimace widened, and they both burst out with sardonic laughter. Feeling the night swallow his last opportunity of catching the next light-rail, Aero sunk in his chair, letting the iced beer wash over the strange and silent pact they had tacitly made.

Aero was twenty-four. Two years prior, he had made his first journey to The Skin, after searching the net, and finding out through an ancestry splitter that his lineage went back to the Philistines. Wasn't long before cash stacked up high enough to purchase a one-way seat on Syrian Airways, which would land him in AMM, the eastern holding city. King Portal was the only footpath for his class of people, so he took it, and heeded the shortcuts and tips other users hinted at in the forum.

Until then, he was an American cat, brought up in the subtropics of an unnamed city, flying with fashion types, software moguls, subcultural chiefs. Anything big and bad, Aero was there. He was trained by Natalia J, who ran a poisonous salamander trade, the best in the biz. She was an eco-systematics freak, dressed in a labcoat, whose permanent high on matcha acid made her appear like an adrenaline junkie. But she was young, and looked it too (and knew it). She even hypnotized one kid into the personal aircraft scene after discovering an FAA loophole. Before you knew it, tabloids were swarming with images of a poor student who had crashed his LTA in an alkaline swamp on the wrong side of I-75.

Aero got lucky, and had worked with Natalia J before, and knew not to take her fleeting rants too seriously. He wore a pale green jacket woven with spider nylon, which he used could upload her eco-indicators, dropping her content onto the server. He got paid for every indicator he could connect to, and track on the Patchbay platform. Most image processing took the form of reading graphs, monitoring CO₂ fluctuations, temperature drops, and chem composition. He'd gone out to a polluted creek by Island City, searching for a rare, microscopic mammal found only in freshwater. He wasn't sure how he discovered it, but he was terrified when he did: it had a vacuum face, razor teeth, and the exact silhouette of a brown bear. He was employed by Eco Clinic, and when the thing took a chunk out of his left bicep, they insisted—smiling—that the venom from its elapines wouldn't disturb his neural system. Naturally, they told him, he would still get his lump sum. They said they would contract him out somewhere else, where the aquatic species are nil. That it would do him good. What they didn't mention was that the venom might have a reverse effect on his vision, but that was his secret.

Coughing up what felt like his internal organs, he lay strapped to the hospital cot. As he felt his youth and tactile precision slip away, he passed out from the pain, and woke up three days later.

The changes were moderate, continuous, but stung.

Aero was used to interpreting code through his hands, but he fell this sense vanquishing. For him, it was like falling into an abyss with arms flailing. Without spatial orientation. In the crevices of New City, every runner and system admin stared at Aero's hands with envy and desire; now, they were numb, just meat without sensors. Aero felt himself retreating into lugubrious corners and shadows, when, like an OS upgrade, his vision was converted into total lucidity.

Before departure, he had his savings liquidated, and paid a visit to Worldwide Currencies in the Diamond District. Most of the jockeys had dual citizenship—in The Skin and New City, so they cut him an illegitimate deal and traded him 12,500 New Shekels for his eco-indicators. His brown features, notched nose, and body hair made them question his nationality, they told him, but he was just like them, Shalom they said,, and escorted him past the Ruby software, which was on display on a set of gleaming, aluminum rails.

Syrian Airways had a nonstop from New City to AMM, and by the time he collapsed in his ragged, economy seat, he had burned through half his Shekels, immediate like a tissue ignited by a handheld lighter.

Sterile sounds flooded the cabin, blue light seared his eyes, and twelve hours later, he had arrived at AMM.

CRACK AND SELL

He stepped out of the hanging gardens to an electronics shop, where, outside, a shadow economy of Internet dealers, gamers, and web contractors dealt the night's codes. Congregations of people were rare in this epoch; you'd know it was the S-Net when rows of youth sat, knees linking, getting their screen fix: heads buzzing, like hungry flies, searching for pushes, blips, someone on the other line.

He flipped them his thumb and index finger—doubled and mirrored—which formed a quad. They murmured some quick short-hand, in their fluidly indecipherable Spanish, as he got the clue and shut the fuck up, leaning on the squat, cracked stone of El Castillo's perimeter.

Grey uniform, brown eyes, color caramel. The three marks of a customs bug. He shot them his fast vision, the glint in his eye registering but not seeing the magic network Ivan and his posse had perfected to protect the third economy.

Fidel slouched, barely detectable who he was under his low, tilted red baseball cap. Pink shirt was like a warning for whoever encroached on his market: tripartite telecom codes, cracked using a polymorphic communication scrambler, the only way into the network after dusk.

Wasn't ketamine or hash or crystals or even Zika serum; just an hour on the network, with encryption, worth more than any smuggled potato sud from Cienfuegos or the agricultural rim on the western edge of the island.

His girl slipped him the white triptych printed on thermal paper—ETECSA, swarming with numerical sequences and 'el clave.'

"Tri CUC," the dealer muttered under his breath.

"No dos?"

"Tri." "Pregúntalos a cualquier de mis amigos."

With a synchronized response as blunt as a TTS army, they all confirmed: "TRI."

She took the gradient bill from his hands before he could doubt it counterfeit, watching him quickly ascend the ramp into the conformity of the ramp district.

Rampa was a jet-set relic. Used to be white, gleaming, abstract humanoid glyphs painted by W-lfredo himself; now, rundown, cruisers circling, European mafia with their morena prostitutes, sporting red polka-dotted headscarves like it was the drive-in.

A crowd of net-fixers hovered below one of those 24-hour diners, a hotspot, where waiters in bright white served overpriced Bolognese to unctuous and portly men. Tasted Italian only after working up a sweat. Her eyes wandered, content, colors in her pocket and the client satisfied. He took up a barstool adjacent to them, flipped his switch, and joined the silent network.

TERABYTE

The marble steps descended to the base of the city, reflecting the diagonal sunlight which entered through the crumbling, Stalinist palace. He recognized the squat columns, the neoclassical frieze, how the three wings of the university loomed over the wide and staggered trail upwards. Angular and forceful, the strong arms of the State.

Fixers waited in the shadows, attuned to new bodies and foreign capital which breached their threshold. His orange satchel, the sign of an investigator, scooped up by a dark-skinned youth, from Trinidad, or the agro-zone. Ivan, he said, informant for the Technoc history database. Seemed smart and a real fixer, but details were murky and mismatched. His reactions malfunctioned—his pitch and scam programmed to seduce the Esperanto-speakers who could communicate in the third economy, with its coffee-, cigar-, USB- and packet-dealers.

Giant palms, and even larger columns, hovered over the pale yellow courtyard of the university. Ivan nodded to another runner, “*ya la cancelaron?*”, as his eyes darted images left and right, like nystagmus. His track started, under the contours of a social realist sculpture, a vicious guerrilla who liberated linguistics, after it had been usurped by the Technoc. “Follow me,” he ordered.

Ivan led him to a hall surrounded by torquing staircases. At its foot, a middle-aged woman who reprimanded him but acquiesced finally. Runners and fixers had their numbers and DNA sequences published on a bulletin behind glass. Top in the class could barely survive on 30 CUC a month. Anyway, it paid better to deal, to police. Another 70 CUC, plus the bribes from chance offenses. The Technoc offered a fat benefit package (waterfront apartment, LADA car, guns), paid handsomely to the men of the revolution. Nothing was really private in this society, except for their illicit transactions, protected by coordinated eyes, which were necessary for survival.

They found an empty bench in the circular park, suits also circling, as he pulled out a small, clouded package the size of a finger. “*Me regalaste algo?*” he asked, expecting a token from Miami. “128GB,” he said, as he pulled his stick out, and gave it to his lean accomplice. Soon as the exchange was consecrated, Ivan signaled another of his fixers, and before long, he disappeared into the colonnaded corridors of the hilltop complex. A side street led them to a grassy patch behind the Algorithm Institute. There, fixers eloped with their girls, traded substances, and sold off what local steals they had made from the state-sponsored vendors. Second fixer swung around, appearing like a ghost, panting. “*Tranquilo, acere*” Ivan nervously assuaged him. He opened up a Cohiba box: tobacco laced with Zika serum, some fatal blend composited behind the Ameijeiras Hospital by off-shift nurses, and re-entered into the pharmacy pipeline. Drivers bottled the remainders in miniature vials, which they hid in the dense, chocolate moss.

He flipped them another gradient bill, tucked the box under his external pouch, and zig-zagged down the monumental stairs, careful to avoid the customs bug, whose uniform camouflaged against the flat, beige color of the stone risers.

Appendix

avatar- the user's representative in the virtual universe, or "virtual constructs that are controlled by human players and function as a means of interacting with other characters [Filiciak]. *Avatara* is a Sanskrit word meaning "descent," and refers in Hinduism "an incarnation, or bodily manifestation, of an immortal being" [Waggoner].

affordance- what an environment *offers* to an animal, or in the case of game theory, the features or characteristics that are given to any given character [Gibson].

domain- term derived from cognitive science, referring to conceptual information about some subdivision of the world [Harrell].

metaphor- following George Lakoff's definition, "the essence of metaphor is understanding and experiencing one thing in terms of another" [Lakoff].

MMORPG- Massively multiplayer online role-playing game

Phantasm- combinations of imagery (mental and sensory) and ideas, with connotative meanings [Harrell].

Prototype theory- a mode of cognitive categorization, in which some members of a category appear more central than others (ex. the concept of a vehicle, where *cars* come to mind, before *trucks, wagons, bicycles, etc.*) [Rosch].

SIGINT- Signals intelligence

Tropospheric Scatter- technology which uses particles that make up the Earth's atmosphere as a reflector for microwave radio signals. The signals are aimed above the horizon toward the receiver station. As they pass through the troposphere, some of the energy is scattered back toward the Earth, allowing the receiver station to pick up the signal, and to communicate. (ex. Guanabo, Cuba to Florida City, Florida).

TTS- text-to-speech

UHF- Ultra high frequency

VHF- Very high frequency

Wetware- a biological means of mimicking patterns of transcendental reason [Lakoff].

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