



# THE SENSORIUM OF THE DRONE AND COMMUNITIES

**Kathrin Maurer**

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For Christian



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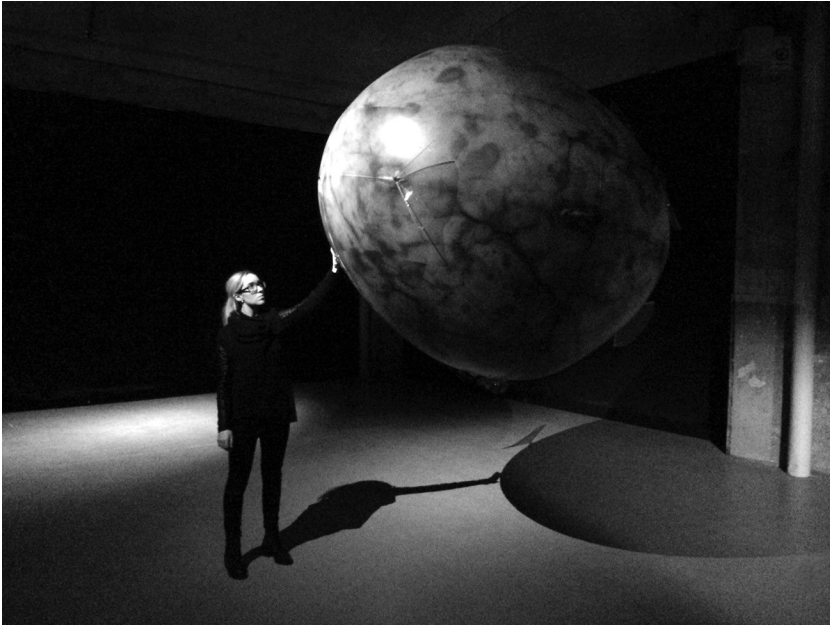
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## Introduction

Drones can be blobs. In Agi Haines's art project *Drones with Desires* (2015), the drone is bubblelike, globular, and slimy looking. A large pink balloon that resembles a human organ, with dark red and bluish blotches, hovers in the gallery.<sup>1</sup> The artwork does not portray the cold, smooth drone one would associate with precision remote-targeting technology. Instead, this drone is amorphous, fleshy, and alive. To create this drone-blob, Haines scanned her own brain and translated its visual anatomy into artificial neural networks that control the drone's motions through sensory inputs. We might understand Haines's drone-blob as referring to the diffuse, dehumanizing, and monstrous violence of military drones. However, I do not read this blob as epitomizing the "techno-bestiary" of the drone.<sup>2</sup> For me, its "blobbiness" exemplifies the drone's potential for antiscopic and multisensorial sensing. The blob and its datafied, tactile, and kinetic modes of sensing point to this book's main idea: drones are much more than aerial cyclopes with pointed vertical vision; they embody synesthetic sensoria with a plethora of heterogeneous sensing modes.

Drone technology has garnered critical attention across disciplinary fields, from engineering to the social sciences and humanities. The first wave of drone scholarship was pivotal in initiating the debate on the emergence and routinization of this technology in the military. In doing so, it privileged the idea of the "scopic regime" in its analyses of the connection between vision and power. These early researchers defined the drone's scopic regime as a militarized system of hypervisuality that effected a vertical, hierarchical, and totalized power relation between the drone operator and the surveilled target. But while the scopic regime is certainly a key characteristic of drone vision, this book broadens the drone's spectrum of perception by drawing on the notion of the sensorium. Taking an



**Figure 0.1**

Agi Haines, *Drones with Desires* (2015). © Agi Haines.

aesthetic approach to the analysis of civilian drones, the book understands the sensorium of the drone as a complex, multimedia, synesthetic sensing assemblage, in which the human agent is enmeshed with the technical apparatus.<sup>3</sup> Drone sensoria sense in many more ways than the notion of the scopic regime suggests. Drone sensing can be embodied, datafied, flattened, volumetric, or swarmlike, and these different modes of sensing often connect to other more-than-optical sensual registers, such as sound, touch, smell, temperature, and movement. This sensorium disrupts the idea of the strawlike, surgical visual regime of the drone as an instrument of precision and pointed invasion.<sup>4</sup>

I am specifically interested in how artists experiment with these drone sensoria in their artworks. Many contemporary artists use the civilian drone and its sensorial potentials as an aesthetic and creative medium. There are literary novels that engage with the sensorium of the drone swarm, and there is visual art that operates with forms of embodied drone sensing. But it is important to note that these aesthetic drone sensoria also go beyond the

visceral level of machinic sensing. It is imperative to my book's agenda to understand that these drone sensoria also have a collective dimension: they are about communities.

Drone researchers to date have mainly discussed communities in a military context.<sup>5</sup> As products of the visual politics of the scopical regime, such communities feature the clear oppositions that the regime entails: top/bottom, target/nontarget, observer/nonobserver, visible/invisible, machine/human.<sup>6</sup> Unlike this previous research, however, I argue that the aesthetic sensoria of civilian drones can construct communities on the basis of decentralized, network-like, and fluid sensing processes.<sup>7</sup> In this context, *constructing* means that in aesthetic works the sensorial assemblage of the drone can create imaginaries of communities. This notion of the imaginary connects in some ways with the work of Charles Taylor, who points to the idea that cultural practices shape social imaginaries.<sup>8</sup> However, I use the term *imaginary* slightly differently. Taylor conducts a macroanalysis of how Western cultural forms and moral normative discourses display the social imaginaries of modernity. I am more interested in the fluid, dynamic, and amorphous imaginaries of communities that are generated by the aesthetic sensorium of the drone in a plethora of different artworks. In addition to these aesthetic imaginaries of communities, I also focus on how civilian drone sensoria can generate "real" communities. There are real-world communities where the drone plays a constitutive role, such as hobby drone communities, social movements, and groups of political activists.<sup>9</sup> But these communities too—and here I draw on Benedict Anderson—have an imaginary dimension, as they revolve around ideas and narratives about the drone.<sup>10</sup> As I discuss in chapter 1, which sets out my theoretical framework and develops my understanding of the notion of community, I am especially interested in imaginaries of communities that highlight machine–human assemblages, swarms, multitudes, and data-calculable publics. The drone sensorium can engender visions of communities that suggest new forms of bonding between machinic and human environments. It can create imaginaries of posthuman collectives that are no longer exclusively defined by human subjectivity and identity but rather are manifested in looser constellations between the human and the nonhuman—the zoological, the earth, and the machine.

*The Sensorium of the Drone and Communities* thus explores the sensorium of civilian, commercial, and amateur drones, although I remain highly aware that military and civilian remote sensing technologies are



deeply intertwined. In comparison with military drones, civilian drones are still underresearched, particularly in the fields of humanities, media studies, and aesthetics.<sup>11</sup> Cultural approaches to civilian drones often highlight their close relationship with the military, considering domestic drones in light of a “boomerang effect”<sup>12</sup> from military drone applications. Domestic drones thus supposedly exemplify media theorist Friedrich Kittler’s contention that the entertainment industry’s media products inherently belong to the military-industrial complex.<sup>13</sup> I acknowledge these connections, but I try to work beyond them by looking at the drone not only as harmful but also as playful. Civilian drones are not just about the militarization of the everyday; they have their own creative power. One goal of this book is to (partially) free the drone from its military stigma, and to detect its creative, life-affirming potential without fetishizing it or forgetting its military baggage. Recent scholars have discussed civilian drones beyond the military genealogical fallacy, and this book is greatly inspired by their work.<sup>14</sup> This does not mean that I am dismissive of the military origins of drone technology but rather that I am attempting to interpret drone sensing and its shaping of communities without exclusively highlighting its military side. One can always trace military contexts and practices when one is dealing with drones. For me, it is a matter of observation: this book attempts to highlight the creative, constructive, and affirmative aspects of the drone, although I always keep the drone’s potentially violent practices in mind. The goal is to read drone technology in terms of the creation of a unique sensorium of which the visual is only a part, and to consider drones’ capacity to establish communities that interrupt and contradict the power relations of drone violence.<sup>15</sup>

My book stretches the idea of what a drone is. Technically, a drone is defined as a flying object—an unmanned aerial vehicle that moves by remote control—or alternatively, as an unmanned ground or underwater vehicle, as drones can also crawl, swim, and dive. But for me as a scholar of visual culture, art, and literature, a drone is not just a technical apparatus or instrument, it is about discourse. Drones do not operate somewhere “out there,” independently of us; they are our sensing avatars, deeply enmeshed with cultural and political contexts. As technocultural assemblages, they are attached to our affectivities, to their surrounding materialities, and to their embodiments. Ole Jensen has suggested that drones can act as “epistemological engines” that provide knowledge about our world.<sup>16</sup>

### Aisthêsis, Art as Sensorium, and Aesthetics as Critical Discourse

To understand these worldmaking powers of the civilian drone, this book takes an aesthetic approach to technology, working with two intersecting understandings of aesthetics, namely, aisthêsis and aesthetics as a critical discourse. Following the original meaning of the Greek word, aisthêsis refers to aesthetics as a way of experiencing, as Alexander Gottlieb von Baumgarten proposed in *Aesthetica*.<sup>17</sup> For Baumgarten, the sensuous and aesthetic realm constitutes a form of knowledge that has an epistemological power of its own, one that is based on sensing and experiencing art. Notably, Baumgarten suggests that one can train this form of knowledge via technology.<sup>18</sup> His idea of aesthetic training involves affective experiences with the “weapons of the senses.”<sup>19</sup> These are instruments of visual, thermal, and sonic sensing, such as “magnifying glasses, binoculars, artificial ears, barometer, thermometer.”<sup>20</sup> For Baumgarten, aisthêsis thus entails a form of sensory perception that can be drilled, enhanced, and fostered by technology. This conception of aisthêsis, which grasps the experientiality of technology, is vital for my work because I explore the sensual and affective dimension of the drone and the material–bodily entanglements between the drone and its agent. My focus on aisthêsis implies an unearthing of the ways in which drones sense—for example, what sensory signals, images, and data they produce, and what sensorial affectivities drones can trigger in the human agent. But aisthêsis does not only describe the technosensuality of a technological object. Drone artists also experiment with the aisthêsis of the drone by turning their artworks into sensoria, thereby making drone-aisthêsis a quintessential aspect of their art.

Digital artists have had an interest in the topic of machinic aisthêsis for quite some time. During the 1980s and 1990s, many began to explore the relationship between bodily experiences and electronics,<sup>21</sup> and “new forms of subjectivity were theorized, from cyborgs to digital *flâneurs* to networked hivemind.”<sup>22</sup> Often these artistic sensoria were synesthetic, speaking to visual, auditory, olfactory, embodied, and tactile sensing registers.<sup>23</sup> Today, many artists are engaging with technological sensoria by critically intervening in the “techno sensual comfortzone,”<sup>24</sup> investigating the commoditization of technosensuality as a part of our everyday lives (for example, in the iPhone, biocomputing, and touch screens).<sup>25</sup> Civilian drones do not really form a part of this technological comfort zone: they do not

emit a sense of ease. Indeed, domestic drones often emanate an aura of the uncanny, creepy, or threatening. But this makes drone artists' negotiations with the drone sensorium all the more interesting. Drone artists rarely stop at the affective level when dealing with the drone sensorium; many of them do much more than just present the drone as a medium with "fun" sensorial possibilities. Rather, they engage with the discursivities of sensing. Drone artists often perform negotiations with, observations of, and interventions in this technology, thereby articulating the second dimension of aesthetics that is at stake in this book: aesthetics as a critical discourse.

Aesthetics epitomizes autonomous representation. It does not have to fulfill any sense-making rules. It is precisely this freedom to observe the world beyond instrumental codes that can render aesthetics a powerful discourse of critique. As modern theories of aesthetics often emphasize, art can (but does not have to) be a medium through which to voice critique. From the German Romantics to the Frankfurt School to systems theory, aesthetics offers the conditions in which to observe the world differently, that is, noninstrumentally, affectively, and nondiscursively. This power of aesthetics is crucial for my interpretation of drone art. Aesthetic negotiations can reflect the vulnerability, uncertainty, and fallibility of drone technology and can obfuscate techno-optimistic narratives about the drone's precision.<sup>26</sup> In drone artists' work, drone sensoria can evoke dissensus: they can be negotiated, criticized, ironized, queered, celebrated, and made strange.<sup>27</sup> Of course, we have to be aware that this view of aesthetics—as critical—also undermines (at least momentarily) its autonomy, since it must attain a heterogeneous determination in order to create dissensus.

This book discusses drone artworks in very different aesthetic genres, including literature, film, photography, and visual art installations and performances. In science fiction novels, literary diaries, dramas, and contemporary prose, for example, drones can occur as protagonists, violent machines, or technical gadgets. Often these literary works highlight drones' military connections. Atef Abu Saif's *The Drone Eats with Me: Diaries from a City under Fire* (2015) narrates the experience of the everyday threat of drone bombardment; the one-woman drama *Grounded* (2013), by the British playwright George Brant, consists of a monologue by a former F-16 fighter pilot who became a military drone sensor operator.<sup>28</sup> In popular culture too, the military drone has played starring roles, such as in Gavin Hood's movie *Eye in the Sky* (2015). In the realm of experimental visual art, Omer Fast's

*5000 Feet Is the Best* (2011), which deals with the traumatic experiences of drone pilots, has garnered much attention.

But instead of art about the military drone, I explore art with and about domestic consumer drones. Literary works, visual installations, films, artistic products from the hobby drone scene, and artworks by political activists can all serve as a repository of examples that demonstrate the multisensoriality of the drone and shed light on its community-shaping powers. For example, there have been literary novels about civilian drones, such as Tom Hillenbrand's sci-fi *Drone State* (*Drohnenland*, 2015), in which drones function as telepresence devices and provide embodied forms of communication.<sup>29</sup> There is the drone surveillance installation *Hansel and Gretel* by Jacques Herzog, Pierre de Meuron, and Ai Weiwei, staged at the Armory in New York City in 2017, in which a drone tracked and observed its visitors. There have also been drone ballets, such as *Networks of Tomorrow* (2021), and drone operas, such as Matthew Sleeth's *A Drone Opera* (2019). While I concentrate on contemporary art on and with domestic drones, I also look back into history.<sup>30</sup> An excursion into nineteenth-century hot-air balloons and their scholarly poetic descriptions shows that they can be seen as early drones. A discussion of Ernst Jünger's novel *The Glass Bees* (*Die gläsernen Bienen*, 1957) provides me with another trajectory to historicize drones.<sup>31</sup> This historicization is necessary if we are to rethink and intervene in narratives that celebrate drone technology as a game-changing, state-of-the-art technology.

Although I frequently refer to *drone art* throughout this book, I am hesitant to establish it as an aesthetic genre; I use the expression more as a working term. The artworks and artists that engage with drones in aesthetic contexts constitute a heterogeneous group that includes political activists, established photographers, amateurs, pop-culture artists, literary authors, and avant-garde filmmakers. Even in the context of military drones, which have been researched more systematically,<sup>32</sup> I find it difficult to speak of drone art as a genre, as these artists also come from diverse backgrounds, work with different media, and relate different narratives about the drone.<sup>33</sup> In the field of civilian drones, the art scene is even more dispersed, since these artists are often very close to hobbyist and do-it-yourself drone communities. Indeed, this amateurship is a decisive factor, and I discuss a variety of drone artworks that have emerged from the hobby drone scene (such as dronies and drone films about the pandemic posted on YouTube). The drone as an aesthetic medium is fairly accessible to amateurs—commercial

drones have become affordable and attainable for many people—and drones' usage in film, photography, and journalism can have a “democratizing” effect insofar as aerial shots no longer have to be made with expensive equipment, such as helicopters and airplanes.<sup>34</sup>

This amateurship by no means implies an inferior aesthetic quality compared with “classic” artworks about drones, such as visual works by Trevor Paglen and James Bridle. But the quality of the “poor image,”<sup>35</sup> as Ariella Azoulay has termed it, does allow me to think about the sensorium of the civilian drone outside the military box. Often, the drone imaginaries of amateur artists who engage with civilian drones articulate a critique of the “technological sublime”<sup>36</sup>—for example, the aestheticizing view of technological inventions as grandiose and monumental. In particular, hobby drone artists undermine the ostentation and fetishization of the drone by producing “quirky” aesthetic images.<sup>37</sup> This book opens up—albeit not exclusively—to “B-grade” aesthetics, amateur art, low-budget productions, and mass-culture phenomena. In this regard, my theoretical muse has been Walter Benjamin and his dialectical embrace of mass culture and technology.

### The Dialectics of the Drone Sensorium

For Benjamin, mass media shape new creative processes and alter our ways of perception, reception, and interpretation. Photography, for example, evokes the destruction of the “aura” and demands an aesthetic sensing that is no longer based on contemplation, ritual, or cult. Rather, photographs trigger distraction, thereby undoing the traditional aesthetic categories of contemplation, uniqueness, originality, and myth. Benjamin welcomes these new media technologies and considers their destructive force as the condition of possibility for construction, that is, for a utopian perspective on a different society. Depending on how one interprets Benjamin's philosophemes about media technology, this constructive moment of technology can be incorporated into a Marxist theoretical frame, a messianic theological horizon, or a theory of aesthetic experience (or a combination of all three). For me, it is not so important to determine which type of utopia is at stake in Benjamin's thinking. Rather, what is key is that his philosophy marks the advent of new technologies as a productive and empowering moment, and that art in league with these technologies can construct, shape, and constitute imaginaries of communities.

Drone art can offer new perspectives on communities and human-machine relationships, as it can engender utopian imaginaries of social bonding in human-machine collectives. As the chapters of this book will show, these imaginaries can take the shape of nonessentialist, nonhuman-centered, and nonbinary communities. But it is important to recognize that technology's utopian potential has a flipside. For Benjamin, this utopian moment was always doomed beneath the shadow of fascism, and he noted that during his time, society was not sufficiently mature to deal with technology.<sup>38</sup> Benjamin saw war as the epitome of this condition of human immaturity, since war demonstrates the perversion and destructiveness of technology. As long as society is ruled by fascism and capitalism, it will remain too immature to use technology humanely and organically.

My investigations of various drone artworks in the following chapters engage with the Janus face of drone technology. Drones and their aesthetic sensoria and imaginaries are masters of dialectics. Like reversible images that can change from a duck into a rabbit or from an old woman into a young woman, drones can flip between life and death in the twinkling of an eye.<sup>39</sup> In this sense, the military drone and the civilian drone are not understood as strict opposites but rather as two sides of the same coin. For example, as I will show in chapter 5, there are drones that are used for farming and agriculture. Although they have a vital and life-affirming agenda, I discuss how their operations (detecting bad and good crops, exterminating parasites) are informed by military optics. Or take the drones that monitored crowds during the pandemic (chapter 7): their surveillance was for the common good, but it could easily constitute a breach of privacy and was ingrained with "everyday militarism."<sup>40</sup> It is imperative for me not to turn a blind eye to the militarism of the drone and its capacity to construct inhumane imaginaries of communities. Nevertheless, this book aims to highlight the affirmative, utopian, and creative sides of drone technology. As Donna Haraway notes of cyborgs, "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."<sup>41</sup> Haraway's words reflect the spirit of this book. Yes, drones as cyborgs are the products of capitalist technology companies and the military. But they can also be unfaithful to their origins and develop their own contexts, frameworks, and uses that resist those of their creators. Drone sensoria are epistemic prisms

that reveal how drones as machinic–human assemblages construct, have an impact on, and shape the worlds and communities we live in.

### Chapter Outline

In the theoretical and historical chapter 1 in Part I, I expand on key terms, such as *drone sensorium*, *assemblage*, *aesthetics*, and *communities*. All of the subsequent chapters focus on specific sensing modes of the drone sensorium within an aesthetic context. Each chapter traces a mode of nonscopic drone sensing—embodied, facial-datafied, flattened, volumetric, swarmlike, and viral sensing—and their respective imaginaries of communities. These explorations of the various nonscopic modes of drone sensing are organized against three larger discursive frames, namely, the body (Part II), the earth (Part III), and the nonhuman (Part IV). Although these frames, and their respective sensorial registers, certainly overlap, they function here as hermeneutic backdrops to orient us amid the variety of aesthetic drone sensoria and their imaginaries of communities.

Part II investigates the relationships between the drone, the body, and communities. For Michel Foucault, the body is more than a biological-physiological organism: “[The] body is directly involved in a political field; power relations have an immediate hold upon it; they invest it, mark it, train it, torture it, force it to carry out tasks, to perform ceremonies, to emit signs.”<sup>42</sup> The body is always embedded in discourses of power, conforming to them, negotiating with them, and resisting them.<sup>43</sup> This is also true for my analysis of drone-body sensoria, and I show that these technobodies must be seen as expressions of political and cultural discourses.

Chapter 2 takes the drone’s embodied sensing as a key sensory concept. In contrast to drones’ frequent association with distance, remoteness, and disembodiment, I argue that sensing with amateur drones can be close, intimate, and immersed. By discussing dronies, drone races, and drone art installations, I show that drones can perform embodied sensing beyond the scopic regime of vision. Embodied sensing cannot be reduced to one sense only: it affects the whole body in a synesthetic experience involving vision, touch, sound, and kinetic sensing.

Chapter 3 expands this discussion of the role of the body within the drone sensorium, shifting attention to the field of facial recognition. How do civilian drones with facial recognition software sense, read, and recognize faces?

How do artists react to these technological developments? The drone sensorium with facial recognition can no longer be grasped as a vertical mode of scopopic perception. Rather, fictive imaginaries suggest that the drone and its facial sensing are networked, datafied, and multidirectional. Here I discuss artworks that portray the drone's capacity to see faces as a special form of social bonding, in which the drone and the human forge an affective alliance. Other artists—by far the majority—warn us about drones with facial recognition, dismantling their failures, biases, and violence.

Part III focuses on drone sensoria that sense the earth—what lies on, underneath, and above its surface. The drone as a remote sensing technology can provide data about climate change, geology, soil quality, and atmospheric conditions. These earth drones are used by scientists, farmers, zoologists, and environmentalists. But artists also engage with earth drones, working with the drone as an eco-medium that generates knowledge about the condition of the earth and enmeshes us with the planet. For example, in Kim Stanley Robinson's cli-fi novel *The Ministry for the Future* (2020), drones are a medium of ecoterrorism to protect the earth from climate collapse.<sup>44</sup> In addition, there are many experimental visual artists that explore drones as tools to sense, monitor, and observe the earth. In these works, the earth is not a distant place external to us. Rather, it represents what Yuk Hui calls a "milieu"<sup>45</sup> closely interconnected with technology. Hui's critique of the dualism between ecology (nature, the organic) and machines (the mechanistic) is guiding here, as his philosophy promotes an understanding of these as interconnected milieus, spheres, and environments.<sup>46</sup> The chapters in this section show that the drone brings us closer to the earth and makes us reflect critically on human-centered views of the planet.

Chapter 4 provides a new take on the flattening drone view of the earth. Traditionally, the drone's flattened view (and aerial perspectives in general) has been connected to a violent gaze based on abstraction, gridlike cartography, and dehumanization. However, this chapter connects the drone to the romantic history of early hot-air and gas ballooning, and it shows that in contemporary visual artworks the drone's flattened sensing can envision planetary communities. In these imaginaries of communities, humans appropriate the earth not as a specific territory that belongs only to some, but as a common planetary space that needs to be protected.

Chapter 5 traces the earth drone by highlighting another sensorial register: the volumetric, three-dimensional, and atmospheric. These earth



drones are interfaces and data processors that can look up from the ground to the sky, monitor the earthy surface (soil) and its in-between spaces, and sense beneath its surface and into the ground. Accordingly, drones can generate sensoria that suggest the three-dimensionality of space, moving away from the scopic (vertical) and flattening cartographic paradigm.<sup>47</sup> Analyzing works of drone art, I show that this form of sensing enables imaginaries of communities that renegotiate our anthropocentric relationship with the earth.

Part IV approaches the drone sensorium from the perspective of nonhuman and zoological modes of sensing and shaping communities. The military and its engineers have a knack for naming drones after swarm animals (for example, Gnat, Killer-bee, or Airspeed Queen Wasp).<sup>48</sup> In fact, the relation between animals and warfare is an interesting one. Often, the animal world serves as a trope to describe the cruelty of war and dehumanize the enemy.<sup>49</sup> But drones have been linked to swarms in the domestic sphere too, and artists have worked with domestic drones, insects, and swarm motifs. Consider, for example, Björn Schülke's *Spider Drone* (2011), a moving, spiderlike, remote-controlled surveillance sculpture, or Roman Signer's analogue experiments with a swarm of small, battery-powered helicopters in *56 Small Helicopters* (*56 Kleine Helikopter*, 2011).

Chapter 6 investigates civilian drones' swarm sensing in popular film, German modernist prose, and protest movements. The drone swarm in "Hated in the Nation," a 2016 episode of the Netflix series *Black Mirror*, stages the swarm as the horrible and bestial "other." In contrast, the 1957 novel *The Glass Bees* by the German literary author Ernst Jünger demonstrates a surprisingly posthuman take on the swarm as a technological community of the multitude, which is imagined beyond gender binaries and sociocentricity. In addition, my discussion of drone swarms in social movements sheds light on the swarm beyond its military connotations.

I further explore the nonhuman and zoological dimension by analyzing the use of drones for virus tracking during the COVID-19 pandemic. Chapter 7 shows how drones served as media to surveil lockdowns, enforce social distancing rules, monitor crowds, and even spray disinfectants. Artists have engaged with the pandemic drone, and I focus on artworks that represent it beyond the aspects of policing and militarization: an independent movie—made in 2016!—that portrays drones as saviors in the midst

of a global pandemic; a YouTube movie about a city in lockdown and the “empathic” gaze of a drone; and the phenomenon of COVID drone shows as mass ornaments in the sky.

Let me conclude my introduction with a few words about my methods and the general structure of the book. As should have become clear from the chapter outline, each individual chapter focuses on a different register of drone sensing. Thus each chapter helps to reveal the richness, multisensoriality, and heterogeneity of the nonscopic drone sensorium. For this reason, the book does not follow a linear structure whereby each chapter would serve as an argumentative stepping-stone for the next. Rather, the chapters constitute exemplary case studies of specific drone sensing modes. Each chapter is intended to demonstrate the multimodality of the drone sensorium and shed light on its different imaginaries of communities. Occasional historical excursions provide a trajectory and an intervention to rethink the spectacularizing “drone-o-rama”<sup>50</sup> narratives that one-sidedly celebrate drone technology.

The artworks I discuss throughout this book demonstrate that the drone is a multisensorial device, and they reveal its community-shaping power. In my eagerness to prove this idea, my discussion of these specially selected artworks perhaps risks harming their uniqueness, complexity, and singularity. I am aware of this. But this book is not intended as a hermeneutic or philological study of aesthetic works. Rather, my goal is to argue that drones are multisensorial assemblages that in turn make us rethink narratives and visions of communities and technology. At times the artworks may be forced to pay a price for this conceptual framing of my book. To analyze artworks is a scholarly method for me: through art analysis I gain new insights into the epistemological power of technology. In my defense, any aesthetic analysis involves a minimization of aesthetic uniqueness, since taking up a particular interpretative stance is inevitably also a decision to leave something unobserved. My readings of the artworks nevertheless strive to make the reader aware of this dilemma, and I make an effort to highlight the multitude and complexity of the drone artworks’ interpretative layers.

The artworks discussed in *The Sensorium of the Drone and Communities* create a critical awareness regarding what we can learn from drones in respect to community models. Thus I do not seek to answer the question of whether drones are good or bad. Instead, I treat drone art and aesthetic drone sensoria

as prisms through which we can observe our communities with remote sensing technology. This is an important—but unprecedented—undertaking in drone research, since drone technology and its field of vision are often conflated with a Western martial gaze. While this conflation is often accurate—this book does not aim to construct a techno-optimistic narrative of the “good” drone—it is nevertheless crucial to recognize the plenitude of the drone’s different aesthetic sensoria and community visions.

## Bibliography

Ackerman, Ada. "Covid-Dronism: Pandemic Visions from Above." In *Pandemic Media: Preliminary Notes toward an Inventory*, edited by Philipp Dominik Keidl, Laliv Melamed, Vinzenz Hediger, and Antonio Somaini, 167–172. Lüneburg: Meson Press, 2020.

Acosta, Ignacio. *Copper Geographies*. Barcelona: Editorial RM, 2018.

Adey, Peter. "Making the Drone Strange: The Politics, Aesthetics and Surrealism of Levitation." *Geographica Helvetica* 71, no. 4 (2016): 319–329.

Adey, Peter, Mark Whitehead, and Alison J. Williams. "Introduction: Air-Target Distance, Reach and the Politics of Verticality." *Theory, Culture & Society* 27, no. 6 (2012): 173–187.

Agostinho, Daniela, Kathrin Maurer, and Kristin Veel, eds. "The Sensorial Experience of the Drone." Themed issue, *The Senses and Society* 15, no. 3 (2020).

Alkouz, Balsam, Athman Bouguettaya, and Sajib Mistry. "Swarm-Based Drone-as-a-Service (SDAAS) for Delivery." In *2020 IEEE International Conference on Web Services Proceedings*, edited by Lisa O'Connor, 441–448. Los Alamitos: Institute of Electrical and Electronic Engineers, 2020.

Alpers, Svetlana. *The Art of Describing: Dutch Art in the Seventeenth Century*. Chicago: University of Chicago Press, 1984.

Alvarez-Taboada, Flor, Claudio Paredes, and Julia Julián-Pelaz. "Mapping of the Invasive Species *Hakea sericea* Using Unmanned Aerial Vehicle (UAV) and WorldView-2 Imagery and an Object-Oriented Approach." *Remote Sensing* 9, no. 9 (2017): 1–17.

Amelang, Katrin. "Zur Sinnlichkeit von Algorithmen und ihrer Erforschbarkeit." In *Kulturen der Sinne: Zugänge zur Sensualität der sozialen Welt*, edited by Karl Braun, Claus-Marco Dieterich, Thomas Hengartner, and Bernhard Tschofen, 358–367. Würzburg: Königshausen Neumann, 2017.

Amoore, Louise. "Algorithmic War: Everyday Geographies of the War on Terror." *Antipode* 41, no. 1 (2009): 49–69.

Amoroso, Nadia. *The Exposed City: Mapping the Urban Invisibles*. New York: Routledge, 2010.

Anand, Abhishek, Peng Wei, Nirmal Kumar Gali, Li Sun, Fenhuan Yang, Dane Westerdahl, Qing Zhang. "Protocol Development for Real-Time Ship Fuel Sulfur Content Determination Using Drone-Based Plume Sniffing Microsensor System." *Science of the Total Environment* 744 (2020): 140885.

Anderson, Benedict. *Imagined Communities: Reflections on the Origin and Spread of Nationalism*. London: Verso, 2006.

Andreas, Michael. "Flächen/Rastern: Zur Bildlichkeit der Drohne." *Behemoth: A Journal on Civilisation* 8, no. 2 (2015): 108–127.

Andrejevic, Mark. "Theorizing Drones and Droning Theory." In *Drones and Unmanned Aerial Systems: Legal and Social Implications for Security and Surveillance*, edited by Aleš Završnik, 21–43. Cham: Springer, 2016.

Anker, Peder. *Imperial Ecology: Environmental Order in the British Empire, 1895–1945*. Cambridge, MA: Harvard University Press, 2001.

Armstrong, Keith. "Embodying a Future for the Future: Creative Robotics and Ecosophical Praxis." *Fibreculture Journal* 28 (2016): 1–20.

Armstrong, Keith. *Future-Future?* Mount Gambier: Riddoch Art Gallery, 2017. <https://www.vrystaatkunstefees.co.za/wp-content/uploads/2020/05/Future-Future-2017.pdf>.

Armstrong, Keith, and Tania Leimbach. "Art-Eco-Science: Field Collaborations." *Antennae: The Journal of Nature in Visual Culture* 48 (2019): 108–127.

Arquilla, John, and David Ronfeldt. *Swarming and the Future of Conflict*. Santa Monica: Rand, 2000.

Asaro, Peter. "The Labor of Surveillance and Bureaucratized Killing: New Subjectivities of Military Drone Operators." *Social Semiotics* 23, no. 2 (2013): 1–29.

Ascott, Roy. "Telenoia." In *Telematic Embrace: Visionary Theories of Art, Technology, and Consciousness*, edited by Edward A. Shanken, 257–275. Berkeley: University of California Press, 2003.

Asendorf, Christoph. "Bewegliche Fluchpunkte: Der Blick von oben und die moderne Raumschauung." In *Iconic Worlds: Neue Bilderwelten und Wissensräume*, edited by Christa Maar and Hubert Burda, 11–16. Cologne: DuMont, 2006.

Augustine. *The Confessions of St. Augustine*. Translated by Rex Warner. New York: Penguin Putnam, 2001.

Azoulay, Ariella. *Civil Imagination: A Political Ontology of Photography*. London: Verso, 2012.

Babb, Carla, and Hong Xie. "US Military Still Buying Chinese-Made Drones Despite Spying Concerns." *Voa News*, September 17, 2019. <https://www.voanews.com/usa/us-military-still-buying-chinese-made-drones-despite-spying-concerns>.

Bailly, Christian. *Automata: The Golden Age, 1848–1914*. London: Robert Hale, 2003.

Baldwin, Thomas. *Airopaidia*. London: J. Fletcher, 1786.

Banse, Gerhard, and Armin Grunwald. *Technik und Kultur: Bedingungs- und Beeinflussungsverhältnisse*. Karlsruhe: KIT Scientific, 2010.

Basso, Bruno, James Dobrowski, and Channing McKay. "From the Dust Bowl to Drones to Big Data: The Next Revolution in Agriculture." *Georgetown Journal of International Affairs* 18, no. 3 (2017): 158–165.

Bauman, Zygmunt, and David Lyon. *Liquid Surveillance: A Conversation*. Hoboken: John Wiley & Sons, 2013.

Baumgarten, Alexander Gottlieb von. *Ästhetik*, edited by Dagmar Mirbach. Hamburg: Felix Meiner, 2007. First published 1750.

Baumgarten, Alexander Gottlieb von. *Philosophische Briefe des Aletheophilus*. Frankfurt/Leipzig, 1741.

Beesley, David. "Drone Panic! On Representations of the Personal Drone by Australian Mainstream Media." *Screen Thought* 1, no. 1 (2018): 1–18.

Begely, Adam. *The Great Nadar: The Man behind the Camera*. New York: Penguin Random House, 2017.

Beidel, Deborah C., Christopher Frueh, Sandra M. Neer, Clint A. Bowers, Benjamin Trachik, Thomas W. Uhde, and Anouk Grubaugh. "Trauma Management Therapy with Virtual-Reality Augmented Exposure Therapy for Combat-Related PTSD: A Randomized Controlled Trial." *Journal of Anxiety Disorders* 61 (2019): 64–74.

Belhumeur, Peter N., Joao P. Hespanha, and David J. Kriegman. "Eigenfaces vs. Fisherfaces: Recognition Using Class Specific Linear Projection." *IEEE Transactions on Pattern Analysis and Machine Intelligence* 19, no. 7 (1997): 711–720.

Benjamin, Walter. *Berlin Childhood around 1900*. Translated by Howard Eiland. Cambridge, MA: The Belknap Press of Harvard University Press, 2006.

Benjamin, Walter. *Illuminations: Essays and Reflections*. Edited by Hannah Arendt. Translated by Harry Zohn. New York: Schocken, 1968.

Benjamin, Walter. "On Some Motifs in Baudelaire." In *Illuminations: Essays and Reflections*, edited by Hannah Arendt, translated by Harry Zohn, 155–200. New York: Schocken, 1968.

Benjamin, Walter. "Theses on the Philosophy of History." In *Illuminations: Essays and Reflections*, edited by Hannah Arendt, translated by Harry Zohn, 253–264. New York: Schocken, 1968.

Benjamin, Walter. "The Work of Art in the Age of Mechanical Reproduction." In *Illuminations: Essays and Reflections*, edited by Hannah Arendt, translated by Harry Zohn, 217–251. New York: Schocken, 1968.

Benjamin, Walter. *The Work of Art in the Age of Its Technological Reproducibility, and Other Writings on Media*. Edited by Michael W. Jennings, Brigid Doherty, and Thomas Y. Levin. Translated by Edmund Jephcott, Rodney Livingstone, and Howard Eiland. Cambridge, MA: The Belknap Press of Harvard University Press, 2008.

Benne, Christian. "Acid Jünger: Tilnærmelser." Translated by Adam Paulsen. In *Soldat, Arbejder, Anark: Ernst Jüngers Forfatterskab*, edited by Adam Paulsen, 359–377. Copenhagen: Museum Tusulanum, 2017.

Berkowitz, Roger. "Drones and the Question of the Human." *Ethics & International Affairs* 28, no. 2 (2014): 159–169.

Berlant, Lauren. "The Commons: Infrastructures for Troubling Times." *Environment and Planning: Society and Space* 34, no. 3 (2016): 393–419.

Bettridge, Thom. "The Fabric of Existence: A Studio Visit with Denim Painter Korakrit Arunanondchai in New York." Ssense.com, accessed October 2, 2021. <https://www.ssense.com/en-us/editorial/fashion/the-fabric-of-existence>.

Blum, Hester. "Terraqueous Planet: The Case for Oceanic Studies." In *The Planetary Turn: Relationality and Geoaesthetics in the Twenty-First Century*, edited by Amy J. Elias and Christian Moraru, 25–36. Evanston: Northwestern University Press, 2015.

Blumenberg, Hans. *Der Mann vom Mond: Über Ernst Jünger*. Frankfurt: Suhrkamp, 2007.

Boehm, Gottfried. "Zwischen Auge und Hand: Bilder als Instrumente der Erkenntnis." In *Mit dem Auge Denken: Strategien der Sichtbarmachung in wissenschaftlichen und virtuellen Welten*, edited by Bettina Heintz and Jorg Huber, 43–54. Vienna: Springer, 2001.

Böhme, Gernot. *Invasive Technification: Critical Essays in the Philosophy of Technology*. London: Bloomsbury, 2012.

Bollmer, Grant. "Empathy Machines." *Media International Australia* 165, no. 1 (2017): 63–76.

Bollmer, Grant, and Katherine Guinness. "Do You Really Want to Live Forever? Animism, Death, and the Trouble of Digital Images." *Cultural Studies Review* 24, no. 2 (2018): 79–96.

Bolman, Brad. "Provocation: A Prairie Drone Companion." *Culture Machine* 16 (2015): 1–6.

Bolman, Brad. "A Revolution in Agricultural Affairs: Dronoculture, Precision, Capital." In *The Good Drone*, edited by Kristin Bergtora Sandvik and Maria Gabrielsen Jumbert, 139–162. New York: Routledge, 2016.

Bolter, Jay David, and Richard Grusin. *Remediation: Understanding New Media*. Cambridge, MA: MIT Press, 2000.

Bonmatin, Jean-Marc, Mark Brown, Robert Paxton, Michael Kuhlmann, Dave Goulson, Axel Decourtye, and Pat Willmer. "Entomology: The Bee-All and End-All." *Nature* 521 (2015): 57–59.

Bonneuil, Christophe, Jean-Baptiste Fressoz, and David Fernbach, eds. *The Shock of the Anthropocene: The Earth, History and Us*. London: Verso, 2016.

Boudway, Ira. "Medical Drone Startup to Begin Covid Vaccine Delivery in April." *Bloomberg News*, February 4, 2021. <https://www.bloomberg.com/news/articles/2021-02-04/medical-drone-startup-to-begin-covid-vaccine-delivery-in-april>.

Bousquet, Antoine. *The Eye of War: Military Perception from the Telescope to the Drone*. Minneapolis: University of Minnesota Press, 2018.

Bracken-Roche, Ciara. "Domestic Drones: The Politics of Verticality and the Surveillance Industrial Complex." *Geographica Helvetica* 71, no. 3 (2016): 167–172.

Braunert, Svea. "Disappearing, Appearing, and Reappearing: Imaging the Human Body in Drone Warfare." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Graae and Kathrin Maurer, 91–109. Manchester: Manchester University Press, 2021.

Braunert, Svea. "Shifting the Pattern: Lateral Thinking and Machine Vision." *The Senses and Society* 15, no. 3 (2020): 259–271.

Braunert, Svea. "To See without Being Seen: Contemporary Art and Drone Warfare." In *To See without Being Seen: Contemporary Art and Drone Warfare*, edited by Svea Braunert and Meredith Malone, 11–25. Chicago: University of Chicago Press, 2016.

Braunert, Svea, and Meredith Malone, eds. *To See without Being Seen: Contemporary Art and Drone Warfare*. Chicago: University of Chicago Press, 2016.

Braidotti, Rosi. *Metamorphoses: Towards a Materialist Theory of Becoming*. Hoboken: John Wiley & Sons, 2013.

Braidotti, Rosi. *The Posthuman*. Cambridge: Polity, 2013.

Braidotti, Rosi. *Posthuman Knowledge*. Cambridge: Polity, 2019.



- Brant, George. *Grounded*. London: Oberon Books, 2013.
- Bratton, Benjamin. "Further Trace Effects of the Post-Anthropocene." *Architectural Design* 89, no. 1 (2019): 14–21.
- Bredenkamp, Horst. *Theorie des Bildakts*. Frankfurt: Suhrkamp, 2010.
- Browne, Simone. *Dark Matters: On the Surveillance of Blackness*. Durham: Duke University Press, 2015.
- Brunelli, Roberto, and Tomaso Poggio. "Face Recognition: Features versus Templates." *IEEE Transactions on Pattern Analysis and Machine Intelligence* 15, no. 10 (1993): 1042–1052.
- Brunner, Otto, Werner Conze, and Reinhart Koselleck, eds. *Geschichtliche Grundbegriffe: Historisches Lexikon zur politisch-sozialen Sprache in Deutschland*. Vol. 2. Stuttgart: Klett, 1972.
- Buddemeier, Heinz. *Panorama, Diorama, Photographie: Entstehung und Wirkung neuer Medien im 19. Jahrhundert*. Munich: Fink, 1977.
- Bull, Michael, Paul Gilroy, David Howes, and Douglas Kahn. "Introducing Sensory Studies." *The Senses and Society* 1, no. 1 (2006): 5–7.
- Buolamwini, Joy, and Timnit Gebru. "Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification." *Proceedings of Machine Learning Research* 81 (2018): 77–91.
- Burke, Edmund. *Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful*. Oxford: Oxford University Press, 2015. First published 1757.
- Burtynsky, Edward, Jennifer Baichwal, and Nicolas de Pencier. *Anthropocene*. Göttingen: Steidl, 2018.
- Butler, Judith. *Bodies That Matter: On the Discursive Limits of Sex*. London: Routledge, 1993.
- Butler, Judith. *Gender Trouble: Feminism and the Subversion of Identity*. London: Routledge, 1990.
- Calder, Simon. "Extinction Rebellion Postpones Heathrow Flight Disruption Plans for the Summer." *Independent*, June 16, 2019. <https://www.independent.co.uk/travel/news-and-advice/extinction-rebellion-heathrow-drones-protest-environment-terminals-flight-delays-cancelled-a8961026.html>.
- Cascone, Sarah. "This Aerial Photographer Captured Images of the Mass Burials on Hart Island." *Art.net*, April 20, 2020. <https://news.artnet.com/art-world/nypd-confiscates-drone-hart-island-1838187>.
- Castro, Teresa. "Of Drones and the Environmental Crisis in the Year of 2020." In *Pandemic Media: Preliminary Notes Toward an Inventory*, edited by Philipp Dominik Keidl,

Laliv Melamed, Vinzenz Hediger, and Antonio Somaini, 81–90. Lüneburg: Meson Press, 2020.

Chamayou, Grégoire. *Drone Theory*. Translated by Janet Lloyd. London: Penguin, 2015.

Chamayou, Grégoire. *A Theory of the Drone*. New York: New Press, 2015.

Chandler, Katherine. "A Drone Manifesto: Re-forming the Partial Politics of Targeted Killing." *Catalyst: Feminism, Theory, and Technoscience* 2, no. 1 (2016): 1–23.

Chandler, Katherine. *Unmanning: How Humans, Machines and Media Perform Drone Warfare*. New Brunswick: Rutgers University Press, 2020.

Chang, Chein-I. *Hyperspectral Imaging: Techniques for Spectral Detection and Classification*. New York: Kluwer Academic/Plenum, 2003.

Chion, Michel. *Audio-Vision: Sound on Screen*. Translated by Claudia Gorbman. New York: Columbia University Press, 1999.

Choi-Fitzpatrick, Austin. *The Good Drone: How Social Movements Democratize Surveillance*. Cambridge, MA: MIT Press, 2020.

Christiansen, Steen Ledet. "Unruly Vision: Synesthetic Space: Drone Music Videos." *Senses and Society* 15, no. 3 (2020): 286–298.

Christopher, John. *Balloons at War: Gasbags, Flying Bombs, and Cold War Secrets*. Stroud: Tempus, 2004.

Cirque du Soleil. *Sparked: Behind the Technology*. YouTube, 2:39, uploaded September 22, 2014. <https://www.youtube.com/watch?v=7YqUocVcyrE>.

Connolly, William E. *Facing the Planetary: Entangled Humanism and the Politics of Swarming*. Durham, NC: Duke University Press, 2017.

Connor, Steven. "The Menagerie of the Senses." *The Senses and Society* 1, no. 1 (2006): 9–26.

Cosgrove, Denis, and Carmen Cosgrove. *Apollo's Eye: A Cartographic Genealogy of the Earth in the Western Imagination*. Baltimore: Johns Hopkins University Press, 2003.

Cosgrove, Denis, and William L. Fox. *Photography and Flight*. London: Reaktion, 2010.

Coyne, Christopher J., and Yuliya Yatsyshina. "Pandemic Police States." GMU Working Paper in Economics 20–25, May 11, 2020. <https://ssrn.com/abstract=3598643>.

Crabtree, Jason. "Gaza and Nagorno-Karabakh Were Glimpses of the Future of Conflict." *FP*, June 21, 2021. <https://foreignpolicy.com/2021/06/21/gaza-nagorno-karabakh-future-conflict-drones/>.

Crampton, Jeremy. "Assemblage of the Vertical: Commercial Drones and Algorithmic Life." *Geographica Helvetica* 71 (2016): 137–146.

Crandall, Jordan. "Ecologies of a Wayward Drone." In *From Above: War, Violence and Verticality*, edited by Peter Adey, Mark Whitehead, and Alison J. Williams, 263–287. London: Hurst, 2011.

Crary, Jonathan. *Techniques of the Observer: On Vision and Modernity*. Cambridge, MA: MIT Press, 1992.

Cravey, Altha, Joseph Palis, and Gabriela Valdivia. "Imagining the Future from the Margins: Cyborg Labor in Alex Rivera's *Sleep Dealer*." *GeoJournal* 80 (2015): 867–880.

Cubitt, Sean. *EcoMedia*. Amsterdam: Rodopi, 2005.

Cureton, Paul Henry. *Drone Futures: UAS in Landscape and Urban Design*. London: Routledge, 2021.

Daggett, Cara. "Drone Disorientations: How 'Unmanned' Weapons Queer the Experience of Killing in War." *International Feminist Journal of Politics* 17, no. 3 (2015): 361–379.

Danner, Chas. "Watch Drones Scold Civilians for Not Wearing Masks." *Intelligencer*, January 31, 2020. <https://nymag.com/intelligencer/2020/01/coronavirus-watch-drones-scold-maskless-civilians-in-china.html>.

D'Armour, Rachael. "China Deploys Drones to Patrol Its Cities amid Coronavirus Outbreak." *Global News*, February 11, 2020. <https://globalnews.ca/video/6535304/china-deploys-drones-to-patrol-its-cities-amid-coronavirus-outbreak>.

Daston, Lorraine, and Peter Galison. "The Image of Objectivity." *Representations* 40 (1992): 81–128.

Deiss, Amely, Anja Dorn, Elena Filipovic, and Milena Mercer, eds. *Raphaela Vogel*. Cologne: Walther König, 2018.

Deleuze, Gilles. "Postscript on the Societies of Control." *October* 59 (1992): 3–7.

Deleuze, Gilles, and Félix Guattari. *A Thousand Plateaus: Capitalism and Schizophrenia*. Translated by Brian Massumi. Minneapolis: University of Minnesota Press, 1987. First published 1980 in French.

Delmont, Matt. "Drone Encounters: Noor Behram, Omer Fast, and Visual Critiques of Drone Warfare." *American Quarterly* 65, no. 1 (2013): 193–202.

Droid Guy. "7 Best Drones with Facial Recognition." The Droid Guy, May 2022. <https://thedroidguy.com/7-best-drones-with-facial-recognition-1077684>.

Eckert, Alfred. "Zur Geschichte der Ballonfahrt." In *Leichter als Luft: Zur Geschichte der Ballonfahrt*, edited by Bernard Korzus and Gisela Noehles, 13–128. Münster: Westfälisches Landesmuseum für Kunst und Kulturgeschichte, 1978.

Eder, Jens, and Charlotte Klonk, eds. *Image Operations: Visual Media and Political Conflict*. Manchester: Manchester Press, 2016.

- Ehemann, Rose. "Selfies and Dronies: Zu Chancen und Gefährdungen der Dynamisierung des Selbst in virtuellen Welten." *Journal für Psychoanalyse* 59 (2018): 60–73.
- Elden, Stuart. "Secure the Volume: Vertical Geopolitics and the Depth of Power." *Political Geography* 1, no. 34 (2013): 35–51.
- Elias, Amy J., and Christian Moraru, eds. *The Planetary Turn: Relationality and Geo-aesthetics in the Twenty-First Century*. Evanston: Northwestern University Press, 2015.
- Elster, Jon. "Exploring Exploitation." *Journal of Peace Research* 15, no. 1 (1978): 3–17.
- Engberg-Pedersen, Anders. "Technologies of Experience: Harun Farocki's Serious Games and Military Aesthetics." *boundary 2* 44, no. 4 (2017): 155–178.
- Engberg-Pedersen, Anders, and Kathrin Maurer, eds. *Visualizing War: Images, Emotions, Communities*. New York: Routledge, 2018.
- Estes, Nick. *Our History Is the Future: Standing Rock versus the Dakota Access Pipeline, and the Long Tradition of Indigenous Resistance*. London: Verso, 2019.
- Estrada, Marcela Suarez. "Hacking the Drone: Counter-Culture Interventions to Fight Violence in Latin America." In *Game of Drones: Of Unmanned Aerial Vehicles*, edited by Claudia Emmert, Jürgen Bleibler, Ina Neddermeyer, and Dominik Busch, 154–163. Berlin: Neofelis, 2020.
- Farocki, Harun. "Phantom Images." Translated by Brian Poole. *Public* 29 (2004): 12–24.
- Farrier, David. *Anthropocene Poetics: Deep Time, Sacrifice Zones, and Extinction*. Minneapolis: University of Minnesota Press, 2019.
- Fazi, Beatrice M. "Digital Aesthetics: The Discrete and the Continuous." *Theory, Culture & Society* 36, no. 1 (2019): 3–26.
- Faßler, Manfred. "Stile der Anwesenheit: Technologien, Traumgesichter, Medien." In *Wunschmaschine/Welterfindung: Eine Geschichte der Technikvisionen seit dem 18. Jahrhundert*, edited by Brigitte Felderer, 251–271. Vienna: Springer, 1996.
- Feigenbaum, Anna. "From Cyborg Feminism to Drone Feminism: Remembering Women's Anti-Nuclear Activisms." *Feminist Theory* 16, no. 3 (2015): 265–288.
- Feigenbaum, Anna, and Anja Kanngieser. "For a Politics of Atmospheric Governance." *Dialogues in Human Geography* 5, no. 1 (2015): 80–84.
- Fernback, Jan. "Sousveillance: Communities of Resistance to the Surveillance Environment." *Telematics and Informatics* 30, no. 1 (2013): 11–21.
- Fish, Adam. "Drones at the Edge of Naturecultures." *Media Fields* 14 (2019): 1–5.
- Fore, Devin. "The Entomic Age." *Grey Room* (2008): 26–55.
- Foucault, Michel. *Discipline and Punish: The Birth of the Prison*. Translated by Alan Sheridan. New York: Pantheon, 1977.

Franz, Nina, and Moritz Queisner. "Die Akteure verlassen die Kontrollstation: Krisenhafte Kooperationen im bildgeführten Drohnenkrieg." In *Das Mitsein der Medien: Prekäre Koexistenzen von Menschen, Maschinen und Algorithmen*, edited by Johannes Benneke, Johanna Seifert, Martin Siegler, and Christina Terberl, 27–58. Munich: Fink, 2018.

French, Sally. "Meet the World's Top Female Drone Pilot." *The Drone Girl*, April 25, 2016. <http://thedronegirl.com/2016/04/25/meet-zoe-the-worlds-top-female-drone-pilot/>.

Frisk, Adam. "What Is Project Maven? The Pentagon AI Project Google Employees Want Out Of." *Global News*, April 5, 2018. <https://globalnews.ca/news/4125382/google-pentagon-ai-project-maven/>.

Fryer-Biggs, Zachary. "Inside the Pentagon's Plan to Win over Silicon Valley's AI Experts." *Wired*, December 21, 2018. <https://www.wired.com/story/inside-the-pentagons-plan-to-win-over-silicon-valleys-ai-experts/>.

Gabrys, Jennifer. *Digital Rubbish: A Natural History of Electronics*. Ann Arbor: University of Michigan Press, 2011.

Gabrys, Jennifer. *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet*. Minneapolis: University of Minnesota Press, 2016.

Gallagher, Shaun. "Aesthetics and Kinaesthetics." In *Sehen und Handeln*, vol. 1, edited by Horst Bredekamp and John M. Krois, 99–113. Berlin: Akademie, 2012.

Gallagher, Shaun, and Jonathan Cole. "Body Schema and Body Image in a Deaf-ferented Subject." *Journal of Mind and Behavior* 16, no. 4 (1995): 369–390.

Galloway, Alexander R., and Eugene Thacker. *The Exploit: A Theory of Networks*. Minneapolis: University of Minnesota Press, 2013.

Garret, Bradley L., and Anthony McCosker. "Non-human Sensing: New Methodologies for the Drone Assemblage." In *Refiguring Techniques in Digital Visual Research*, edited by Edgar Gómez Cruz, Shanti Sumartojo, and Sarah Pink, 13–23. London: Palgrave Macmillan, 2017.

Gates, Kelly A. *Our Biometric Future: Facial Recognition Technology and the Culture of Surveillance*. New York: NYU Press, 2011.

Gibbs, Samuel. "Google's AI Is Being Used by US Military Drone Programme." *The Guardian*, March 7, 2018. <https://www.theguardian.com/technology/2018/mar/07/google-ai-us-department-of-defense-military-drone-project-maven-tensorflow>.

Giot, Christophe. "Cloudism: Towards a New Culture of Making Landscapes." In *Routledge Research Companion to Landscape Architecture*, edited by Ellen Braae and Henriette Steiner, 113–123. London: Routledge, 2018.

Giot, Christophe, Ilmar Hurkkens, Alexandre Kapellos, James Melsom, and Pascal Werner. "Scales of Topology in Landscape Architecture." *Scales of the Earth* 4 (2011): 156–163.

Girot, Christophe, and James Melsom. "The Return of the Aviators." *Topos* 86 (2014): 102–107.

Gitelman, Lisa, ed. *Raw Data Is an Oxymoron*. Cambridge, MA: MIT Press, 2013.

Global News. "China Deploys Drones to Patrol Its Cities amid Coronavirus Outbreak." *Global News*, February 11, 2020. <https://globalnews.ca/video/6535304/china-deploys-drones-to-patrol-its-cities-amid-coronavirus-outbreak>.

Graae, Andreas Immanuel. "The Cruel Drone: Imagining Drone Warfare in Art, Culture, and Politics." PhD diss., University of Southern Denmark, 2017.

Graae, Andreas. "Swarming Sensations: Robo-bees and the Politics of the Swarm in *Black Mirror*." *The Senses and Society* 15, no. 3 (2020): 329–343.

Graae, Andreas Immanuel. "Swarm of Steel: Insects, Drones and Swarming in Ernst Jünger's *The Glass Bees*." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Graae and Kathrin Maurer, 149–166. Manchester: Manchester University Press, 2021.

Graae, Andreas Immanuel, and Kathrin Maurer. "Introduction." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Graae and Kathrin Maurer, 1–16. Manchester: Manchester University Press, 2021.

Graham, Kennedy, ed. *The Planetary Interest: A New Concept for the Global Age*. New Brunswick: Rutgers University Press, 1999.

Graham, Stephen. "Drone: The Robot Imperium." In *Vertical: The City from Satellites to Bunkers*, 67–94. London: Verso, 2016.

Graham, Stephen. *Vertical: The City from Satellites to Bunkers*. London: Verso, 2016.

Grau, Oliver. *Virtual Art: From Illusion to Immersion*. Cambridge, MA: MIT Press, 2003.

Grayson, Kyle, and Jocelyn Mawdsley. "Scopic Regimes and the Visual Turn in International Relations: Seeing World Politics through the Drone." *European Journal of International Relations* 25, no. 2 (2019): 431–457.

Greene, Daniel. "Drone Vision." *Surveillance & Society* 13, no. 2 (2015): 233–249.

Greenwood, Faine. "Can a Police Drone Recognize Your Face?" *Slate*, July 8, 2020. <https://slate.com/technology/2020/07/police-drone-facial-recognition.html>.

Greenwood, Faine. "The Dawn of the Shout Drone." *Slate*, April 16, 2020. <https://slate.com/technology/2020/04/coronavirus-shout-drone-police-surveillance.html>.

Gregory, Derek. "The Everywhere War." *Geographical Journal* 177, no. 3 (2011): 238–250.

Gregory, Derek. "From a View to a Kill: Drones and Late Modern War." *Theory, Culture & Society* 28, nos. 7–8 (2014): 188–215.

- Gregory, Derek. "Seeing Machines." *Geographical Imaginations: Wars, Spaces and Bodies*, April 15, 2014. <https://geographicalimagination.com/2014/04/15/seeing-machines/>.
- Gregory, Derek. "The War on Ebola." *Geographical Imaginations: Wars, Spaces and Bodies*, October 25, 2014. <http://geographicalimagination.com/2014/10/25/the-war-on-ebola>.
- Grimal, Francis, and Jae Sundaram. "Combat Drones: Hives, Swarms, and Autonomous Action?" *Journal of Conflict and Security Law* 23, no. 1 (2018): 105–135.
- Gusterson, Hugh. *Drone: Remote Control Warfare*. Cambridge, MA: MIT Press, 2015.
- Gynnild, Astrid. "The Robot Eyewitness: Extending Visual Journalism through Drone Surveillance." *Digital Journalism* 2, no. 3 (2014): 334–433.
- Hansen, John Paulin, Alexandre Alapetite, Ian Scott MacKenzie, and Emilie Møhlenbach. "The Use of Gaze to Control Drones." In *Proceedings of the Symposium on Eye Tracking Research and Application*, edited by Pernilla Qvarfordt and Dan Wintzer Hansen, 27–34. New York: The Association of Computing Machinery: 2014.
- Haraway, Donna. *Manifestly Haraway*. Minneapolis: University of Minnesota Press, 2016.
- Haraway, Donna. "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14, no. 3 (1988): 575–599.
- Hardt, Michael, and Antonio Negri. *Multitude: War and Democracy in the Age of Empire*. New York: Penguin, 2005.
- Haus der Kunst. *Künstlergespräch mit Raphaela Vogel und der Philosophin Juliane Rebentisch*. YouTube, 1:14:03, uploaded July 1, 2019. <https://www.youtube.com/watch?v=7bkiHozNxOk>.
- Hawkins, Gay. *The Ethics of Waste: How We Relate to Rubbish*. Lanham: Rowman and Littlefield, 2005.
- Heidegger, Martin. "Die Frage nach der Technik, Vorträge und Aufsätze (1910–1976)." In *Gesamtausgabe*, vol. 7, edited by Friedrich Wilhelm von Herrmann, 5–36. Frankfurt: Vittorio Klostermann, 2000.
- Heidegger, Martin. *The Question Concerning Technology and Other Essays*. Edited and translated by William Lovitt. New York: Garland, 1977.
- Heise, Ursula. *Sense of Place and Sense of Planet: The Environmental Imagination of the Global*. New York: Oxford University Press, 2010.
- Helmholtz, Hermann von. *Die Thatsachen in der Wahrnehmung*. Berlin: August Hirschwald, 1879.

Herrmann, Goetz, and Jutta Weber. "Game of Swarms: Swarm Technologies, Control, and Autonomy in Complex Weapons Systems." In *Game of Drones: Of Unmanned Aerial Vehicles*, edited by Claudia Emmert, Jürgen Bleibler, Ina Neddermeyer, and Dominik Busch, 174–196. Berlin: Neofelis, 2020.

Hillenbrand, Tom. *Drohnenland*. Cologne: Kiepenheuer und Witsch, 2015.

Hoel, Aud Sissel. "Operative Images: Inroads to a New Paradigm of Media Theory." In *Image-Action-Space: Situating the Screen in Visual Practice*, edited by Louisa Feiersinger, Kathrin Friedrich, and Moritz Queisner, 11–28. Berlin: Walter de Gruyter, 2018.

Hoelzl, Ingrid. "Postimage." In *Posthuman Glossary*, edited by Rosi Braidotti and Maria Hlavajova, 360–362. London: Bloomsbury, 2018.

Hoelzl, Ingrid, and Remi Marie. "From Softimage to Postimage." *Leonardo* 50, no. 1 (2017): 72–73.

Holden, Meghan. "Statement Regarding Westport Drone Covid-19 Pilot Program." ACLU, April 22, 2020. <https://www.acluct.org/en/press-releases/statement-regarding-westport-drone-covid-19-pilot-program>.

Holland, Arthur Michel. *Eyes in the Sky: The Secret Rise of Gorgon Stare and How It Will Watch Us All*. Boston, MA: Houghton Mifflin Harcourt, 2019.

Holmqvist, Caroline. "Undoing War: War Ontologies and the Materiality of Drone Warfare." *Millemium* 41, no. 3 (2014): 535–552.

Horn, Eva. "Challenges for an Aesthetics of the Anthropocene." In *The Anthropocenic Turn: The Interplay between Disciplinary and Interdisciplinary Responses to a New Age*, edited by Gabriele Dürbeck and Philip Hüpkes, 97–111. New York: Routledge, 2020.

Horn, Eva, and Lucas Marco Gisi, eds. *Schwärme: Kollektive ohne Zentrum: Eine Wissensgeschichte zwischen Leben und Information*. Bielefeld: Transcript, 2009.

Horn, Eva. "Einleitung." In *Schwärme: Kollektive ohne Zentrum: Eine Wissensgeschichte zwischen Leben und Information*, edited by Eva Horn and Lucas Marco Gisi, 7–16. Bielefeld: Transcript, 2009.

Horton, Jessica L. "Drones and Snakes." *Art in America* 105, no. 9 (2017): 104–109.

Houtryve, Tomas van, and Svea Braeunert. "Empathy and the Image under Surveillance Capitalism: Interview with Photographer Tomas van Houtryve." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Graae and Kathrin Maurer, 74–88. Manchester: Manchester University Press, 2021.

Howes, David, and Constance Classen. *Ways of Sensing: Understanding the Senses in Society*. London: Routledge, 2013.

Hsu, Hwai-Jung, and Kuan-Ta Chen. "Face Recognition on Drones: Issues and Limitations." In *Proceedings of the First Workshop on Micro Aerial Vehicle Networks, Systems,*



and *Applications for Civilian Use*, edited by Kuan-Ta Chen et al., 39–44. New York: Association for Computing Machinery, 2015.

Hubermann, Georges-Didi. *Das Nachleben der Bilder: Kunstgeschichte und Phantomzeit nach Aby Warburg*. Frankfurt: Suhrkamp, 2010.

Hui, Yuk. "Machine and Ecology." *Angelaki* 25, no. 4 (2020): 54–66.

Huysen, Andreas. "Fortifying the Heart—Totally: Ernst Jünger's Armored Texts." *New German Critique* 59, no. 1 (1993): 3–23.

Hyde, Ralph. *Panoromania! The Art and Entertainment of the All-Embracing View*. London: Trefoil, 1988.

Ihde, Don. *Bodies in Technology*. Minneapolis: University of Minnesota Press, 2002.

Jablonowski, Maximilian. "Beyond Drone Vision: The Embodied Telepresence of First-Person-View Drone Flight." *Senses and Society* 15, no. 3 (2020): 344–358.

Jablonowski, Maximilian. "Drone It Yourself! On the Decentering of Drone Stories." *Culture Machine* 16 (2015). <http://culturemachine.net/drone-culture/drone-ityourself/>.

Jablonowski, Maximilian. "Dronie Citizenship?" In *Selfie Citizenship*, edited by Adi Kuntsman, 97–106. London: Palgrave Macmillan, 2017.

Jablonowski, Maximilian. "Ferngesteuertes Feeling: Zur Technogenen Sensualität Unbemannten Fliegens." In *Kulturen der Sinne: Zugänge zur Sensualität der sozialen Welt*, edited by Karl Braun, Claus-Marco Dieterich, Thomas Hengartner, and Bernhard Tschofen, 385–391. Würzburg: Königshausen Neumann, 2017.

Jablonowski, Maximilian. "Der Nomos des Vertikalen: Zur Ortung und Ordnung ziviler Drohnen." In *Ordnungen in Alltag und Gesellschaft: Empirisch-kulturwissenschaftliche Perspektiven*, edited by Stefan Groth and Linda Mülli, 77–92. Würzburg: Königshausen & Neumann, 2019.

Jackman, Anna. "Sensing." *Society for Cultural Anthropology, Theorizing the Contemporary. Fieldsights* (blog), June 27, 2017. <https://culanth.org/fieldsights/sensing>.

Jacobson, Lindsay. "Be One with the Drone: Elite Athletes Compete Head-to-Head in Drone Racing League." *ABC News*, July 27, 2019. <https://abcnews.go.com/Technology/drone-elite-athletes-compete-head-head-drone-racing/story?id=64494623>.

Jay, Martin. "Cultural Relativism and the Visual Turn." *Journal of Visual Culture* 1, no. 3 (2002): 267–278.

Jay, Martin. *Downcast Eyes: The Denigration of Vision in Twentieth-Century French Thought*. Berkeley: University of California Press, 1993.

- Jay, Martin. "The Scopic Regimes of Modernity." In *Vision and Visuality*, edited by Hal Foster, 3–29. Seattle: Bay Press, 1988.
- Jensen, Ole B. "New 'Foucauldian Boomerangs': Drones and Urban Surveillance." *Surveillance & Society* 14, no. 1 (2016): 20–33.
- Jensen, Ole B. "Thinking with the Drone: Visual Lessons in Aerial and Volumetric Thinking." *Visual Studies* 35, no. 5 (2020): 417–428.
- Johnson, James. "Artificial Intelligence, Drone Swarming and Escalation Risks in Future Warfare." *RUSI Journal* 165, no. 2 (2020): 26–36.
- Johnston, John. *The Allure of Machinic Life: Cybernetics, Artificial Life, and the New AI*. Cambridge, MA: MIT Press, 2008.
- Johnston, John. "Machinic Vision." *Critical Inquiry* 26 (1999): 27–48.
- Jones, Caroline A. "Introduction." In *Sensorium: Embodied Experience, Technology, and Contemporary Art*, edited by Caroline A. Jones, 1–4. Cambridge, MA: MIT Press, 2006.
- Jones, Caroline A. "The Mediated Sensorium." In *Sensorium: Embodied Experience, Technology, and Contemporary Art*, edited by Caroline A. Jones, 5–49. Cambridge, MA: MIT Press, 2006.
- Jünger, Ernst. *The Glass Bees*. Translated by Louise Bogan and Elizabeth Meyer. New York: Noonday Press, 1960. First published 1957 in German.
- Kanz, Christine. *Maternale Moderne: Männliche Gebärdphantasien zwischen Kultur und Wissenschaft (1890–1933)*. Munich: Fink, 2009.
- Kanz, Christine. "Max Beckmann's Revenants and Ernst Jünger's Drones: Vision and Coolness in the Interwar Period." In *Visualizing War*, edited by Anders Engberg-Pedersen and Kathrin Maurer, 43–56. New York: Routledge, 2018.
- Kapadia, Ronak K. *Insurgent Aesthetics: Security and the Queer Life of the Forever War*. Durham, NC: Duke University Press, 2019.
- Kaplan, Caren. *Aerial Aftermaths: Wartime from Above*. Durham, NC: Duke University Press, 2017.
- Kaplan, Caren. "Atmospheric Politics: Protest Drones and the Ambiguity of Air-space." *Digital War* 1 (2020): 50–57.
- Kaplan, Caren. "Balloon Geography: The Emotion of Motion in Aerostatic War-time." In *Aerial Aftermaths: Wartime from Above*, 68–103. Durham: Duke University Press, 2017.
- Kaplan, Caren. "The Drone-o-Rama: Troubling the Temporal and Spatial Logics of Distance Warfare." In *Life in the Age of Drone Warfare*, edited by Caren Kaplan and Lisa Parks, 161–177. Durham, NC: Duke University Press, 2017.

Kaplan, Caren. "Eyes in the Skies: *Repellent Fence* and Trans-Indigenous Time-Space at the US-Mexico Border." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Grae and Kathrin Maurer, 203–224. Manchester: Manchester University Press, 2021.

Kaplan, Caren. "Mobility and War: The Cosmic View of US Air Power." *Environment and Planning* 38, no. 2 (2006): 395–407.

Kaplan, Caren, and Andrea Miller. "Drones as Atmospheric Policing: From US Border Enforcement to the LAPD." *Public Culture* 31, no. 3 (2019): 419–445.

Kaplan, Caren, and Patricia A. Zimmermann. "Coronavirus Drone Genres: Spectacles of Distance and Melancholia." *Film Quarterly* (April 30, 2020). <https://filmquarterly.org/2020/04/30/coronavirus-drone-genres-spectacles-of-distance-and-melancholia/>.

Kapp, Ernst. *Elements of a Philosophy of Technology: On the Evolutionary History of Culture*. Minneapolis: University of Minnesota Press, 2018.

Kent, Neil. *The Sami Peoples of the North: A Social and Cultural History*. New York: Hurst & Co., 2018.

Kiesel, Helmuth. *Ernst Jünger: Die Biographie*. Munich: Siedler, 2009.

Kindervater, Katharine Hall. "The Emergence of Lethal Surveillance: Watching and Killing in the History of Drone Technology." *Security Dialogue* 47, no. 3 (2016): 223–238.

Kirkwood, Jeffrey West, and Leif Weatherby. "Operations of Culture: Ernst Kapp's Philosophy of Technology." *Grey Room* (2018): 6–15.

Kirszenbaum, Martha. "Korakrit Arunanondchai by Martha Kirszenbaum." *Bomb* 149 (2019). <https://bombmagazine.org/articles/korakrit-arunanondchai/Kirszenbaum>.

Kitchin, Rob. "Civil Liberties *or* Public Health, or Civil Liberties *and* Public Health? Using Surveillance Technologies to Tackle the Spread of COVID-19." *Space and Polity* 24, no. 3 (2020): 362–381.

Kitchin, Rob. "Using Digital Technologies to Tackle the Spread of the Coronavirus: Panacea or Folly?" Programmable City Working Paper 44, Maynooth University, Maynooth, April 2020. <http://progcity.maynoothuniversity.ie/>.

Kittler, Friedrich. *Gramophone, Film, Typewriter*. Stanford: Stanford University Press, 1999.

Klauser, Francisco. "Looking Upwards: Drones and the Social Appropriation of Air-space." In *Game of Drones: Of Unmanned Aerial Vehicles*, edited by Claudia Emmert, Jürgen Bleibler, Ina Neddermeyer, and Dominik Busch, 164–173. Berlin: Neofelis, 2020.

Klauser, Francisco. "Splintering Spheres of Security: Peter Sloterdijk and the Contemporary Fortress City." *Environment and Planning: Society and Space* 28, no. 2 (2010): 326–340.

Klauser, Francisco. *Surveillance and Space*. London: Sage, 2016.

Klauser, Francisco. "Surveillance Farm: Towards a Research Agenda on Big Data Agriculture." *Surveillance & Society* 16, no. 3 (2018): 370–378.

Kolbert, Elizabeth. "Enter the Anthropocene Age of Man." *National Geographic* 219, no. 3 (2011): 60–85.

"Korakrit Arunanondchai: Painting with History in a Room Filled with People with Funny Names 3 at Palais de Tokyo Paris." *Mousse Magazine*, 2015. <http://moussemagazine.it/korakrit-arunanondchai-palaisdetokyo>.

Koss, Juliet. "On the Limits of Empathy." *Art Bulletin* 88, no. 1 (2006): 139–157.

Kracauer, Siegfried. "The Mass Ornament." In *The Mass Ornament: Weimar Essays*, edited and translated by Thomas Y. Levin, 75–88. Cambridge, MA: Harvard University Press, 1995.

Krämer, Sybille. "Operative Bildlichkeit: Von der Grammatologie zu einer Diagrammatologie? Reflexionen über erkennendes Sehen." In *Logik des Bildlichen: Zur Kritik der ikonischen Vernunft*, edited by Martina Hessler and Dieter Mersch, 94–122. Bielefeld: Transcript, 2009.

Kranzberg, Melvin. "Technology and History: Kranzberg's Laws." *Technology and Culture* 27, no. 3 (1986): 544–560.

Krauss, Rosalind. "Grids." *October* 9 (1979): 51–64.

Kullmann, Karl. "The Drone's Eye: Applications and Implications for Landscape Architecture." *Landscape Research* 43, no. 7 (2018): 906–921.

Kunak, Göksu. "Interview: Hito Steyerl: Zero Probability and the Age of Mass Art Production." *Berlin Art Link*, November 19, 2013. <http://www.berlinartlink.com/2013/11/19/interview-hito-steyerl-zero-probability-and-the-age-of-mass-art-production/>.

Kurgan, Laura. *Close Up at a Distance: Mapping, Technology, and Politics*. New York: Zone, 2013.

Lacan, Jacques. "The Subversion of the Subject and the Dialectic of Desire in the Freudian Unconscious." In *Écrits: A Selection*, 323–360. New York: Routledge, 1977.

Lamsters, Kristaps, Jānis Karušs, Māris Krievāns, and Jurijs Ješkins. "Application of Unmanned Aerial Vehicles for Glacier Research in the Arctic and Antarctic." *Environment, Technologies, Resources: Proceedings of the International Scientific and Practical Conference* 1 (2019): 131–135.

Latour, Bruno. *Facing Gaia: Eight Lectures on the New Climatic Regime*. Cambridge: Polity, 2017.

Latour, Bruno. "Why Gaia Is Not a God of Totality." *Theory, Culture & Society* 34, nos. 2–3 (2017): 61–81.

Lauzon, Claudette. "Stranger Things: A Techno-Bestiary of Drones in Art and War." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Graae and Kathrin Maurer, 180–202. Manchester: Manchester University Press, 2021.

Lechler, Bernd. "Raphaela Vogel, Drohnen: Ungeheuer am Himmel?" Deutschlandfunk, June 6, 2019. [https://www.deutschlandfunk.de/raphaela-vogel-bei-game-of-drones-drohnen-ungeheuer-am.807.de.html?dram:article\\_id=450868](https://www.deutschlandfunk.de/raphaela-vogel-bei-game-of-drones-drohnen-ungeheuer-am.807.de.html?dram:article_id=450868).

Lee-Morrison, Lila. *Portraits of Automated Facial Recognition: On Machinic Ways of Seeing the Face*. Bielefeld: Transcript, 2019.

Lethen, Helmut. *Verhaltenslehren der Kälte: Lebensversuche zwischen den Kriegen*. Frankfurt: Suhrkamp, 1994.

Levin, Michael. *Modernity and the Hegemony of Vision*. Berkeley: University of California Press, 1993.

Levinas, Emanuel. *Ethics and Infinity: Conversations with Philippe Nemo*. Translated by Richard A. Cohen. Pittsburgh: Duquesne University Press, 2011.

Liljefors, Max. "Omnivoyance and Blindness." In *War and Algorithm*, edited by Max Liljefors, Gregor Noll, and Daniel Steuer, 127–164. London: Rowman and Littlefield, 2020.

Liljefors, Max, Gregor Noll, and Daniel Steuer, eds. *War and Algorithm*. London: Rowman and Littlefield, 2020.

Lockwood, Jeffrey. *The Infested Mind: Why Humans Fear, Loathe, and Love Insects*. Oxford: Oxford University Press, 2013.

Luke, Timothy. "On the Politics of the Anthropocene." *Telos* 172 (2015): 139–162.

Luo, Shuangling, Haoxiang Xia, Taketoshi Yoshida, and Zhongtuo Wang. "Toward Collective Intelligence of Online Communities: A Primitive Conceptual Model." *Journal of Systems Science and Systems Engineering* 18, no. 2 (2009): 203–221.

Lyon, David, ed. *Surveillance as Social Sorting: Privacy, Risk, and Digital Discrimination*. New York: Routledge, 2003.

Lyon, David. "Introduction." In *Surveillance as Social Sorting*, edited by David Lyon, 1–9. New York: Routledge, 2003.

Lyon, David. "Surveillance and Social Sorting: Computer Codes and Social Sorting." In *Surveillance as Social Sorting*, edited by David Lyon, 13–20. New York: Routledge, 2003.

Lyotard, Jean-François. *Lessons on the Analytic of the Sublime: Kant's Critique of Judgment*. Translated by Elizabeth Rottenberg. Stanford: Stanford University Press, 1994.

Magnet, Shoshana. *When Biometrics Fail: Gender, Race, and the Technology of Identity*. Durham, NC: Duke University Press, 2011.

Majetschak, Stefan. "Sichtvermerke: Über den Unterschied zwischen Kunst und Gebrauchsbildern." In *Bild-Zeichen: Perspektiven einer Wissenschaft vom Bild*, edited by Stefan Majetschak, 97–121. Munich: Fink, 2005.

Manderson, Desmond. "Chronotopes in the Scopic Regime of Sovereignty." *Visual Studies* 32, no. 2 (2017): 167–177.

Mann, Steve, Jason Nolan, and Barry Wellman. "Sousveillance: Inventing and Using Wearable Computing Devices for Data Collection in Surveillance Environments." *Surveillance & Society* 1, no. 3 (2003): 331–355.

Manning, Erin. *Politics of Touch: Sense, Movement, Sovereignty*. Minneapolis: University of Minnesota Press, 2007.

Manovich, Lev. *The Language of New Media*. Cambridge, MA: MIT Press, 2005.

Massumi, Brian. *Ontopower: War, Powers, and the State of Perception*. Durham, NC: Duke University Press, 2015.

Maurer, Kathrin. "Adalbert Stifter's Poetics of Clouds and Nineteenth-Century Meteorology." *Oxford German Studies* 45, no. 4 (2016): 421–433.

Maurer, Kathrin. "Ballooning as a Technology of Seeing in Jean Paul's *Des Luftschiffers Giannozzo Seebuch* (1801)." In *Before Photography*, edited by Kirsten Belgum, Vance Byrd, and John D. Benjamin, 17–38. Berlin: Walter de Gruyter, 2021.

Maurer, Kathrin. "Det Farlige Øjeblik: Ernst Jüngers Fotobøger og hans Teori om Fotografiet." In *Soldat, Arbejder, Anark: Ernst Jüngers Forfatterskab*, edited by Adam Paulsen, 155–176. Copenhagen: Museum Tusulanum, 2017.

Maurer, Kathrin. "Drones as Big Data Archives: Mimesis and Counter-Archiving in Contemporary Art on Military Drones." In *(W)archives*, edited by Daniela Agostinho, Solveig Gade, Nanna Bonde Thylstrup, and Kristin Veel, 119–141. Berlin: Sternberg Press, 2021.

Maurer, Kathrin. "Flattened Vision: Nineteenth-Century Hot Air Balloons as Early Drones." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Graae and Kathrin Maurer, 19–38. Manchester: Manchester University Press, 2021.

Maurer, Kathrin. "The Paradox of Total Immersion: Watching War in Nineteenth-Century Panoramas." In *Visualizing War: Images, Emotions, Communities*, edited by Anders Engberg-Pedersen and Kathrin Maurer, 78–94. New York: Routledge, 2018.

Maurer, Kathrin. "Translating Catastrophes: Yoko Tawada's Poetic Responses to the 2011 Tōhoku Earthquake, the Tsunami, and Fukushima." *New German Critique* 43, no. 1 (2016): 171–194.

Maurer, Kathrin. "Visual Power: The Scopic Regime of Military Drones." *War, Media, Conflict* 10, no. 2 (2017): 141–151.

Maurer, Kathrin. *Visualizing the Past: The Power of the Image in German Historicism*. Berlin: Walter de Gruyter, 2013.

Maxwell, Richard, and Toby Miller. *Greening the Media*. Oxford: Oxford University Press, 2012.

McCosker, Anthony. "Drone Media: Unruly Systems, Radical Empiricism, and Camera Consciousness." *Culture Machine* 16 (2015). <https://culturemachine.net/drone-culture/drone-media/>.

McFarland, Matt. "Slaughterbots Film Shows Potential Horrors of Killer Drones." *CNNMoney*, November 14, 2017. <https://money.cnn.com/2017/11/14/technology/autonomous-weapons-ban-ai/index.html>.

McLean, Heather. "In Praise of Chaotic Research Pathways: A Feminist Response to Planetary Urbanization." *Environment and Planning: Society and Space* 36, no. 3 (2018): 547–555.

McNeil, Joanne, and Ingrid Burrington. "Dronism." *Dissent* 61, no. 2 (2014): 57–60.

Meschiari, Matteo. "Roots of the Savage Mind: Apophenia and Imagination as Cognitive Process." *Quaderni di Semantica* 2, no. 1 (2009): 1–39.

Metz, Christian. *Film Language: A Semiotics of the Cinema*. Translated by Michael Taylor. Chicago: University of Chicago Press, 1991. First published 1971 in French.

Mieszkowski, Jan. "The Drone of Data." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Graae and Kathrin Maurer, 55–73. Manchester: Manchester University Press, 2021.

Millar, Heather. "Racing Drones." *Air & Space Magazine*, November 2016. <https://www.airspacemag.com/flight-today/racing-drones-180960969/>.

Milligan, Brett. "Making Terrains: Surveying, Drones and Media Ecology." *Journal of Landscape Architecture* 14, no. 2 (2019): 20–35.

Minsky, Marvin. "Telepresence." *Omni Magazine*, June 1980. <https://web.media.mit.edu/~minsky/papers/Telepresence.html>.

Mirzoeff, Nicholas. "The Right to Look." *Critical Inquiry* 37, no. 3 (2011): 473–496.

Mirzoeff, Nicholas. "Visualizing the Anthropocene." *Public Culture* 26, no. 2 (2014): 213–232.

Misawa, Kana, and Jun Rekimoto. "ChameleonMask: Embodied Physical and Social Telepresence Using Human Surrogates." In *Proceedings of the 33rd Annual ACM Conference: Extended Abstracts on Human Factors in Computing Systems*, edited by Bo Begole and Jinwoo Kim, 401–411. New York: Association for Computing Machinery, 2015.

Mishara, Aaron L. "Klaus Conrad (1905–1961): Delusional Mood, Psychosis, and Beginning Schizophrenia." *Schizophrenia Bulletin* 36, no. 1 (2010): 9–13.

Mitchell, W. J. T. *What Do Pictures Want? The Lives and Loves of Images*. Chicago: University of Chicago Press, 2005.

Miyoshi, Masao. "Turn to the Planet: Literature, Diversity, and Totality." *Comparative Literature* 53, no. 4 (2001): 283–297.

Moore, Tina, and Dean Balsamini. "NYPD Seizes Drone Documenting Mass Hart Island Burials amid Coronavirus." *New York Post*, April 18, 2020. <https://nypost.com/2020/04/18/nypd-seizes-drone-documenting-mass-hart-island-burials-amid-coronavirus>.

Moraru, Christian. *Reading for the Planet: Toward a Geomethodology*. Ann Arbor: University of Michigan Press, 2015.

Morris, Kate. *Shifting Grounds: Landscape in Contemporary Native American Art*. Seattle: Washington University Press, 2019.

Morton, Timothy. *The Ecological Thought*. Boston, MA: Harvard University Press, 2010.

Morton, Timothy. *Ecology without Nature: Rethinking Environmental Aesthetics*. Cambridge, MA: Harvard University Press, 2007.

Morton, Timothy. *Hyperobjects: Philosophy and Ecology after the End of the World*. Minneapolis: University of Minnesota Press, 2013.

Næss, Arne, and Bob Jickling. "Deep Ecology and Education: A Conversation with Arne Næss." *Canadian Journal of Environmental Education* 5, no. 1 (2000): 48–62.

Nancy, Jean-Luc. "The Confronted Community." Translated by Amanda Macdonald. *Postcolonial Studies* 6, no. 1 (2003): 23–36.

Nancy, Jean-Luc. *The Inoperative Community*. Edited by Peter Connor, Lisa Garbus, Michael Holland, and Simona Sawhney. Translated by Peter Connor. Minneapolis: University of Minnesota Press, 1991.

Neaman, Elliot. *A Dubious Past: Ernst Jünger and the Politics of Literature after Nazism*. Berkeley: University of California Press, 1999.

Ngai, Sianne. *Ugly Feelings*. Cambridge, MA: Harvard University Press, 2009.

Nochlin, Linda. *The Politics of Vision: Essays on Nineteenth-Century Art and Society*. Boulder: Westview Press, 1989.

Nora, Pierre, and Lawrence D. Kritzman, eds. *Realms of Memory: Rethinking the French Past*. Vols. 1–3. Translated by Arthur Goldhammer. New York: Columbia University Press, 1996.

Noys, Benjamin. "Drone Metaphysics." *Culture Machine* 16 (2015): 1–22.

Nye, David E. *American Technological Sublime*. Cambridge, MA: MIT Press, 1996.



- Oettermann, Stephan. *The Panorama: History of a Mass Medium*. Translated by Deborah Lucas-Schneider. New York: Zone, 1997.
- Olsen, Hanna Brooks. "Dronie Like a Pro: How to Master the Drone Selfie." *CreativeLive*, July 21, 2014. <https://www.creativelive.com/blog/dronie-tips>.
- Paglen, Trevor. *I Could Tell You But Then You Would Have to Be Destroyed by Me: Emblems from the Pentagon's Dark World*. Brooklyn: Melville House, 2006.
- Paglen, Trevor. "Invisible Images: Your Pictures Are Looking at You." *Architectural Design* 89, no. 1 (2019): 22–27.
- Parikka, Jussi. *A Geology of Media*. Minneapolis: University of Minnesota Press, 2015.
- Parikka, Jussi. *Insect Media: An Archaeology of Animals and Technology*. Minneapolis: University of Minnesota Press, 2010.
- Parikka, Jussi. *Medianatures*. London: Open Humanities Press, 2013.
- Parikka, Jussi. "Politics of Swarms: Translations between Entomology and Biopolitics." *Parallax* 14, no. 3 (2008): 112–124.
- Parks, Lisa. *Cultures in Orbit: Satellites and the Televisual*. Durham: Duke University Press, 2005.
- Parks, Lisa. "Drones, Infrared Imagery, and Body Heat." *International Journal of Communication* 8 (2014): 2518–2521.
- Parks, Lisa. "Drones, Vertical Mediation, and the Targeted Class." *Feminist Studies* 42, no. 1 (2016): 227–235.
- Parks, Lisa. "Vertical Mediation and the U.S. Drone War in the Horn of Africa." In *Life in the Age of Drone Warfare*, edited by Caren Kaplan and Lisa Parks, 134–158. Durham, NC: Duke University Press, 2017.
- Petersen, Rikke Munck. "The Dispatched Drone and Affective Distance in Fieldwork." *The Senses and Society* 15, no. 3 (2020): 311–328.
- Pizer, John. "Planetary Poetics: World Literature, Goethe, Novalis, and Yoko Tawada's Translational Writing." In *The Planetary Turn: Relationality and Geoaesthetics in the Twenty-First Century*, edited by Amy J. Elias and Christian Moraru, 3–24. Evanston: Northwestern University Press, 2015.
- Ploeg, Irma van der. "Biometrics and the Body as Information." In *Surveillance as Social Sorting: Privacy, Risk, and Digital Discrimination*, edited by David Lyon, 57–73. New York: Routledge, 2003.
- Puig de la Bellacasa, Maria. *Matters of Care: Speculative Ethics in More Than Human Worlds*. Minneapolis: Minnesota University Press, 2017.
- Rancière, Jacques. *Dissensus: On Politics and Aesthetics*. Edited and translated by Steven Corcoran. London: Continuum, 2010.

- Rancière, Jacques. *The Politics of Aesthetics*. Translated by Gabriel Rockhill. London: Bloomsbury, 2010.
- Raunig, Gerald. *Dividuum: Machinic Capitalism and Molecular Revolution*. Translated by Aileen Derieg. South Pasadena: Semiotext(e), 2016.
- Rebentisch, Juliane. *Ästhetik der Installation*. Frankfurt: Suhrkamp, 2003.
- Reid, Paul. *Biometrics for Network Security*. Upper Saddle River: Prentice Hall, 2004.
- Rhee, Jennifer. "Adam Harvey's 'Anti-Drone' Wear in Three Sites of Opacity." *Camera Obscura: Feminism, Culture, and Media Studies* 31, no. 2 (2016): 175–185.
- Richardson, Michael. "Drone Cultures: Encounters with Everyday Militarisms." *Continuum* 34, no. 6 (2020): 858–869.
- Richardson, Michael. "Pandemic Drones." *The Conversation*, March 31, 2020. <https://theconversation.com/pandemic-drones-useful-for-enforcing-social-distancing-or-for-creating-a-police-state-134667>.
- Richardson, Niall, and Adam Locks. *Body Studies: The Basics*. New York: Routledge, 2014.
- Ritter, Joachim, Karlfried Gründer, and Gottfried Gabriel, eds. *Historisches Wörterbuch der Philosophie*. Vol. 1. Basel: Schwabe, 2005.
- Robbins, Christopher. "NYPD Seizes Drone of Photojournalist Documenting Mass Burials on Hart Island." *Gothamist*, April 20, 2020. <https://gothamist.com/news/nypd-seizes-drone-photojournalist-documenting-mass-burials-hart-island>.
- Robinson, Kim Stanley. *The Ministry for the Future*. New York: Orbit Books, 2020.
- Roßler, Gustav. "Kleine Galerie neuer Dingbegriffe: Hybriden, Quasi-Objekte, Grenzobjekte, epistemische Dinge." In *Bruno Latours Kollektive: Kontroversen zur Entgrenzung des Sozialen*, edited by Georg Kneer, Markus Schroer, and Erhard Schüttpelz, 76–107. Frankfurt: Suhrkamp, 2008.
- Russell, Stuart, Anthony Aguirre, Ariel Conn, and Max Tegmark. "Why You Should Fear Slaughterbots." *IEEE Spectrum*, January 23, 2018. <https://spectrum.ieee.org/automaton/robotics/artificial-intelligence/why-you-should-fear-slaughterbots-a-response>.
- Saif, Atef Abu. *The Drone Eats with Me: Diaries from a City under Fire*. Manchester: Comma Press, 2015.
- Salter, Michael. "Toys for the Boys? Drones, Pleasure and Popular Culture in the Militarisation of Policing." *Critical Criminology* 22, no. 2 (2014): 163–177.
- Sands, Daniele. "Gaia Politics, Critique, and the Planetary Imaginary." *Substance* 49, no. 3 (2020): 104–121.
- Sandvik, Kristin Bergtora. "African Drone Stories." *Behemoth: A Journal on Civilisation* 8, no. 2 (2015): 73–96.

Sandvik, Kristin Bergtora, and Maria Gabrielsen Jumbert, eds. *The Good Drone*. New York: Routledge, 2016.

Sandvik, Kristin Bergtora, and Maria Gabrielsen Jumbert. "Humanitarian Drones: An Inventory." *Revue Internationale et Stratégique* 98, no. 2 (2015): 139–146.

Sandvik, Kristin Bergtora, Katja Lindskov Jacobsen, and Sean Martin McDonald. "Do No Harm: A Taxonomy of the Challenges of Humanitarian Experimentation." *International Review of the Red Cross* 99, no. 904 (2017): 319–344.

Sarlos, Garbor. "Hated in the Nation: A Phantasma of the Post-Climate World." In *Reading Black Mirror: Insights into Technology and the Post-Media Condition*, edited by German A. Duarte and Justin Micheal Battin, 309–324. Bielefeld: Transcript, 2021.

Schaefer, John D. *Sensus Communis: Vico, Rhetoric, and the Limits of Relativism*. Durham, NC: Duke University Press, 1990.

Scharre, Paul. *Army of None: Autonomous Weapons and the Future of War*. New York: Norton, 2018.

Scharre, Paul. "How Swarming Will Change Warfare." *Bulletin of the Atomic Scientists* 74, no. 6 (2018): 385–389.

Scharre, Paul. "Why You Should Not Fear Slaughterbots." *IEEE Spectrum*, December 22, 2017. <https://spectrum.ieee.org/automaton/robotics/military-robots/why-you-shouldnt-fear-slaughterbots>.

Schinkel, Eckhard. "Der Ballon in der Literatur." In *Leichter als Luft: Zur Geschichte der Ballonfahrt*, edited by Bernard Korzus and Gisela Noehles, 200–236. Münster: Westfälisches Landesmuseum für Kunst und Kulturgeschichte, 1978.

Schiølin, Kasper. "Revolutionary Dreams: Future Essentialism and the Sociotechnical Imaginary of the Fourth Industrial Revolution in Denmark." *Social Studies of Science* 50, no. 4 (2020): 542–566.

Schivelbusch, Wolfgang. *The Railway Journey*. New York: Urizen, 1980.

Schmarsow, August. "The Essence of Architectonic Creation." In *Empathy, Form, and Space*, edited by Harry Francis Mallgrave and Eleftherios Ikonomou, 281–297. Santa Monica: Getty Center for the History of Art and the Humanities, 1994.

Schmidt-Burckhardt, Astrit. "The All-Seer: God's Eye as Proto-Surveillance." In *CRTL [SPACE]: Rhetorics of Surveillance from Bentham to Big Brother*, edited by Thomas Y. Levin, Ursula Frohne, and Peter Weibel, 16–31. Cambridge, MA: MIT Press, 2002.

Schnepf, J. D. "Flood from Above: Disaster Mediation and Drone Humanitarianism." *Media + Environment* 2, no. 1 (2020): 13466.

Schnepf, J. D. "Unsettling Aerial Surveillance: Surveillance Studies after Standing Rock." *Surveillance & Society* 17, no. 5 (2019): 747–751.

Schoofs, Hilde, Stephanie Delalieux, Tom Deckers, and Dany Bylemans. "Fire Blight Monitoring in Pear Orchards by Unmanned Airborne Vehicles (UAV) Systems Carrying Spectral Sensors." *Agronomy* 10, no. 5 (2020): 1–12.

Segal, Howard P. *Technological Utopianism in American Culture*. Syracuse: Syracuse University Press, 2005.

Shackle, Samira. "The Mystery of the Gatwick Drone." *The Guardian*, December 1, 2020. <https://www.theguardian.com/uk-news/2020/dec/01/the-mystery-of-the-gatwick-drone>.

Shane, Scott, and Daisuke Wakabayashi. "The Business of War: Google Employees Protest Work for the Pentagon." *New York Times*, April 4, 2018. <https://www.nytimes.com/2018/04/04/technology/google-letter-ceo-pentagon-project.html>.

Shaw, Ian. *Predator Empire: Drone Warfare and Full Spectrum Dominance*. Minneapolis: University of Minnesota Press, 2016.

Siegert, Bernd. *Cultural Techniques: Grids, Filters, Doors, and Other Articulations of the Real*. Translated by Geoffrey Winthrop-Young. New York: Fordham University Press, 2015.

Siegert, Bernd. "(Not) in Place: The Grid, or, the Cultural Techniques of Ruling Spaces." In *Cultural Techniques: Grids, Filters, Doors, and Other Articulations of the Real*, 97–120. New York: Fordham University Press, 2015.

Simondon, Gilbert. *On the Mode of Existence of Technical Objects*. Translated by Cecile Malaspina and John Rogove. Minneapolis: University of Minnesota Press, 2017.

Simonite, Tom. "Facebook Creates Software That Matches Faces Almost as Well as You Do." *Technology Review*, March 17, 2014. <https://www.technologyreview.com/2014/03/17/13822/facebook-creates-software-that-matches-faces-almost-as-well-as-you-do>.

Sloterdijk, Peter. *Terror from the Air*. Translated by Amy Patton and Steve Corcoran. Los Angeles: Semiotext(e), 2009.

Smith, Terry. "Comparing Contemporary Arts; or, Figuring Planetaryity." In *The Planetary Turn: Relationality and Geoaesthetics in the Twenty-First Century*, edited by Amy J. Elias and Christian Moraru, 175–192. Evanston: Northwestern University Press, 2015.

Somaini, Antonio. "Machine Vision in Pandemic Times." In *Pandemic Media: Preliminary Notes Toward an Inventory*, edited by Philipp Dominik Keidl, Laliv Melamed, Vinzenz Hediger, and Antonio Somaini, 147–156. Lüneburg: Meson Press, 2020.

Somaini, Antonio. "On the Scopic Regime." *Leitmotiv* 5 (2005–2006): 25–38.

Soroye, Peter, Tim Newbold, and Jeremy Kerr. "Climate Change Contributes to Widespread Declines among Bumble Bees across Continents." *Science* 367, no. 6478 (2020): 685–688.

South China Morning Post. *Shanghai's Drone Show Welcoming 2020 Reportedly Never Happened on New Year's Eve*. YouTube, 2:25, uploaded January 30, 2020. [https://www.youtube.com/watch?v=F\\_DkUXiLczE](https://www.youtube.com/watch?v=F_DkUXiLczE).

- Spivak, Gayatri Chakravorty. *Death of a Discipline*. New York: Columbia University Press, 2003.
- Stahl, Roger. "What the Drone Saw: The Cultural Optics of the Unmanned War." *Australian Journal of International Affairs* 67, no. 5 (2013): 659–674.
- Steinmetz, George. "Drones Are Changing How We See the World." *Time*, May 31, 2018. <https://time.com/longform/drones-career>.
- Steinmetz, George, and Andrew Revkin. *The Human Planet: Earth at the Dawn of the Anthropocene*. New York: Abrams, 2020.
- Steyerl, Hito. "In Defense of the Poor Image." *e-flux journal* 11 (2009). <http://www.e-flux.com/journal/view/94>.
- Steyerl, Hito. "In Free Fall: A Thought Experiment on Vertical Perspective." *e-flux journal* 24 (2011): 1–11.
- Steyerl, Hito. "In Free Fall: A Thought Experiment on Vertical Perspective." In *To See without Being Seen: Contemporary Art and Drone Warfare*, edited by Svea Braeunert and Meredith Malone, 71–81. Chicago: University of Chicago Press, 2016.
- Steyerl, Hito. "A Sea of Data: Apophenia and Pattern (Mis-)recognition." *e-flux journal* 72 (2016): 1–14.
- Steyerl, Hito, and Laura Poitras. "Techniques of the Observer: Hito Steyerl and Laura Poitras in Conversation." *Artforum International* 53, no. 9 (2015): 306–317.
- Stiegler, Bernard. *The Neganthropocene*. Edited and translated by Daniel Ross. London: Open Humanities Press, 2018.
- Strawser, Bradley J. "Moral Predators: The Duty to Employ Uninhabited Aerial Vehicles." *Journal of Military Ethics* 9, no. 4 (2015): 342–368.
- Stubblefield, Thomas. *Drone Art: The Everywhere War as Medium*. Oakland: University of California Press, 2020.
- Stubblefield, Thomas. "In Pursuit of Other Networks." In *Life in the Age of Drone Warfare*, edited by Caren Kaplan and Lisa Parks, 195–219. Durham, NC: Duke University Press, 2017.
- Suchman, Lucy. *Human-Machine Reconfigurations: Plans and Situated Actions*. New York: Cambridge University Press, 2007.
- Suchman, Lucy, and Jutta Weber. "Human-Machine Autonomies." In *Autonomous Weapon Systems: Law, Ethics, Policy*, edited by Bhuta Nehal, Susanne Beck, Robin Geiß, 75–102. New York: Cambridge University Press, 2016.
- Tahir, Anam, Jari Böling, Mohammad-Hashem Haghbayan, Hannu T. Toivonen, and Juha Plosila. "Swarms of Unmanned Aerial Vehicles: A Survey." *Journal of Industrial Information Integration* 16 (2019): 100106.

- Taylor, Charles. *Modern Social Imaginaries*. Durham, NC: Duke University Press, 2003.
- Thacker, Eugene. "Networks, Swarms, and Multitudes." *Ctheory.net*, May 18, 2004. <https://journals.uvic.ca/index.php/ctheory/article/view/14541/5388>.
- Tidman, Zoe. "Coronavirus: Italian Mayor Plans on Using Drones to Send People Back Home during Lockdown." *Euronews*, March 26, 2020. <https://www.euronews.com/2020/03/26/watch-italian-mayor-uses-drone-to-scream-at-locals-to-stay-indoors-amid-coronavirus-crisis>.
- Tönnies, Ferdinand. "Gemeinschaft und Gesellschaft (Erstausgabe 1887)." In *Ferdinand Tönnies Gesamtausgabe*, vol. 2, edited by Bettina Clausen and Dieter Haselbach, 3–34. Berlin: Walter de Gruyter, 2019.
- Trecka, Mark. "The Implication of a Fence: Part Three: The Sovereignty of Context." *Beacon Broadside* (blog), July 6, 2016. <https://www.beaconbroadside.com/broadside/2016/07/the-implication-of-a-fence-part-three-the-sovereignty-of-context.html>.
- Tuck, Sarah. "Drone Alliances." In *Fragmentation of the Photographic Image in the Digital Age*, edited by Daniel Rubenstein, 73–80. New York: Routledge, 2020.
- Tuck, Sarah, ed. *Drone Vision: Warfare, Surveillance, Protest*. Gothenburg: Art and Theory Publishing Hasselblad Foundation, 2022.
- Tuck, Sarah. "Drone Vision and Protest." *Photographies* 11, nos. 2–3 (2018): 169–175.
- Valaouris, Michael. *Das Feld hat Augen: Bilder des überwachenden Blicks*. Berlin: Deutscher Kunstverlag Kunstbibliothek Staatliche Museen zu Berlin, 2017.
- Vandinther, Jackie. "Drone Video Shows Inmates Digging Mass Burial Graves on New York's Hart Island." *CTV News*, April 8, 2020. <https://www.ctvnews.ca/world/drone-video-shows-inmates-digging-mass-burial-graves-on-new-york-s-hart-island-1.4888134>.
- Varley-Winter, Olivia. "The Overlooked Governance Issues Raised by Facial Recognition." *Biometric Technology Today* 5 (2020): 5–8.
- Vavarella, Emilio. "Interview with the Drone: Experimenting with Post-Anthropocentric Art Practice." *Digital Creativity* 27, no. 1 (2016): 71–81.
- Veys, Charles, James Hibbert, Phillip Davis, and Bruce Grieve. "An Ultra-Low-Cost Active Multispectral Crop Diagnostics Device." In *2017 IEEE Sensors (Proceedings)*, edited by Krikor Oznyan, 1005–1008. New York: Institute of Electrical and Electronics Engineers, 2017.
- Villazana, Libia. "Transnational Virtual Mobility as a Reification of Deployment of Power: Exploring Transnational Processes in the Film *Sleep Dealer*." *Transnational Cinemas* 4, no. 2 (2013): 217–230.
- Virgillito, Maria Enrica. "Rise of the Robots: Technology and the Threat of a Jobless Future." *Labor History* 58, no. 2 (2017): 240–242.

Virilio, Paul. *War and Cinema: The Logistics of Perception*. Translated by Patrick Camiller. London: Verso, 1989.

Vischer, Robert. "On the Optical Sense of Form: A Contribution to Aesthetics." In *Empathy, Form, and Space: Problems in German Aesthetics, 1973–1893*, edited by Harry Francis Mallgrave and Eleftherios Ikonomou, 89–123. Santa Monica: Getty Center for the History of Art and the Humanities, 1994.

Warburg, Aby. *Der Bilderatlas Mnemosyne*. Berlin: Akademie, 2008.

Wayman, James L. "The Scientific Development of Biometrics over the Last 40 Years." In *The History of Information Security*, edited by Karl De Leeuw and Jan Bergstra, 263–274. Amsterdam: Elsevier Science, 2007.

Weber, Jutta. "Artificial Intelligence and the Socio-Technical Imaginary: On Skynet, Self-Healing Swarms and Slaughterbots." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Graae and Kathrin Maurer, 167–179. Manchester: Manchester University Press, 2021.

Weizman, Eyal. *Forensic Architecture: Violence at the Threshold of Detectability*. New York: Zone, 2019.

Werber, Niels. "Ants and Aliens: An Episode in the History of Entomological and Sociological Construction of Knowledge." *Berichte zur Wissenschaftsgeschichte* 34, no. 3 (2011): 242–262.

Werber, Niels. "Jüngers Bienen." *Zeitschrift für deutsche Philologie* 130 (2011): 245–260.

Westport Police Department. "Westport Police Department Testing New Drone Technology 'Flatten the Curve' Pilot Program." Press Release, April 2020.

Wich, Serge, Lorna Scott, and Lian Pin Koh. "Wings for Wildlife: The Use of Conservation Drones, Challenges and Opportunities." In *The Good Drone*, edited by Kristin Bergtora Sandvik and Maria Gabrielsen Jumbert, 163–177. New York: Routledge, 2016.

Wiener, Norbert. *Cybernetics or Control and Communication in the Animal and the Machine*. Cambridge, MA: MIT Press, 2019. First published 1948.

Wilcox, Lauren. "Drones, Swarms and Becoming-Insect: Feminist Utopias and Post-human Politics." *Feminist Review* 116, no. 1 (2017): 25–45.

Wilcox, Lauren. "The Gender Politics of the Drone." In *Drone Imaginaries: The Remote Power of Vision*, edited by Andreas Immanuel Graae and Kathrin Maurer, 110–129. Manchester: Manchester University Press, 2021.

Williams, Alex. "The Drones Were Ready for This Moment." *New York Times*, May 23, 2020. <https://www.nytimes.com/2020/05/23/style/drones-coronavirus.html>.

Williams, Geoffrey R., and David R. Tarpay, "Colony Collapse Disorder in Context." *Bioessays* 32, no. 10 (2010): 845.

Witte, Karsten, Barbara Correll, and Jack Zipes. "Introduction to Siegfried Kracauer's 'The Mass Ornament.'" *New German Critique* 5, no. 1 (1975): 59–66.

Wittgenstein, Ludwig. *Philosophische Untersuchungen*. Frankfurt: Suhrkamp, 2001.

Wölfflin, Heinrich. "Prolegomena to a Psychology of Architecture." In *Empathy, Form, and Space*, edited by Harry Francis Mallgrave and Eleftherios Ikonomou, 149–187. Santa Monica: Getty Center for the History of Art and the Humanities, 1994.

Young, Liam. *Machine Landscapes: Architectures of the Post Anthropocene*. Hoboken: John Wiley & Sons, 2019.

Zimmermann, Yvonne. "Videoconferencing and the Uncanny Encounter with One-self: Self-Reflexivity as Self-Monitoring 2.0." In *Pandemic Media: Preliminary Notes Toward an Inventory*, edited by Philipp Dominik Keidl, Laliv Melamed, Vinzenz Hediger, and Antonio Somaini, 99–103. Lüneburg: Meson Press, 2020.

Zittel, Claus. *Theatrum Philosophicum: Descartes und die Rolle ästhetischer Formen in der Wissenschaft*. Berlin: Akademie, 2009.

Zuboff, Shosana. *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. London: Profile, 2019.

Zuev, Dennis, and Gary Bratchford. "The Citizen Drone: Protest, Sousveillance and Droneviewing." *Visual Studies* 35, no. 5 (2020): 442–456.

Zylinska, Joanna. *Nonhuman Photography*. Cambridge, MA: MIT Press, 2017.

Zylinska, Joanna. "Photography after Extinction." In *After Extinction*, edited by Richard Grusin, 51–70. Minneapolis: University of Minnesota Press, 2018.



