In war, operational art determines when, where, and for what purpose major forces will fight over time.


At the close of the millennium in 1999, a controversy surfaced in the U.S. military pertaining to the definition of "Operational Art." The army was faced with updating their field manual, FM 100-5—the bible of army doctrine. The new version, even before its official release, proved highly controversial. When a draft was distributed for review in 1998, the point of contention became clear: "The 1998 FM 100-5 folds the concepts of war and operations other than war (OOTW) into one—Operations." In the new manual, Operations Other Than War were equivalent to war. "Past versions of FM 100-5 failed to address or separated the notions of OOTW and war," explained Major Michael McCormick, from the Corps of Engineers, charged with examining the new manual.

If OOTW and war were now one and the same, was there anything that did not count as war? What was the role of "diplomacy, economics, and information" in the wars of the third millennium? Should the term include "the political and other nonmilitary factors"? Operational Art was once the provenance of "military flag officers." They saw themselves as "the keepers of the arcane art." Now their ownership, and the very definition of their craft, was contested.

A "Do Not Disturb" door sign hung outside the room. "Damp towels had taken over every chair back, the trash cans overflowed, and dirty clothes piled up in the corner." Trevor Paglen, a graduate student

The author would like to thank the "Third Bird." For readability, many of the citations have been abbreviated without the use of ellipsis. Capitalization has sometimes been altered.

2 Michael McCormick, The New FM 100-5: A Return to Operational Art (Fort Leavenworth, KS: School of Advanced Military Studies, 1997), 1.
4 Trevor Paglen, Blank Spot on the Map: The Dark Geography of the Pentagon's Secret World (New York: Dutton, 2009), 47.
at Berkeley, was staying in a hotel in Vegas. The chair of his dissertation committee, Professor Gillian Hart, considered her lifelong mission an inquiry into the possibilities of progressive social change. "How do we steer a course between the economism that 'only one thing is possible' and the voluntarism that 'anything is possible' so as to illuminate concrete possibilities for social change?" she asked. Her question was inspired by the work of the political theorist and activist Antonio Gramsci, who spent years thinking about how one could change the world while confined in his prison cell in Italy.

Meanwhile, Harun Farocki was studying operational images, obsessively, one after the other. These images were meant to be "seen" primarily by machines. They were "seen" by ballistic missiles that used them to adjust their trajectory in flight, as much as they were "seen" by other automated systems to navigate, select, and connect to specific parts of their surrounding environment. Why was Farocki looking at them? Occasionally they were also seen by human eyes. In 1991 during the Iraq war, operational images taken by missiles were shown on TV.

Why were machines equipped with eyes? A widespread understanding of humans as beings who encountered the world via five senses solidified during the Industrial Revolution. Karl Marx was one of the first to point out the connection between the two: "The forming of the five senses is a labor of the entire history of the world down to the present." As the 19th century advanced, and as the first Industrial Revolution gave way to the Second Industrial Revolution, new kinds of instruments were developed to replace not only manual workers with machines but specific senses within humans. While Marx had focused on the "hand" of the laborer, the new commercial era of photography, phonography, and later film and radio focused on eyes and ears, images and voice. New instruments were described as actually seeing light waves and bearing sound waves and vibrations. The eye and the camera obscura had been compared to each other since Kepler, but why did new "sensing" machines, instruments described as sensing the world around us, proliferate at the beginning of the 20th century?

"The Mountain in the Lake"

By the 1950s, the assumption that machines could "see" was so prevalent that the psychoanalyst Jacques Lacan asked what would happen when the world was seen once again by humans—after it had been exclusively viewed by machines for "a few centuries." Cameras could record the world without us. In a world where "every living being has disappeared, the camera can nonetheless record the image... in complete solitude." Lacan described

5 Karl Marx, Economic and Philosophical Manuscripts (1844).
How "we can with no problem at all imagine" devices "complex enough to develop their films themselves, pack them into tiny capsules, and deposit them in a refrigerator." But what would this record be about? Lacan did not deny the importance of this record, but he insisted that something about it changed when we considered the moment when humans came back to see the film. What the machines had seen in solitude for all those years would take on a different quality.

In the 1960s the psychologist James J. Gibson ridiculed popular explanations of vision based on inverted retinal images by referring to them as "little man in the brain" theories. Didn't someone, he reminded us, have to see that retinal image as well? Operational images have no place in a world understood by reference to the old dichotomies of idealism and realism. They record a world that does not exist independently of a perceiving consciousness (complete realism). But they do not exist only in its presence (complete idealism). They show a world where what is perceived remains unreal, while what is real is not perceived.

When one sees an image that includes a mirrorlike reflection, for example of a mountain in a lake, is that an operational image? Is the lake "seeing" the mountain? What happens when humans return to Earth and see an archive of Operational Images accumulated throughout centuries, similar to those compiled by Parocchi? What happens when Paglen's one hundred photographs micro-edged on an ultra-archival disc designed to last longer than the Earth itself are rediscovered, after billions of years? Lacan asked, What happens when "the image of the mountain in the lake" recorded automatically by cameras is seen again by humans? "What is certain is that--as soon as they saw on the film of the image of the mountain, they would also see its reflection on a lake." The reflection takes form at that moment. By reference to reflected images, Lacan recognized a paradox haunting automatically recorded images. The reflection of the mountain in the lake becomes an Operational Image the moment it is no longer exclusively seen by machines.

An automatic camera could film "the Café de Flore as it weathers in complete solitude," but what is important to note is that any shimmering reflections bouncing back and forth from glass to porcelain to cutlery would only be recognized at the same time as the image itself is perceived. Just like Operations Other Than War can no longer be distinguished from war, there is no firm boundary between Operational Images (OI) and All Other Images (AOI).

Power in Recoil

Could Paglen, from his room in Vegas, change anything in the world? Could he even write a good dissertation and graduate? Equipped with a high-powered telescope, tripod, camera, and military-band-capable radio scanner, he set up his cell phone alarm to wake him up, pre-dawn.

One problem was that Paglen felt implicated. He was the son of an Air Force doctor who grew up on military bases around the world. Years at Berkeley hardly diminished his childhood fascination with planes, “whose engines seemed to split open the sky itself when its black cobra-like airframe swooped down.” As a child, he learned that these vehicles traveled faster than the speeds recorded in the Guinness Book of World Records. For a boy that age, knowing that there was a black world of world records was mind-blowing. And how to justify in later years all those lazy sunny days of mid-afternoon tequilas and beers shared with bright-eyed, bushy-tailed pilots whom he met as a teenager, or the occasional borrowing of their alcohol ration cards? UC Berkeley was implicated too. The department of geography was named after a former CIA director, John McCone. Every year, top scholars and students were recruited to work for the National Geospatial Intelligence Agency. The library in the basement archived documents for the U.S. Geological Survey, part of the U.S. Department of the Interior charged with divvying the natural resources of the country. Paglen had used them for his dissertation research.

“We make the world around us, but the world also makes us,” Paglen wrote in his thesis. His statement echoed the famous words of Marx: “Men make their own history, but they do not make it as they please.” Napoleon had caused some, including Marx, to believe that men made history, but when his less-charming nephew, Napoleon III, occupied the throne and set aside the democratic ideals of the French Revolution, it became clearer to Marx that it was history that made men. These epic events exemplified a modern conundrum that Paglen could not yet shake off.

Nobody that ever walked by Professor Judith Butler’s office in the rhetoric department at Berkeley could ignore the forces that conditioned and limited subjects to act in certain prescribed ways—and certainly not Paglen. Butler took Marx’s lesson further by showing how even the desire to emancipate oneself from these forces was itself already a conditioned response: “The subject is the effect of power in recoil,” she explained. The very desire for freedom, our feelings of guilt at not doing more, our “unhappy consciousness” so eloquently described by Hegel, were nothing more than byproducts of power relations, and therefore ineffective for

8 Karl Marx, The Eighteenth Brumaire of Louis Bonaparte (1852).
changing them. Scholars not only needed to note the horrors of the outside world, but to see how they echoed those within.

Schickimicki Cyborgs—Between Guilt and Paradise

Paglen described in his dissertation the relation between man and the world in particular cybernetic terms, referring to the “feedback loops” made famous after World War II and described by Norbert Wiener. Perhaps a “cybernetic” understanding of our place in the world, part materially determined but not completely so, could be a way of steering the course between economism and voluntarism? But how could a discipline so clearly connected to war work be used to liberate us from some of its darkest policies?

The feminist scholar Donna Haraway, author of the influential *Cyborg Manifesto*, was forced to acknowledge the material conditions that permitted her widely read essay to exist in the first place: “I am conscious of the odd perspective provided by my historical position—a Ph.D. in biology for an Irish-Catholic girl was made possible by Sputnik’s impact on U.S. national science-education policy.” One way of attenuating her persistent feelings of guilt was to stop pining for the paradise that never was, “The cyborg would not recognize the Garden of Eden; it is not made of mud and cannot dream of returning to dust.”

Giving up the fantasy of an original Operational Art was as difficult as giving up the belief in a Garden of Eden, especially for older practitioners of the craft who protested against its redefinition. “Operational Art is, rather, thinking and acting like an explorer before the days of Google Earth, the Weather Channel, and Global Positioning Systems,” explained Brigadier General Wass de Czege, in 2011. Fantasies of explorers romping around paradise with no technologies to aid them continued to appeal, especially to a retired General. But the revised army field manual, FM 100-5, with its new definition of Operational Art, brought home the message that these scenarios were unrealistic. It acknowledged instead a more complex relation between humans and technology, where one could not be separated from the other.

The new definition of Operational Art not only denied a difference between OOTW and W, but it eliminated the “timeless elements” of the craft. Major Walter E. Platt, from the infantry, protested the new definition in his monograph *What is Operational Art?* (1999): “First, the draft doctrine does not capture successfully the *timeless elements* of operational

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art. Second, by not identifying the timeless elements, the human dimension of applying operational art is not emphasized to the degree necessary.12 With timelessness gone, the age-old concept of the “human” was imperiled, he lamented. Perhaps, in the course of his long career, he had seen scenes comparable to the ones Farocki was filming. In Farocki’s long shots, timelessness is nowhere to be found as even still images quiver gently, and also gone is any essential “human dimension.”

In Farocki, human and nonhumans seem at first to be clearly distinct. The dismal dehumanization of the world is explicitly denounced. But we soon see how complicated the relation between them is when he shows us the wonders of commercial and military engineering. The “machines” depicted by Farocki are more than imperfect imitators of “humans.” His “humans” are more like imperfect imitations of “machines” (How to Live in the German Federal Republic, Harun Farocki (1990)). They care for us, more than we do ourselves.

Pascal once offered a “scandalous piece of advice” by saying that the “best way to become a believer is to follow the religious rituals.”13 What happens when machines follow human rituals, and humans abandon them? Will they become believers while we no longer are? If Farocki allows his camera to keep on recording, we will soon find out.

Cyborgs are campy creatures in Haraway’s account. “The main trouble with cyborgs, of course, is that they are the illegitimate offspring of militarism and patriarchal capitalism, not to mention state socialism. But illegitimate offspring are often exceedingly unfaithful to their origins. Their fathers, after all, are inessential.” But Farocki delivers Schickimicki cyborgs who have loving fathers: they are regular Berliners with strong penchant for German cars and engineering, who might attend at least once in their lives industry-led professional development seminars (Indocration) and who might occasionally buy Playboy magazine (An Image).

Revelation and Apocalypse

In biblical terms, “apocalypse” is another word for “revelation”—both share the prophetic and oracular qualities that something will happen. For Paglen, revealing the black world of classified military and civilian ops is not enough. Revelation “can solidify their place in the state.”14 “Revelation, in and of itself, accomplishes little,” concluded Paglen, taking a position different from either traditional journalism or from WikiLeaks and its

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14 Paglen, Blank Spots on the Map.
ents, the human dimension to the degree necessary. The "human" was imperiled, career, he had seen scenes. In Farocki's long shots, ill images quiver gently, and at first to be clearly distinct. Plicitly denounced. But we in them is when he shows gineering. The "machines" mitators of "humans." His "machines" (How to Live in 30). They care for us, more high advice" by saying that the religious rituals." What nation humans abandon them? r are? If Farocki allows his out. way's account. "The main illegitimate offspring of nation state socialism. But ilful to their origins. Their lives Schickimicki cyborgs ters with strong penchants attend at least once in their minors (Indoctrination) and An Image.

...for "revelation"—both something will happen. For military and civilian ops is in the state." "Revelation, 1 Paglen, taking a position from WikiLeaks and its

15 Most of them celebrate "revelation," which, for example, is the title of the last chapter of Annie Jacobsen's Area 51 bestselling account of the vast Nevada desert space dedicated to classified research, Annie Jacobsen, Area 51: An Uncensored History of America's Top Secret Military Base (New York: Little Brown, 2011).
19 Paglen, Blank Spots on the Map, 337.
admits Paglen, is better than nothing, but it is far from a democratic process led by informed citizenry.

Scholars like Althusser and Butler had studied how one becomes a subject of power. They agreed that the mere act of interpellation, where one responds to someone’s call, is already one such example. But secrets subjectivize through silence.

Possibilities of Efficacious Action

Can enlightenment work when revelation fails? Secrecy is a way of “removing knowledge” from circulation.21 In the 1920s Max Weber denounced how secrecy was employed by bureaucracies “to increase the superiority of the professionally informed by keeping their knowledge secret.” How, by whom, and to which ends is it employed today?

A common master narrative claims that more “knowledge” leads to a better world. But once we realize that removing knowledge is as efficacious for certain purposes as producing it, we are no longer so sure. A key component of knowledge in the era of high capitalism is to know what someone else does not know. Privileged information is the creme de la creme of knowledge at the dawn of the third millennium. This is knowledge not aimed at universal well-being and world peace, but rather at individual gain and national superiority. It has never been easy to separate the sheep from the goats, but we can begin to discuss knowledge-making projects designed primarily for advantage and edge.22How else can epistemologists show “how the few can dominate the many.”23 At certain key junctures, the R&D strategies of Big Pharma, Tobacco, and Energy, among others, have included efforts for concealing knowledge from the general public or from specific trial subjects.24 Agnotology, the study of efforts to keep us from knowing, is now as relevant as epistemology.25

22 While Philip Kitcher is circumspect about the master narrative linking science to universal well-being, he completely neglects aspects of knowledge whose ultimate goal is not to benefit everyone. Philip Kitcher, Science, Truth, and Democracy (Oxford: Oxford University Press, 2001).
24 Naomi Oreskes and Erik M. Conway, Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming (New York: Bloomsbury Press, 2010), Allan M. Brandt, The Cigarette Century: The Rise, Fall, and Deadly Persistence of the Product that Defined America (New York: Basic Books, 2007), and the work by Susan M. Reverby on syphilis experiments in Guatamala are some classic examples.
If traditional knowledge shows us how the world usually goes in one direction, secret or privileged knowledge is about knowing how it can go the other way. A historical survey of "Maxwell's demon" reveals how the very possibility of knowing what someone else could not know arose as a key example for understanding exceptions to the laws of nature. "Maxwell's demon" was an imaginary creature that appeared sometime in 1874, in conversations between the physicists James Clerk Maxwell and William Thomson. It was designed to show how the second law of thermodynamics, also known as the law of entropy, could have exceptions to it. Since then, physicists have attempted to "exorcise" the demon showing how it can only operate if it is allowed to know something others cannot know. Thus Léonard Szilárd, one of the inventors of the chain reaction who pushed for the creation of the Manhattan Project, described the demon as "one who is continuously and exactly informed"—concluding that, practically, this was impossible. And in Richard Feynman's (1963) exorcism, the demon became tired from observing all the time, and thus stopped functioning. "It," explained Feynman, "cannot get rid of the extra heat that it gets from observing...it cannot tell whether it is coming or going, much less whether the molecules are coming or going, so it does not work." Behind these exorcisms lays the fantasy of an ever-prescient observer who sees what others could not. By the time Feynman wrote about the demon, large areas of physics, from the Manhattan Project to the Cold War and beyond, had become cloak-and-dagger operations. "Maxwell's demon" shows us how this transformation affected the form and content of research.

**Not What, But How**

The size of the secret—approximately four million people in the U.S. hold security clearances for classified projects—calls for replacing our interest in finding out what the secret is with how. To understand how secrecy works, we need to understand its relation to technology.

The Count of Monte Cristo, in one of his elaborate plots to accumulate wealth and sink his enemies, went to visit a telegraph—a technology that during the first half of the 19th century worked by transmitting light signals across long distances. "I have been told," Monte Cristo told the humble operator, that you do not always understand the signals you repeat." "Certainly, sir; and that is what I like the best," the operator responds. "Why do you like that best?" "Because then I have no responsibility; I am a machine and nothing else." Upon hearing those words, Monte Cristo recognized a moment of opportunity and seized it, bribing the operator into repeating signals that he did not understand. The signals, announcing...
that King Don Carlos, who had been imprisoned in France, escaped from Bourges and returned to Spain, caused Monte Cristo's enemies, holders of Spanish bonds, to lose a million francs. Reflecting on his success, he exclaimed: "I have just made a discovery for 25,000 francs, for which I would have paid a 100,000."

The novel's plot revolved around the belief that privileged or secret knowledge could be used for profit. Monte Cristo's story was based on real possibilities. The Rothschilds made one of the most successful financial speculations ever after the Battle of Waterloo by carefully preparing relay horses and fast sailboats to get news of the outcome a few hours before everybody else. But the real knowledge that Wellington beat Napoleon that evening, or the false knowledge that King Don Carlos escaped (in the fictional account), was much less important than the other privileged knowledge: that whomever sold bonds on the mere supposition of privileged information could make a fortune. Unlike the Rothschilds, Monte Cristo did not have any actual privileged information, yet he knew all about the relation between breaking news and money. Showing how secret or privileged knowledge works, rather than showing the secret itself, is the concern of Operational Art, as it was for Alexandre Dumas (père).

Secrecy is also about delegation. A secretary is "someone who is entrusted with private or secret matters." Secrets are kept from people by people. Hierarchies and social distance between the two prevent leakage. Social distance is analogous to physical distance, which, according to Paglen, "translates" itself into secrecy. A "prison's physical distance from urban centers translated into a kind of cultural distance: their geography translated into secrecy." It also translates into violence. Is it easier to kill at a distance? Farocki focuses intently on the asymmetry of Asymmetrical Warfare, filming the tools of its trade.

The "moral implications of distance" have been frequently noted. A story to which authors have returned again and again, since the Enlightenment, involves the possibility of killing a Chinese mandarin at a distance, in order to inherit his fortune. The great writer Chateaubriand asked, "If thou couldst by a mere wish kill a fellow-creature in China, and inherit his fortune in Europe, with the supernatural conviction that the fact would never be known, would'st thou consent to form such a wish?" The novelist Honoré de Balzac repeated the story when the main character of Père Goriot is asked "what he would do if he could become wealthy by killing an old Chinese mandarin, without leaving Paris, just by an act of will?" These types of questions became even more relevant as the means for

28 Definition from *Oxford English Dictionary*.
ried in France, escaped from Cristo’s enemies, holders of the most successful financial enterprise in the world, the Rothschilds, and money. Showing how it was achieved, Alexandre Dumas (père), the novelist, is “someone who is kept from people by the two prevent leakage, which, according to on’s physical distance from 15 distance; their geography and violence. Is it easier to kill 30 Asymmetrical symmetry of

producing these effects were simplified. “In the most widespread version of the story,” as told in the late 20th century, “the Chinese mandarin can be killed simply by pressing a button.” Let us not forget that it is with the push button that we can now actualize the mere wish (of Chateaubriand) and the simple “act of will” (of Balzac). As a finger draws closer to its target, setting off a missile on route toward another one, physical distances are quickly eliminated, while psychological ones between us and the “other” close in incrementally. The effect of such minimal finger action can be massive. How did it come to be that wishes could be realized by simply pressing a button?

Farocki shows us buttons, many of them, in what already look like outdated technologies. Now the button is almost gone, replaced by touch screens activated with light brushing movement (reminiscent of the old page turning technique) or the gentle spread of our fingers. Who is going to be killed with this gentler stroke?

Lacan took his thought experiment about recording machines in a world without humans further, asking if they could be synchronized to cause explosions all by themselves. A photo-cell could replace the finger on the button: “We can take things further. If the machine were more complicated, a photo-cell focused on the image in the lake could cause an explosion to take place somehow—it is always necessary, for something to seem efficacious, for an explosion to take place somewhere—and another machine could recall the echo or collect the energy of this explosion.” Are the machines that feed on operational images capable of efficacious actions all by themselves? Lacan’s answer shows how ineffective our usual understanding of efficacy is. Fully automated war is a fantasy. Decades later, Jacques Derrida considered a similar Cold War scenario where machines speedily took over the project of annihilating the world. He, like Lacan before him, pointed to what Farocki showed, that this war would be nothing other than fabulous.

Derrida argued that literature as an art form belonged to the nuclear age—before its time. A good novel was nothing more than an eloquent archive of humanity, one which could stand for it after it was gone. The thrill of reading a novel resided in readers’ belief that the world may ultimately one day

31 I use the word “fabulous” in its relationship to “fable.” On the relationship between the “fable” of nuclear war and its reality, see Jacques Derrida, “No Apocalypse, Not Now (Full Speed Ahead, Seven Missiles, Seven Missiles),” Diacritics 14, no. 2 (1984).
32 “Literature comes to life and can only experience its own precariousness, its death menace and its essential finitude. The movement of its inscription is the very possibility of its effacement. Thus one cannot be satisfied with saying that, in order to become serious and interesting today, a literature and a literary criticism must refer to the nuclear issue, must even be obsessed by it.” Ibid.
disappear. A few years before the Great War exploded, Rainer Maria Rilke thus felt compelled to abandon his own authorial voice and write the pretend notebooks of an anonymous foreigner who could not stop thinking about death, *The Notebooks of Malte Laurids Brigge.* What better way of grasping the human condition than by reading "Mallarmé, Kafka, or Joyce," asked Derrida? These authors, to him, seemed as if they had been writing with a future nuclear catastrophe in mind. Their archive of humanity was better "than in present-day novels that would offer direct and realistic descriptions of a 'real' nuclear catastrophe." Paglen's *The Last Pictures* no longer has a future war or apocalypse as a distant implicit reference; it considers it as imminent and does so explicitly. For the first time, we have art purposefully designed with that end in mind. Unfortunately, Derrida did not live to see this epochal transformation. "Literature belongs to the nuclear age by virtue of the performative character of its relation to the referent, and the structure of its written archive," explained Derrida. Literature is no longer with us.

We can turn to Derrida to think carefully about why literature no longer functions like it did during the nuclear age. The post-nuclear age calls for a different kind of performance. What will its new "relation to the referent" be? Why will its archival structure no longer be based on alphabetical writing? On what will it be based instead? If we think of photography as a medium that replaced literature as an archival form during the Second Industrial Revolution, we can ask about the perceived apocalypse-to-come that motivated this change.

Photography’s role as a medium for archiving humanity was established with Edward Steichen’s *Family of Man* (1955) photographic exhibition, bringing together “503 photographs by 273 artists from 68 countries.” Because of its privileged status as a record, it was added to UNESCO’s Memory of the World Register in 2003. UNESCO is now putting much of its material on CD-ROMs. Although Paglen’s photography-based project has similarly eschewed a literary alphabetical structure, he is even less optimistic about the future of digital coding than UNESCO. His images are miniaturized on silicon and cased in gold. When will the catastrophe they are meant to survive take place?

**Art and Science during the Cold War**

Science and art, the historian and philosopher of science Peter Galison reminds us, have not always been operating categories for understanding...

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representation. In conversation with Paglen, Galison imagined what would happen if Leonardo da Vinci was asked if his drawing of turbulent water were art or science. Galison pictured da Vinci responding with irritation: “You’re crazy! What are you talking about? I don’t even recognize this choice.” The difference between science and art only became clear and in direct reference to those terms by the end of the 19th century. When Rodin, Delacroix, Duchamp, and others decided to show locomotion (of horses and humans) in ways that differed from what the photographic camera revealed, they did claim their representation of movement was better, but they did not once think that they were contributing anything to science.

The relation between science and art became more complicated during the Cold War. Ten years before completing his archive of the nuclear “Family of Man,” Steichen organized at the Museum of Modern Art an exhibition called The Exact Instant. The “art” exhibit included “scientific” images. A thirty-foot-wide by fourteen-foot-long mural of atomic bomb photos graced the museum. The images were taken by Harold Edgerton, who developed the electronic stroboscope at MIT and who went on active duty during World War II with his powerful lighting equipment.30 His two associates, Kenneth Germeshausen and Herbert E. Grier, who had helped him in his earliest photographic work, followed similar paths. Germeshausen worked at the rad lab at MIT and Grier went to the Manhattan Project. In 1947 they founded a successful and highly lucrative defense contract business (later named EG&G, after their initials, and today Perkin-Elmer).

Edgerton’s photographs “have hung on our museum’s walls almost as consistently as Picasso’s have.”31 Were they science or art? While da Vinci may have well been irritated by the question, James R. Killian, Eisenhower’s most trusted scientific advisor during the fateful Sputnik years, was pleased with it. It presented him with an opportunity to explain how science was not all about war. Killian started his career as a young science writer who would later become president of MIT, and who was key in explaining Edgerton’s work and articulating the relationship of art and science during the Cold War. The type of relationship between the science and art advocated by Killian was quite specific. Science clearly affected art: “Advances in science have clearly given new dimensions in art.”32 Art, however, did not affect


science in the same way: "Whether the progress of science is constantly shaped to some degree by the larger cultural movements is more uncertain and difficult to argue." 39 He agreed with certain historians, such as Lynn White Jr., who claimed that engineering and technology were the primary forces shaping the world, not art. He disagreed with others, such as Norbert Wiener, who thought that the work of the scientist "parallels closely the goal of the effort of the modern artist." 40 As an aside, he was clear that he did "not embrace the metaphysics of Marshall McLuhan." 41

In 1979 Killian contended with the famous essayist Susan Sontag, who she accused of expressing "a deprecatory attitude toward all photography" in her book On Photography (1977). He strongly disagreed with Sontag's statement that the effectiveness of Edgerton's photographs were "inextricably linked to the powers of the machine." 42 "No one," wrote Sontag, "can deny the informativeness and formal beauty of many photographs made possible by the steady growth of these powers, like Harold Edgerton's high-speed photographs of a bullet hitting its target, of the swirls and eddies of a tennis stroke." 43 But Killian insisted that "Edgerton's photographs frequently transcend the 'powers of the machine.'" 44 Clearly at odds with her, Killian instead turned to Gyorgy Kepes, his colleague, friend, and the founder (in 1967) and director (until 1972) of the Center for Advanced Visual Studies at MIT. 44 Kepes, who strove during his lifetime to increase the collaboration between scientists and artists, included Edgerton's photographs next to artists' in The Nature and Art of Motion.

Killian was keen to stress the influence of Edgerton's work on art: "There can be no question that the 'magic light,' whether it be spark or strobe, or single or multiple flashes, has influenced painting, or at times verified the theories of avant-garde artists." 45 He was also eager to stress that this influence emerged from the launch pad of science and engineering: "It would

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39 Ibid.
40 Ibid, 108.
41 Ibid, 118.
42 "In her recent book, On Photography (1977), which expresses a deprecatory attitude toward all photography, Susan Sontag observes that 'Whatever the claims of photography as a form of personal expression or a tool with painting, it remains true that its originality is inextricably linked to the powers of the machine: no one can deny the informativeness and formal beauty of many photographs made possible by the steady growth of these powers, like Harold Edgerton's high-speed photographs of a bullet hitting its target, of the swirls and eddies of a tennis stroke.' James R. Killian, Jr., "Papa Flash and His Magic Lamp," in Moments of Vision: The Stroboscopic Revolution in Photography (Cambridge: MIT Press, 1979), 16.
43 Ibid.
44 Killian explained that Edgerton's photographs "introduce us to the beauties of that new land of vision so strikingly described in Gyorgy Kepes's books, Language of Vision and The New Landscape." Ibid, 10.
be misleading, then, not to recognize that Edgerton is first and foremost a scientist and engineer.”

He stressed that “Edgerton recoils from any discussion of the artistic values of his photographs.”

Later commentators cited Edgerton as responding in the same vein, as saying: “Don’t make me out to be an artist. I am an engineer. I am after the facts. Only the facts.”

From his Vegas hotel window Paglen saw an airplane fleet operated by the Special Projects Division of Edgerton, Germshehausen, and Grier. Paglen wondered if he could use the paradigmatic tool of the Scientific Revolution, the telescope, to enact a much different revolution. He had seen dedicated satellite chaser Ted Mokczan with “a pair of binoculars and deduce hidden knowledge from observable phenomena.”

He traded binoculars for telescopes much more powerful than Galileo’s. What was the difference between the “hidden knowledge” he sought and the one Galileo had searched for? Galileo had military applications in mind when he extolled the potential of his new instrument. Edgerton’s photographs emerged clearly from a Cold War context, exemplifying the dominant way of understanding the relation between science and art during that period.

EGG & G employees continued to see their work as essentially one based on taking photographs, but in no sense did they think their work could be artistic. “The job is to get good photography of the targets you’re running against.”

How would Paglen’s relationship to photographic knowledge be any different—and less complicit?

Mark F. Moynihan, CIA member and assistant director of the President’s Foreign Intelligence Advisory Board (2000), congratulated Edgerton’s work in his essay “The Scientific Community and Intelligence Collection.” The Physics Today article articulated the difference between “tools of war” and “tools of knowledge.” The technology, “which was developed in the 1920s and 1930s by Harold Edgerton, a professor of electrical engineering at MIT,” was firmly in the “tools of knowledge” category.

The view from Paglen’s Vegas hotel window was much less clear.

While science and art interactions had typically taken place across the studio, the laboratory, and the factory, Paglen worked from his hotel

46 Ibid., 10.
47 Ibid., 33.
48 Ibid., 13.
49 Ibid., 18.
50 For more on EG & G military contract work, see Annie Jacobsen's dialogue with an EG & G employee, Jacobsen, Area 51.
51 Paglen, Blank Spot on the Map, 342.
room, while Farocki worked with found footage taken from a myriad of sources. At one point, Paglen's "focus started to wander." He wrapped up his dissertation and, in addition to his research, "took to pursuing the images for their own sake." From Farocki we learn that "if such images possess beauty—this beauty is not calculated." Operational Art functions not because it believes it can change the world, but despite that it does. "No one," neither artist nor scientist, "knows at the beginning just how the story will end," and no one any longer has any idea of where the theater of war begins and ends. \footnote{Lorraine Daston, "Suddenly," in Innen Stadt Aussen (Köln: König, 2010). On the exhibition Olafur Eliasson. Innen Stadt Aussen, Martin-Gropius-Bau, Berlin, April 28 – August 9, 2010.}

Noting our penchant to look past the truth, Nietzsche explained in Beyond Good and Evil (1886), that "one is much more of an artist than one knows." \footnote{Friedrich Nietzsche, Jenseits von Gut und Böse: Vorstudien zur Philosophie der Zukunft (1886). For the relation of philosophy to art see David N. Rodowick, Philosophy's Artful Conversation (Cambridge, MA: Harvard University Press, 2014).} In the age of Operational Art, our inclination is just the opposite: one is perhaps more of a scientist than one would ever acknowledge. \footnote{Hans-Ulrich Obrist et al., Laboratorium (Cologne: Dumont, 2001).}
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