

# MACHINES OF ARTICULATION: READING POLITICS THROUGH AESTHETIC OPERATIONS

Daniela Agostinho, Anders Engberg-Pedersen, and Jussi Parikka

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## ABSTRACT

This article is articulated in three voices of scholars who have worked on questions of war, visual culture, and contemporary political aesthetics that also relates to art and film practices. Media theorist Jussi Parikka, literary scholar Anders Engberg-Pedersen, and visual culture researcher Daniela Agostinho address the relations between images, aesthetics and operations through the lens of two books published concomitantly, Parikka's *Operational Images: From the Visual to the Invisual* and Engberg-Pedersen's *Martial Aesthetics: How War Became an Art Form*. Both books expand the scope of what Czechoslovakian-born filmmaker Harun Farocki termed "operational images" in his experimental documentaries and theoretical writings from the early 2000s. Through his analyses of the politics of imagery in the military-industrial context, Farocki notably defined "operational images" as images that do not depict or represent but rather perform tasks such as tracking, surveilling, detecting, and targeting. For both Parikka and Engberg-Pedersen, Farocki's central concept of operational images forms a point of departure for writing media archaeologies of the present. In a three-voiced dialogue, the authors unfold operations as a "machine of articulation," a conceptual and analytical device that reveals surprising linkages and frictions across different themes, techniques, scales, and historical periods.

## KEYWORDS

Operational Images, War, Military Aesthetics, Farocki, Artistic Methods

In this article, media theorist Jussi Parikka, literary scholar Anders Engberg-Pedersen, and visual culture researcher Daniela Agostinho address the relations between images, aesthetics and operations through the lens of two books published concomitantly, Parikka's *Operational Images: From the Visual to the Invisual*<sup>1</sup> and Engberg-Pedersen's *Martial Aesthetics: How War Became an Art Form*.<sup>2</sup> Both books expand the scope of what Czechoslovakian-born filmmaker Harun Farocki termed "operational images" in his experimental documentaries and theoretical writings from the early 2000s. Through his analyses of the politics of imagery in the military-industrial context, Farocki notably defined "operational images" as images that do not depict or represent but rather perform tasks such as tracking, surveilling, detecting, and targeting. Farocki's concept has enabled incisive analyses of these procedures, but also expanded the range of perspectives on warfare and aesthetics. Indeed, by foregrounding the role of perception in technical operations, Farocki has proven influential well beyond the critique of the military-industrial realm. Farocki's term enables us to see more clearly the often-inconspicuous forms of logistical power and to position image-making itself as a form of analysis and knowledge that also establishes a strong link with earlier theorization of media and war—such as Paul Virilio—as well as recent debates such as on environmental violence, media, and warfare. For both Parikka and Engberg-Pedersen, Farocki's central concept of operational images forms a point of departure for writing media archaeologies of the present. But they continue Farocki's legacy by developing his ideas in alternative, yet complementary directions: Engberg-Pedersen's focus on the overlaps as well as incongruencies between war and aesthetics enters into dialogue with Parikka's emphasis on operations-other-than-war and unpacking of the broader field of operations that comes to characterize their expanded reach across a range of technoscientific uses and institutions. Both are elaborating these points through aesthetics and technology, and both are interested in the interaction of historical developments as informing an analysis of the present, or even, ideally, transformative humanities that establishes circuits of collaboration beyond academia, such as with artistic practices. The authors unfold operations as a "machine of articulation," a conceptual and analytical device that reveals surprising linkages and frictions across different themes, techniques, scales, and historical periods. The authors also discuss the methodological implications of operational images, reflecting on what it might mean for writing and other modalities of expression, in terms of perspective and juxtaposition of different

images, cases, and contexts. In doing so, the article puts forward “operations” as a key term to make sense of contemporary political situations, to unearth their multiple and intersecting historical trajectories, and to foreground the role of aesthetics and artistic methods in both revealing and questioning the imbrications of aesthetics and power.

DANIELA AGOSTINHO (DA): Both your projects explore the ramifications of Harun Farocki’s “operational images” in novel ways. Trevor Paglen, in his own essay on operational images, claimed that, “we’re quickly approaching (and have in fact probably long past) a moment where most of the images in the world are descendants of the ‘operational images’ in *Eye/Machine*,” Farocki’s trilogy from the early 2000s.<sup>3</sup> Yet your work does not merely stay within the realm of contemporary images and artifacts that descend from this early articulation of operational images; instead, Farocki’s work becomes a point of departure for a historically-informed analysis that traces the origins of contemporary phenomena in the field of war and “operations other than war.” What was the impetus behind your projects?

JUSSI PARIKKA (JP): *Operational Images* has a simple, yet important task: to examine the operative capacity of the concept of operational images. How does it function as a concept that does not only represent or denote a particular kind of a “new image,” but becomes a methodological inquiry into transformation of imaging practices? Concepts, too, are operations. In this case, we step back from the image to the operations that produce or sustain images, or the operations that are triggered by images. It shifts the focus from the visibility of images to the infrastructures and thus also non-visual aspects of this mode of production of reality.

Part of my interest is to track the emergence of the term in Harun Farocki’s work, a point that has been made several times in artistic discourse and academic research in visual culture and media studies: what *are* such images that are defined less by their visual representational content than their operative modality, in other words, an implied or explicated action, impact, or even automation of sorts? This, then, implies not just mapping what exists, but also their operational “value,” in other words: what is this concept good for in the context of current concerns in the humanities, aesthetics, and beyond?

There is a lot to unpack there, so let me start with the method. Farocki's own work, as we know, articulated this through film and video, where the issue was not only a definition of such images as a taxonomic task, but to investigate by way of visual arts methods how those operational spheres become visible, or remain invisible, or accessible mainly through proxies.

Hence, I am interested in this recursive task of images about images, or as I would push it, images about *unimages*,<sup>4</sup> that might be more often numerical or otherwise "invisible," as Paglen has argued.<sup>5</sup> So, at the end of the day, this is really about the conceptual possibility of taking a notion, such as operational images, and using it as a particular force of articulation that then also questions the "newness" of such images and starts to work like a media historical machine of articulation. I am interested in surprising historical junctions where the notion becomes operative—for example, the planetary imaging of geodesic maps around the 1730s as an early form of instrumental measurement that becomes a map-image that functions as an instrument of geopolitical (and, in some ways, also colonial) power. This operation opens up the planetary from a particular ground perspective where considerations of the shape and size of the planet are an entry point to also the political powers of traveling for comparative perspectives across the geographical surface as well as techniques of measurement.

Why such historical junctions when addressing contemporary topics? At the back of my mind is the idea of recursion as methodology, as elaborated in certain media theoretical and historical scholarship. Friedrich Kittler's work has been articulated in such terms, and it also features in *cultural techniques* literature, such as Markus Krajewski's *The Server*,<sup>6</sup> where the point about recursive historiography is "applied." Tracing particular current infrastructures, routines, or cultural techniques backwards, which in the process of this iterative writing of a history, changes the terms involved at both ends—the past and the current. It is thus setting up seemingly separate pairs of terms into a historical conversation: (computer) servers and (human) servants, (noise) sirens and (mythological) sirens, and so on.<sup>7</sup> Recursive operations, in this sense, are zigzagging operations, akin to the spirit of the *L'Abécédaire de Gilles Deleuze*.<sup>8</sup> Zigzags are not random connections but carefully curated perspectives that help to think beyond linear time and progression of, say, image types from simple to complex, non-technical to technical. This notion of recursion and zigzag aims to read back and forth the

concept beyond digital culture, diving into photographic history, such as photogrammetry. This includes studying the datafied 19th century image—whether drawn or photographic—in relation to the digital datafied image, as well as practices like the aerial photography and remote sensing, e.g., via satellite. It is within the tension of these terms that particular (so-called) histories, or genealogies, start to emerge. Hence, this approach connects not only to the history of images but also to the history of measurement and its institutional applications, feeding into targeting (warfare) and data capture (colonialism). It's not only the image as image but the constitutive lines through which images become representational, while they also have a foot in the realm of geometric proportions, relations, and other aids that facilitate the emergence of numbers, in the midst of representational content, so to speak. Often, this is pitched as mathematics versus images, but the two are, of course, closely conjoined: the linear perspective implies the history of zero and the vanishing point (a point made brilliantly by Brian Rotman),<sup>9</sup> and mathematics implies the operative role of notation systems, which undermine any Platonic ideals we might otherwise entertain about Numbers. As for us, interested in visual arts and visual culture, this is where the unimages are articulated at the threshold of images; they are understood recursively through each other. Measurement does not necessitate images, but images can act as a means of asking questions about unimages—about the invisible elements of culture. This, I think, is a key point in Farocki's films (from *Images of the World* and the *Inscription of War*, to the *Eye/Machine* series): they are visual images that show the broader set-up in which (un)images too operate.

ANDERS ENGBERG-PEDERSEN (AEP): The basic question that drives *Martial Aesthetics* is this: what is the operational role of aesthetics in warfare? More specifically, my book traces how aesthetic artifacts and discourses have been co-opted by military institutions in order to optimize warfare. As with Jussi, I have been guided by the work of Harun Farocki. In a work such as *Serious Games*, Farocki asks how art, media, operability, and warfare in the 21st century intersect in curious ways and have been ever tightly integrated. What is the nature of this integration, and how did we get here? I take Farocki's work as my point of departure for a both historical and theoretical analysis of a martial aesthetics, which today plays a central role in how war is imagined and waged, yet whose origins can be traced back roughly 250 years. Following two tracks, I show, first, how the imagined worlds of literature, games, and philosophy were seized upon by military institutions that have since sought to

leverage their aesthetic power for the purpose of warfare. Second, I show how a military discourse arose among Prussian military thinkers in the early 19th century that adopted the language of art and aesthetics and spoke of war as an art form in its own right. This conceptual imbrication of war and aesthetics continues to resonate in the contemporary military theory known as military design.

Taking a step back, I would also say that the book is an attempt to turn the tables on much research in the fields of art and aesthetics—my own previous work included. It has been customary to view war as a primary agent, if not *the* primary agent, of history and, similarly, as a fundamental force that impacts on and shapes the field of aesthetics. In this view, works of art appear as belated, *posthoc* reactions that have little bearing on the course of military affairs. In an earlier book called *Empire of Chance. The Napoleonic Wars and the Disorder of Things*,<sup>10</sup> I followed this line of thinking, as I tried to show how over twenty years of large-scale warfare, stretching across the European continent and, indeed around the globe, upended traditional knowledge paradigms, as well as ways of representing war and violence. The magnitude of the wars forced authors such as Heinrich von Kleist, Honoré de Balzac, Stendhal, and Lev Tolstoy, among others, to invent new forms of writing to capture a phenomenon that seemed too vast and complex for the existing forms of art. And I'm far from alone in this pursuit. There is excellent scholarship that has grappled with the ways in which literature and other art forms have responded to the experience of warfare (see, e.g., the work by Kate McLoughlin, Paul K. Saint-Amour, Jan Mieczkowski, Neil Ramsey, and many others.)<sup>11</sup> The arts are indispensable for providing a glimpse into this troubled experience and for giving us a better understanding of the tremendous impact of past wars. But we also need to recognize a less obvious and perhaps somewhat uncomfortable truth, viz, that the arts themselves, the theory of art, and various forms of creative imagined worlds, also serve as tools and engines of warfare. And increasingly so in the 21st century. If we stay within our discipline, stick to the conventional *modus operandi* and research objects of literary scholars, we will miss the tremendous impact that the arts have had on how war is actually waged. The book therefore turns to somewhat unusual objects—horoscopes, *Kriegsspiele*, synthetic training environments along with military theory, doctrines, and handbooks—and reverses the direction of reading in order to show the practical, operational force of aesthetics in the business of war.

DA: There are many resonances between the terms you work with and your interest in operations. What common interests do you see between your analyses, and where do they complement or speak to one another?

JP: There is a significant resonance between the two takes, something I like to think in terms of nesting. Many of the themes in Anders' book are nested inside operational images in implicit (sometimes also explicated) ways, creating a dialogue despite the different emphases. When I argue that operational images are *not* just about war and the military, I am pointing to the broader field of operations that comes to characterize their expanded reach across a range of technoscientific uses and institutions. This does not dismiss the central points Anders makes, but works within similar terrain. Anders' take is one of the most inspiring and systematic investigations of the particular aesthetic regime of warfare, while it shows how it resonates across a body of other techniques: simulation and training are here key examples, both of which are strongly implied in my book too. Similarly, I see operational images nested in many of the trajectories—historical and analytical—he articulates with fresh examples and readings. While we come from different disciplines, there is a shared middle ground where we meet by way of some of the impulses of theorization—not just theory but the context of theory. For example, the central link between war and media theory, as it emerged gradually since the 1980s and 1990s with Virilio, Kittler, and others.

AEP: There are indeed many deep resonances. Evidently, the question of operability is central to both our endeavors. Jussi zooms in on the operational image, but then shows how this type of image, or non-image, is operative across a whole swath of different media and contexts. I, by contrast, remain within the military, but argue that military institutions have developed a broader operational aesthetics, utilizing creative imaginative worlds and aesthetic theories to optimize warfighting and military strategy. I was thrilled to come across Jussi's discussions of the operational image and how it links representations and perceptions to actions, because these discussions are key for thinking about how certain types of literature, games, simulations, training scenarios, and other media work in the military realm. And I was particularly interested in Jussi's reflections on the ontogenetic character of operational images, because the operational aesthetics we find in the military realm is essentially worldbuilding. It brings about a Leibnizian plethora of

imagined martial worlds, which shape the perceptions and visions of their immersed users and may or may not be brought across the threshold of the real.

We didn't know of each other's project until very late in the writing stage, but we both contribute to a wider operational turn in media and cultural studies in the past decade. I am thinking here of work by, for example, Aud Sissel Hoel,<sup>12</sup> Jens Eder and Charlotte Klonk,<sup>13</sup> and Pasi Väliäho.<sup>14</sup> This development not only shifts focus from what media *are*, to what they *do*, and thereby to the operations they perform beyond the realm of representation, but also highlights the embeddedness of media in various networks and institutions. Our examples differ, to be sure, but both works show how images and artifacts gain their operational force at the intersection of particular objects, institutional settings, and the broader historical context. And this in turn highlights the two books' related overarching aim: to reframe our understanding of operational images and martial aesthetics by rummaging through the historical archives for earlier examples that preceded these concepts. In other words, I found in Jussi's work an impetus congenial to my own, viz. to write a media archaeology of the present.

DA: There is a close relationship between operations and infrastructures that both of you point out. We know how the construction, access, and control of infrastructure (also digital) is a major force from war to capitalist logistics.<sup>15</sup> Jussi, you open your book with the idea that “it's images all the way down,” suggesting that images exist in and are central to the functioning of the infrastructures of contemporary management of life, even if we do not recognize them as such. Could you elucidate this premise and explain how “operational images” as a term allows you to shed light on this inconspicuous role of images?

JP: This idea of “images all the way down” is a version of the parable of “turtles all the way down” (as one cosmological story of the constitution of the world). Images are infrastructured across material and social layers, which enable them to be born but also used, mobilized, and integrated into other systems, such as management of life. This can be understood quite literally: operational images feature in various medical and biological systems of observation and intervention, as much of media studies has shown. Images are instruments, expanding their inherently epistemic function to actual or potential actions. This includes imaging systems that open up



different scales of life,<sup>16</sup> from the molecular and the microscopic, to the large-scale sensorial (remote sensing) systems, which map biomes, growth, plant health, or even extraterrestrial planetary surfaces. In these contexts, the notion of “image” bends into something else than the photographic, as those “images” are becoming instrumental beyond representational uses. One of the examples in the book, albeit touched only briefly, is the work on the Mars Rover imaging systems,<sup>17</sup> underlining the point about extra-planetary scope of imaging. In terms of biopolitics, the COVID-19 pandemic also sparked interesting media studies reflections, particularly on thermal imaging. For example, Antonio Somaini points to this particular pandemic and post-pandemic trend in terms of machine vision, including “the diagnostic examination of medical imaging and the enforcement of measures of physical distancing through drones, heat cameras, and machine vision techniques.”<sup>18</sup> Images, to state the obvious, are part of the broader security-surveillance complex of sensing, although not all operational images are reducible to surveillance; they are also used in a variety of other institutional contexts. The *bios* in the biopolitics is not focused only on the human world but concerns the broader *zoe* of non-human life as well.

A more recent piece of research and writing with Paolo Patelli elaborated on a very different context of operational image, namely ecological modeling. The link to science studies is one aspect where we find the concept’s usefulness, connecting to the sorts of knowledge formations—including the actionable element of “policy”—prevalent today. With Paolo, we write about ecological simulation and modeling through the Aarhus University ALMaSS system (the Animal, Landscape and Man Simulation System), a C++ code platform an open science project that has been in development since late 1990s. It is not a visual system in the traditional sense but works as a planning, assessment, and management instrument for studying landscape scale changes. Such systems are interesting from the perspective of the model—as an expanded sense of “image”—which is a central element in the instrumentation of scientific investigation.<sup>19</sup> This *bio* or *zoepolitics* is thus one of technoscientific media that enacts different scales of governance too.

DA: The operational forces that you identify and explicate in your different projects bring to light the centrality of operations as a mode of power, or perhaps of operations as indispensable to power. Jussi, you devote particular attention to unpacking the term “operation” in your book, but also to conceptually open the possibilities

of operational analysis, drawing links between “operative ontologies,” the agential realism of Karen Barad, and the operations of racial capitalism examined by Simone Browne. What are these operations that you surface in operational images?

JP: A glossary of operations of operational images would be extensive—while often we associate the term with “targeting,” perhaps also “measuring,” we could add for example: analyzing, comparing, modeling, simulating, tracking, navigating, extracting, trapping, projecting, forecasting, quantifying, territorializing, mining, etc. Hence, these operations start to take on a life of their own. In other words, they become central to a multitude of areas of digital culture—and, as per my argument, not just digital culture. They start to unfold the political context of visual and invisual cultures, expanding beyond warfare into domains like the logistics of racial capitalism, for example. War and Capital go together in ways that go beyond warfare itself.<sup>20</sup> As Asia Bazdyrieva points out in a recent text of ours, environmental and military forms of knowledge and action—and even terror—are also interlinked, as demonstrated by the widespread Russian aggressions of the past years.<sup>21</sup> Svitlana Matviienko has in related spirit referred to the “energy terrorism” at play.<sup>22</sup> While the core point of my book is to conceptually open the methodological possibilities of operational analysis in this manner of expanded scales of investigation, I hope that the term “operational images” can link different techniques in ways that builds a more comprehensive image of the contemporary political situation. Building on Anders’ earlier point on the “operative” or “operational” mode in media and art studies, this could be said to connect to a broader theoretical and methodological approach that reads politics through the operations that constitute them; hence my interest in how operational images links to theories such as cultural techniques, operative ontologies, and the fine-tuned theoretical work of scholars like Karen Barad, whose concept of onto-epistemology I find outstandingly rich. Barad’s work underlines that epistemic positions are material, which in my case in many ways relates to the instrumentation (inclusive of infrastructure), where media “is.” Ontogenesis, as Anders points out, is a key notion here.

DA: Your proposition to read politics through the operations that constitute them really puts aesthetics to the test. In this regard, Anders’ notion of “operational aesthetics” is particularly interesting in the apparent contradiction it entails (if aesthetics is traditionally conceived as purposeless). It also raises the question of how elements of traditional aesthetics (such as creativity or sensibility)

are operationalised in war. Anders, to return to your earlier point about turning the tables on research in the field of aesthetics, how does aesthetics emerge as a primary agent, rather than a field of reaction to material events?

AEP: In a historical perspective, the notion of an “operational aesthetics” could indeed appear to be a contradiction in terms. According to well-established histories of aesthetic theory, it was in the 18th century that art was disconnected from its more mundane, practical purposes and established as a distinct, autonomous sphere, beholden to its own internal rules. As Kant famously put it, the work of art is characterized by its “purposiveness without purpose.” At the same time, aesthetic theorists hammered out a series of concepts that have informed discussions of art ever since. Not merely autonomy and lack of utility, but also play, creativity, imagination, and genius became key terms in this shift. However, if we leave the lofty discussions of high-art among the leading theorists and literati of the day, and instead turn to a much more motley group of retired officers and part-time inventors, we find a persistent effort to deploy these aesthetic concepts in a different sphere, viz. that of warfare. Developing autonomous imaginary worlds in the form of the tactical wargame, these gamers co-opted and retooled the basic building blocks of aesthetics to the practical purpose of training officers and optimizing military tactics. With the emergence of the modern wargame between 1780-1830, inventors such as Opiz, Hellwig, Venturini, Reisswitz, Aretin and others, recognized the potential—and the very real force—of imaginary, autonomous playworlds and incorporated them into military education. “Operational aesthetics,” then, designates the merger of autonomous play and practical purpose: an at once material and imaginative tool, whose rationale lies outside the imagined world in the very practical business of waging war.

But this import of aesthetic concepts into the realm of war goes even further. It is striking that over the past two centuries, there have been numerous attempts within military theory to cast warfare itself as an art form. Of course, there is a long-standing debate that centers on the question: is war a science or an art? In other words, are there a set of fixed rules that govern warfare, or can we only go by more fungible and practical rules of thumb? This, for example, is one of the key debates between two of the giants of military theory—Carl von Clausewitz and Antoine-Henri Jomini. But at the beginning of the 19th century, certain, very cultured, military theorists begin to think of war as an art form in its own right—on par with music,

sculpture, or painting. There are several obvious ethical pitfalls to this endeavor, not least that it maps a whole value system associated with art—with the artistic genius as the highest manifestation of human potential—onto the realm of war. Nevertheless, a growing contemporary movement within Western militaries, called “military design,” continues to speak of war in terms of the creative imagination, genius, artistry, and virtuosity, with some of its proponents explicitly adopting the stance of an avantgarde movement.

DA: I was quite struck by your point, Anders, that as war has become more complex, ambiguous, and contingent after 9/11, Iraq, and Afghanistan, the military has found the need to bring in aesthetic elements, which seem to be more suited to dealing with uncertainty, open-endedness, and contingency.<sup>23</sup> These are dimensions that, as scholars of art and aesthetics, we tend to cherish as unique features in our field, and seeing them incorporated by the military for the training and conduct of war is quite startling—and a bit upsetting as well. Can you elaborate on this incorporation of aesthetics to deal with uncertainty?

AEP: Perhaps a good place to start is with the *9/11 Commission Report*. Among the many security failures in the US intelligence environment, the report singled out the “failure of imagination” as the most severe. The fact that security threats could materialize from a place beyond the purview of conventional strategic and scenarios thinking changed US security protocols. As Louise Amoore has argued, the first decade of the 21st century witnessed a shift from a “politics of probability,” in which security regimes focused on the more narrow range of the most likely events, to a “politics of possibility” that radically opened up the horizon of the future in an attempt to secure every imaginable—and hitherto unimaginable—future.<sup>24</sup> Or, in Donald Rumsfeld’s phrase, strategic thinking could no longer be satisfied with managing the known unknowns, but had to expand its realm and seek to imagine the “unknown unknowns.”

At the same time, the protracted wars in Iraq and Afghanistan that followed in the wake of 9/11, proved intractable with the established concepts of war that dominated US military doctrine. Asymmetric, urban warfare against an irregular, elusive enemy displayed a degree of unpredictability and uncertainty that forced US military leadership to abandon existing doctrinal concepts and develop a new martial onto-epistemology, which incorporated contingency to a much greater degree.

Together, these developments opened the doors of military establishments for art. In 2007, for example, the Department of Homeland Security invited a group of science fiction writers to present their visions of future warfare and thereby expand the array of possible futures available to military strategic thinking. As Lindsay Thomas has argued, the post-9/11 security regime has come to take “fiction” very seriously.<sup>25</sup> Indeed, as I have shown in a forthcoming essay, national security fiction has in recent years developed into a distinct martial aesthetic genre with military officers, intelligence officials, admirals and CIA directors turning to fiction and becoming authors of imaginative literature in an attempt to expand the horizon of possible futures in the name of national security and use novels and novellas as a laboratory for military and political strategy.<sup>26</sup> They form a rather curious avantgarde that merges both meanings of the term, at once military and aesthetic. In this process, however, the traditional merits and values of art and aesthetics are evidently transformed. Contingency, uncertainty, and open-endedness are invoked only in order to be more efficiently neutralized. Instead of reveling in the possibilities of an open future, the possible worlds of art are quickly reduced to an optimal future scenario to be implemented.

DA: Your points remind me of Louise Amoore’s notion of “foreclosed futures,” which speaks to how the open-endedness associated with futures is curtailed by predictive technologies that limit political futures to a few pre-delimited scenarios.<sup>27</sup> In this regard, I was struck by your formulation of “factitious futures,” where the artificial and the real do not stand as opposites but are rather folded into each other. I found this to be a very insightful way of making sense of the latest developments in synthetic data environments, which are never entirely synthetic but always in relation to the real/embodied.

AEP: Yes, I’m interested in the ways in which military artifacts of various sorts operate in a liminal space between the imaginary and the real, between fiction and fact, and between autonomy and functionality. Whether in the form of games, synthetic training environments, or VR simulations, these military artifacts are engaged in a sort of worldbuilding. They construct a series of tactical scenarios of an imagined potential future state of the world. In other words, these futures are “factitious” in the original Latin meaning of the term: “artificial” or “made by art.”

Yet, such artificial futures generate real, perceptual and behavioral patterns in the present for the soldiers immersed in these worlds—patterns that may then be invoked down the line on the actual battlefield. This process not only interweaves the real with the purely imagined, it also creates a curious looping temporality, in which the future becomes a repetition of a constructed future from the past—one that has already been experienced virtually in the military artifact, even though it has never taken place. In 2018, seizing on the potential—if not on the potential drawbacks—of such factitious futures, General James Norman Mattis promoted the use of virtual training with the statement that infantry should fight “twentyfive bloodless battles” before being deployed. Or in the words of another US general: “Our soldiers will become virtual veterans of twenty-five bloodless battles before the first round is ever fired in combat.” This notion of “virtual veterancy” captures well the collapse of distinct temporal and ontological categories effected by contemporary military training tools.

DA: Jussi, you also use the notion of “operational aesthetic,” drawing on artistic practices, such as Geocinema’s and your own collaborations with artist-scholar Abelardo Gil-Fournier. Can you say more about what “operational aesthetic” entails?

JP: The short answer would be that it is about process and proceduality. I refer to Neil Harris,<sup>28</sup> Ilka Brasch,<sup>29</sup> Tom Gunning,<sup>30</sup> and others, who have looked into the cinematic and literary histories of such proceduality as a particular theme around the late 19th century and early 20th century. This fundamentally concerns the visuality and visibility of machines and their (internal) mechanisms as part of cultural history of technology. It is about showing how things work as spectacle, but also about how these themes evolved into the cinematic repertoire, particularly with Farocki, who explored labor and production (of e.g., operational images, a certain image engineering). I relate this to Geocinema’s wonderful cinematic ethnography of the Digital Belt and Road infrastructure in China, which features this backstory of a massive scientific infrastructure. So, I am interested in images of process (e.g., scientific expertise, or making of images) and how this processuality doubles up in the aesthetics of *moving* images.

I am fascinated by the aesthetics of not just machines and machineries but also of bureaucracy. A hat-tip is due to the many scholars who have looked at, for example, aesthetics of Cold War think

tanks<sup>31</sup> or control rooms,<sup>32</sup> whose work have helped me to think through the architectural relation of operational aesthetics that also appear in some of the image-based art practices I am interested in. Here, the cinematic view defines such spaces in particular ways—the aesthetics of administration is one version of the aesthetics of operational images, I would say—and how process itself is not necessarily a thing that is visible but instead withdraws into the background, like labor often does. Similarly, another axis of themes and investigation that complicates the idea of operational aesthetics as being solely about visibility is that of scale. Moving from representations of a machine in operation to considering large-scale infrastructures as being available to representation is a big step, so to speak. Think of it as the operational aesthetic equivalent to Fredric Jameson's point about cognitive mapping: abstract or large-scale systematic features that do not lend themselves into a simple image.<sup>33</sup>

In addition, I want to return to what Anders mentioned concerning the factitious futuring powers: this notion captures exceptionally well the link between bureaucratic information processing and scenario building, as well as the sort of expanded aesthetics that pertains to this mode of power. One form of futuring, to echo earlier points, is training or how the combination of techniques of the body (training and drilling) are related, enacted in, and operationalized by way of simulations.

DA: Jussi, you briefly write about your method, drawing on Harun Farocki's method of soft montage, and how your book unfolds in loops and series. I would be curious to hear how drawing inspiration from Farocki has impacted how both of you work with your source material and the kind of arguments you formulate.

JP: Parallel to writing *Operational Images* and the forthcoming co-authored *Living Surfaces*,<sup>34</sup> I collaborated with artist Abelardo Gil-Fournier on some video works. In *Seed, Image, Ground*, we mobilized Farocki's concept of soft montage as a way to think of two parallel "tracks" of image-based movement. While there are many other precedents for the split-screen aesthetics,<sup>35</sup> for us, this approach was an interesting epistemic position, echoing what Christa Blümlinger had written about Farocki's work, that "the organisation of images appears much more important than the method used to record or generate them."<sup>36</sup> Farocki's own notes about the soft montage are a bit obscure at times, but they help outlining this notion of relation, composition, and doubling as it relates

to image synthesis. Here, he actually talks about projection, but I think it is useful for our concerns as well:

There is succession as well as simultaneity in a double projection, the relationship of an image to the one that follows as well as the one beside it; a relationship to the preceding as well as to the concurrent one. Imagine three double bonds jumping back and forth between the six carbon atoms of a benzene ring; I envisage the same ambiguity in the relationship of an element in an image track to the one succeeding or accompanying it.<sup>37</sup>

*Seed, Image, Ground*, a video commissioned by Fotomuseum Winterthur and then also installed in various exhibitions, including in Shenzhen and Athens, was an attempt to think of imaging of vegetal surfaces in those terms that elaborate this doubling and composition of what the image-surface duo does in relation to themes of ecological life and agriculture. However, I have also been interested in what this means for writing: how might one write in a split-screen style that narrates different scales and cases? How might this connection to the recursive method mentioned earlier? It thus becomes a methodological device, enabling historical themes to interact in surprising ways. Now, in Autumn 2024, we have just finished our new video essay, *Lumi*, that again engages with images through images. The underpinning narrative about reconstruction of planetary light through reflective surfaces is somewhat situated in environmental discussions but is fundamentally about images and memory: what kinds of “storage” does images represent when they also embody landscapes—such as the idea of frozen surfaces as captured light. Here, topics familiar from works like those of Chris Marker are replaced onto data, AI, and planetary environmental change, positioning these as conditions of luminescence.

Video is not writing, and writing is not moving images, yet the compositional effect of structural or rhythmic choices comes to play a role across different modalities of expression. This interplay is also helpful for methodological discussions that feed into academic inquiry, such as developing conceptual approaches to aesthetics of planetary light in the latter case.

AEP: Farocki’s soft montage has certainly also been methodologically productive in shaping my own approach. Indeed, it was Farocki’s work that turned my attention to the links and overlaps but also the incongruencies and frictions between war and aesthetics in



the first place. My book opens by immersing the reader in a narrative account of a combat situation, only to zoom out and reveal that the scene unfolds within a military simulation, itself nested within Farocki's artwork *Serious Games*. This opening serves as more than a simple vignette, though. It becomes methodologically exemplary in two ways. First, I extend the method of juxtaposition from concrete images to the much larger fields of aesthetics and the military, showing the often strange ways in which they have merged historically. Tracing the histories of aesthetics and military media in parallel tracks makes it possible to notice and analyze when, how, and why they become entangled. Second, Farocki's method of juxtaposing first- and second-order observations—an inside-outside perspective—has been central to establish not just an epistemological, but also a critical position on martial aesthetics.<sup>38</sup> Disabling the co-option of aesthetics requires an immersion in military artifacts, yet equally an analytical tearing apart, the jamming of military technologies of experience, the temporary ejection of the immersed user to reveal the seams of the artifice. For this, too, I have found Farocki's simultaneous inside-outside perspective to be a productive model.

DA: As our governments and political systems implicate us so deeply in wars—most acutely right now in the ongoing occupation of Palestine and the genocide of Palestinians—something I appreciate about your work is how you foreground the many levels at which we are always implicated in operations of war and management of life/death. There is no position of exteriority to claim. Many have noted the fundamental complicity between military and consumer technologies.<sup>39</sup> Thanks to student movements worldwide, from Rhodes Must Fall to the current campus protests for Palestine, it is once again becoming undeniably clear how our knowledge institutions are so deeply imbricated with economies of war. Your careful historical analyses of how operations of war and capital underpin perception—and vice-versa—which, of course, was already present in Harun Farocki's work, render these implications quite noticeable on different scales. With this in mind, how do you see your roles as scholars/researchers in making sense of these implications?

JP: The link between the military-industrial complex, entertainment, and universities has been structurally central, especially in the US, since the Cold War. Now, as we know, universities globally—across different political systems—are linked in all sorts of ways with corporate providers, and the link to the military industry continues to

be central. For example, Secretary General of Nato Jens Stoltenberg participated in the “cutting the red ribbon” ceremony for the new center for quantum technologies in Copenhagen just last year. Much of this resonates with NATO’s broader initiative under the DIANA banner—“the Defence Innovation Accelerator for the North Atlantic”—and the focus on “dual-use” innovation, which has been, for a long time, again since the Cold War at least, part of the R&D agenda: civilian and military. Besides that, we live in weird times: neo-Nazis and far right groups marching in demonstrations that oppose anti-Semitism (as seen in France), silencing of Jewish voices who demand peace (in Germany among other countries), and universities resorting to calling the cops on their own students. Furthermore, the marginalization of Palestinian and Pro-Palestinian voices is often linked to all sorts of military-industrial contracts that are central to our ongoing version of the grim *realpolitik* that only seems to deepen with the looming Trump presidency.

As for my academic work, I have two main areas of focus that interest me within the security-military-environmental complex. These two do not cover the whole field of important research or other scholarly practices but reflect what I have been interested in over the past years. On the one hand, the environmental has been—and continues to be—defined through military interests and knowledge. It relates to the conflation of infrastructures of sensing that military, security, and environmental research have shared. Not always, of course, but in significant parts, for example, during the Cold War.<sup>40</sup> This focus on nature as a battlefield<sup>41</sup> extends in two ways: first, toward the control of environmental factors as part of strategization of space and resources and, second, into the extended warfare of finance, where nature becomes again part of the resource-oriented ways of extractivism or, for example, speculation. Then, on the other hand—and seemingly contradictory to my earlier point, though not necessarily so—not all sensing is surveillance (to echo Benjamin Bratton).<sup>42</sup> In other words, not all forms of sensorial technologies should be seen as the expansive sphere of surveillance, which easily gets inflated and meaningless. I am curious about the other realms of measurement and quantification, which are not merely seen as “objectification” in the classical sense of alienation but rather part of a complex bundle of simulation and modeling of ecological factors, agencies, and, thus, of knowledge. For sure, the security-surveillance apparatus is central, but in parallel to that, we also need to refine the sense of sensing that is irreducible to only those industries and modes of power. This also

links to my interest in AI, particularly the cases where AI is not exclusively read through the culture and logistics industries of large tech corporations but also an expanded scientific field of advanced computation that operationalizes, for example, environmental data. Of course, these areas often overlap—big tech is centrally trying to capture the area of environmental datafication too, of which agriculture is a central example. However, I am also interested in reading the narrative in ways that are not *only* about the big tech capture.

AEP: I suppose my role, over the past decade or so, has been to cast a slanted light on a topic that is usually analyzed through the lens of political science, traditional military history, or, closer to home, media archaeology. With a background in comparative literature and theory, I seek to bring an aesthetic perspective to bear on war, revealing the various ways in which warfare is shaped by aesthetic concepts and artifacts. This pursuit has brought me far beyond my original field of literature and into military theory, game studies, and international relations. My hope is that the more established fields of war studies will benefit from such a somewhat unusual humanities perspective. In a similar vein, I recently founded a book series called *Prisms: Humanities and War*, which seeks to integrate media studies, the arts, history, and philosophy with the fields of political science, international relations, and law.<sup>43</sup> For me, the cross-pollination of fields and expertise is crucial to any attempt to grasp a phenomenon as elusive, complex, and vast as warfare.

DA: As the fields of visual culture and aesthetics have become so thoroughly operationalized and incorporated into domains like the military or the infrastructures of capital and life management, as you deftly point out, where do you locate the potential of visual culture, artistic research and aesthetics for social and political critique? How does this operationalization change the stakes for aesthetics?

JP: I don't want to suggest that operationalization functions as the opposite of artistic or social critique. On the contrary, I think the latter is—and must be—involved in the circuits of technical imaging in ways that develop a full-fledged understanding of how such systems work (and how they can be made to work against themselves). For example, Farocki's way of using images to talk about images—visually narrating the different scales of operational images—is a useful way of dealing with the broader implications of automated systems. In more recent years, we have seen lots of

excellent examples of variation of the theme, such as the use of game engines for particular critical narratives. *How To Disappear* by Total Refusal, an anti-war movie within game engine space, is one such example. Another is Lawrence Lek's video and game engine work on AI systems. In really interesting cinematic ways, Sasha Litvintseva and Beny Wagner engage with images and measuring in *Constant*, while Emma Charles and Ben Evans James investigate the landscape-infrastructure-energy nexus in their 16mm film *On A Clear Day You Can See the Revolution From Here*. Stephen Cornford's video essay *Spectral Index* investigates the visual/invisual space of remote sensing in really interesting ways, showing the link to mineral and other resource prospecting. What is interesting to me are both these critical accounts, which help to understand the transformation of what is considered visible vis-à-vis, what is considered measurable, and, then, how practices with operational images can be productive in more ways than critique. This is what we also try to do with Abelardo in our new piece, *Lumi*.

Beyond art, the space of architectural imaging and fields like GIS are important examples, but there are many other areas where we need to grapple with the role of "models" as "not-just-images." Climate modeling would be one crucial area in this regard. The full stack of operational images includes both critique and creative, pragmatic mobilization of such possibilities of image-data-sensing, without which for example our understanding of the environmental crisis would not be possible. Artistic methods are also fully implied, directly or indirectly, in this changing regime of visual practices and cultural techniques of quantification. This immanence interests me.

AEP: First of all, I would agree with Jussi that, even as visual culture and aesthetics are frequently co-opted and their purpose transformed, the first task is to understand these processes and tease out what remains unthought in these developments. This is why Farocki's work is *gefundenes Fressen* for cultural analysts. With his distinctive methods and soft touch, he puts operationalization itself on display while leaving much unsaid. His work can therefore serve as a model or launch pad for understanding operational procedures and their implications across all sorts of media and fields. Even an old medium like literature has a history of being co-opted by the military to serve national security interests, and unearthing these media histories and understanding such media operations are necessary preliminary endeavors to any kind of political critique.

At the same time, I think it is fair to question whether traditional forms of critique are, indeed, sufficiently operational. Whatever one thinks of recent years' critique of critique, there are lessons to be learned both from the praxis-oriented elements of the postcritique movement and from the very institutions and operational media that Jussi and I analyze. Surveillance systems, capitalist infrastructures, and military artifacts structure our contemporary world because of their tremendous operative force. To state the obvious, works of cultural analysis lack anything comparable. There is no army attached to a work of social or political critique to implement its alternative vision. That's probably a good thing. However, in the evident absence of such transformative force, it has long been deemed sufficient for critics to simply *point* to the problem. For a while now, however, there has been a deeper tectonic shift underway across the sciences. Spurred, no doubt, by the spiraling number of crises and societal challenges—the climate, demographics, misinformation, AI, warfare, and more—as well as by funding bodies' demands for “impact.” As a result, humanities scholars are increasingly asked to go beyond “mere” epistemic contributions. Instead, we are tasked with the development of transformative—or, to reclaim the term, *operational*—knowledge that leads to concrete positive social change. Such efforts require a new set of relays, channels, and partnerships between artists and scholars, on the one hand, and the institutions, stakeholders, and decision-makers with the power to change things, on the other. It becomes a matter of reaching and engaging people who would not by themselves pick up the *Nordic Journal of Aesthetics*—even though they are precisely the ones who should do so.

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**Fig. 1**  
Still from *Lumi* (video, 2024), courtesy of Abelardo Gil-Fournier and Jussi Parikka.

**Fig. 2**  
Still from *Seed, Image, Ground* (video, 2020), courtesy of Abelardo Gil-Fournier and Jussi Parikka.

- 1 Jussi Parikka, *Operational Images: From the Visual to the Invisual* (Minneapolis, MN: University of Minnesota Press, 2023).
- 2 Anders Engberg-Pedersen, *Martial Aesthetics. When War Became an Art Form* (Stanford, CA: Stanford University press, 2023).
- 3 Trevor Paglen, "Operational Images," *e-flux journal* 59 (November 2014), <https://www.e-flux.com/journal/59/61130/operational-images/>.
- 4 Parikka, *Operational Images*, 63; Peter Geimer, "Was ist kein Bild? Zur Störung der Verweisung," in *Ordnung der Sichtbarkeit. Fotografie in Wissenschaft, Kunst, und Technologie*, ed. Peter Geimer (Frankfurt: Suhrkamp, 2002), 313–341.
- 5 Paglen, "Operational Images."
- 6 Markus Krajewski, *The Server: A Media History from the Present to the Baroque* (New Haven: Yale University Press: 2018).
- 7 Geoffrey Winthrop-Young, "Siren Recursions," *Kittler Now: Current Perspectives in Kittler Studies*, eds. Stephen Sale and Laura Salisbury (Cambridge, MA: Polity Press, 2015), 71–94.
- 8 Pierre-André Boutang, *L'Abécédaire de Gilles Deleuze* (Sub-Til Productions, 2019), <https://www.youtube.com/playlist?list=PLiR8NqajHNPbaX2rBoA2z6iPGpU0iPIS2>.
- 9 Brian Rotman, *Becoming Beside Ourselves: The Alphabet, Ghosts, and Distributed Human Being* (Durham, NC: Duke University Press, 2008).
- 10 Anders Engberg-Pedersen, *Empire of Chance. The Napoleonic Wars and the Disorder of Things* (Cambridge, MA: Harvard University Press, 2015).
- 11 Kate McLoughlin, *Authoring War: The Literary Representation of War from the Iliad to Iraq* (Cambridge, MA: Cambridge University Press, 2011); Paul K. Saint-Amour, *Tense Future: Modernism, Total War, Encyclopedic Form* (Oxford: Oxford University Press, 2015); Jan Mieszkowski, *Watching War* (Stanford: Stanford University Press, 2012); Neil Ramsey, *Romanticism and the Biopolitics of Modern War Writing* (Cambridge, MA: Cambridge University Press, 2023).
- 12 Aud Sissel Hoel, "Operative Images. Inroads to a New Paradigm of Media Theory," in *Image – Action – Space: Situating the Screen in Visual Practice*, eds. Luisa Feiersinger, Kathrin Friedrich, and Moritz Queisner (Berlin, Boston: De Gruyter, 2018), 11–28.
- 13 Jens Eder and Charlotte Klonk, eds., *Image Operations: Visual Media and Political Conflict* (Manchester: Manchester University Press, 2017).
- 14 Pasi Väliäho, *Biopolitical Screens: Image, Power, and the Neoliberal Brain* (Cambridge, MA: MIT Press, 2014).
- 15 Laleh Khalili, *Sinews of War and Trade. Shipping and Capitalism in the Arabian Peninsula* (London: Verso, 2020).
- 16 Nina Samuel, "Images as Tools: On Visual Epistemic Practices in the Biological Sciences," *Studies in History and Philosophy of Biological and Biomedical Sciences* 44, no. 2 (June 2013): 225–236; Lisa Cartwright, *Screening the Body. Tracing Medicine's Visual Culture* (Minneapolis: University of Minnesota Press, 1995).
- 17 Janet Vertesi, *Seeing Like a Rover: How Robots, Teams, and Images Craft Knowledge* (Chicago: University of Chicago Press, 2015).
- 18 Antonio Somaini, "Machine Vision in Pandemic Times," in *Pandemic Media: Preliminary Notes Toward an Inventory*, ed. Philipp Dominik Keidl, Lali Melamed, Vinzenz Hediger, and Antonio Somaini (Lüneburg: meson press, 2020), 148.
- 19 Paolo Patelli and Jussi Parikka, "Model Ecologies. On Disassembling and Reassembling Landscapes" in *Media Matters in Landscape Architecture*, ed. Karen M'Closkey and Keith VanDerSys (Novato, CA: ORO Editions, forthcoming 2025).
- 20 Éric Alliez and Maurizio Lazzarato, *Wars and Capital*, trans. Ames Hodges (South Pasadena: Semiotext(e), 2016).
- 21 Asia Bazdyrieva, Bryan Norton, and Jussi Parikka, "Earth as Image and Operation," *Journal of Visual Culture* 22, no. 2 (2023): 202–221, <https://doi.org/10.1177/14704129231218185>.
- 22 Svitlana Matviyenko, "Nuclear Cyberwar: From Energy Colonialism to Energy Terrorism," *e-flux* 126 (April 2022), <https://www.e-flux.com/journal/126/460842/nuclear-cyberwar-from-energy-colonialism-to-energy-terrorism/>.
- 23 Engberg-Pedersen, *Martial Aesthetics*, 91–92.
- 24 Louise Amoore, *The Politics of Possibility: Risk and Security Beyond Probability* (Durham, NC: Duke University Press, 2013).
- 25 Lindsay Thomas, *Training for Catastrophe: Fictions of National Security after 9/11* (Minneapolis: University of Minnesota Press, 2021).
- 26 Anders Engberg-Pedersen, "The National Security Novel: 'Useful Fiction,' Persuasive Emotions, and the Securitization of Literature," *Critical Inquiry* 51, no. 2 (Winter 2025): 225–246.
- 27 Louise Amoore, *Cloud Ethics: Algorithms and the Attributes of Ourselves and Others* (Durham, NC: Duke University Press, 2020).
- 28 Neil Harris, "The Operational Aesthetic," in *Popular Fiction: Technology, Ideology, Production, Reading*, ed. Tony Bennett (London: Routledge, 1990).
- 29 Ilka Brasch, *Film Serials and American Cinema, 1910–1940* (Amsterdam: Amsterdam University Press, 2018).
- 30 Tom Gunning, "Crazy Machines in the Garden of Forking Paths: Mischief Gags and the Origins of American Film Comedy," in *Classical Hollywood Comedy*, ed. Kristina Brunovska Karnick and Henry Jenkins (New York: Routledge, 1995), 7–105.
- 31 Pamela M. Lee, *Think Tank Aesthetics: Midcentury Modernism, the Cold War, and the Neoliberal Present* (Cambridge, MA: The MIT Press, 2020).
- 32 Cormac Deane, "The Control Room: A Media Archaeology," *Culture Machine* 16 (2020), <https://culturemachine.net/vol-16-drone-cultures/the-control-room/>.
- 33 Alberto Toscano and Jeff Kinkle, *Cartographies of the Absolute* (Winchester: Zero Books, 2015).

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- 34 Abelardo Gil-Fournier and Jussi Parikka, *Living Surfaces. Images, Plants, and Environments of Media* (Cambridge, MA: The MIT Press, 2024).
  - 35 Jonathan Rozenkrantz, *Videographic Cinema. An Archaeology of Electronic Images and Imaginaries* (London: Bloomsbury, 2020).
  - 36 Christa Blümlinger, "The Art of the Possible: Notes About Some Installations by Harun Farocki," in *Art and the Moving Image: A Critical Reader* (London & New York: Tate Publishing, 2008), 276.
  - 37 Harun Farocki, "Cross Influence/Soft Montage," in *Harun Farocki. Against What? Against Whom?* ed. Antje Ehmann and Kodwo Eshun (London: Raven Row & Koenig Books, 2009), 70. See also Nora Alter, "Two or Three Things I Know about Harun Farocki," *October* 151 (Winter 2015): 151–158; and Jussi Parikka and Abelardo Gil-Fournier, "An Ecoaesthetic of Vegetal Surfaces: On Seed, Image, Ground as Soft Montage," *Journal of Visual Art Practice* 20, no. 1–2 (2021): 16–30.
  - 38 Anders Engberg-Pedersen, "Technologies of Experience: Harun Farocki's Serious Games and Military Aesthetics," *boundary 2* 44, no. 4 (2017): 155–178.
  - 39 Annie Ring, "Complicity," in *Uncertain Archives. Critical Keywords for Big Data*, ed. Nanna Bonde Thylstrup, Daniela Agostinho, Catherine D'Ignazio, Annie Ring and Kristin Veel (Cambridge, MA: MIT Press, 2021), 87–97; Lisa Parks, "Drones, Vertical Mediation, and the Targeted Class," *Feminist Studies* 42, no. 1 (2016), 227–235; Daniela Agostinho, "Cruel Intimacies," in *Warchives. Archival Imaginaries, War and Contemporary Art* (Berlin: Sternberg Press, 2020), 207–226.
  - 40 Paul Edwards, *A Vast Machine: Computer Models, Climate Data, and the Politics of Global Warming* (Cambridge, MA: The MIT Press, 2010).
  - 41 Raazmig Keucheyan, *Nature is a Battlefield: Towards a Political Ecology* (John Wiley & Sons, 2017).
  - 42 Benjamin Bratton, *The Revenge of the Real: Politics for a Post-Pandemic World* (London: Verso, 2021).
  - 43 See also Jens Bjerling, Anders Engberg-Pedersen, Solveig Gade, and Christine Strandmose Toft, *War and Aesthetics: Art, Technology, and the Futures of Warfare* (Cambridge, MA: The MIT Press, 2024).