Jussi Parikka, **Operational Images: From the Visual to the Invisual**, Minneapolis: University of Minnesota Press, 2023, 296 pp., $29.00 (paperback).

Reviewed by
Ziwei Chen
University of California, Berkeley

Jussi Parikka's *Operational Images: From the Visual to the Invisual* spans multiple fields, including critical computing studies, media archaeology, and visual studies. First proposed by Harun Farocki (2001–2003) in his *Eye/Machine* trilogy, the "operational image" emerges in response to military violence during the Gulf War. It marks a shift in the ontology of images from "representational to nonrepresentational, from the primacy of human perception of bodies, movement, and things to measurement, pattern, analysis, navigation, and more" (p. vii). However, Parikka's theorization and historicization of the operational image extend beyond militarism to consider the pervasiveness of operations—machine learning algorithms, autonomous driving, contemporary video practices—in forming an *invisual* culture, in which visual images do not feature "in the optical or experiential sense" (p. 22). While Parikka seemingly moves away from media archaeology, the subject of his earlier inquiries, he reminds us that operational images not just emerge from contemporary large-scale machine learning algorithms, but also have their roots in historical photographic practices and scientific instruments that shape the perception of the world as images. Parikka's *Operational Images* is an exciting contribution to both visual studies and media theory, examining how visual culture is fundamentally transformed into an invisual culture in both historical moments and contemporary video and art installations.
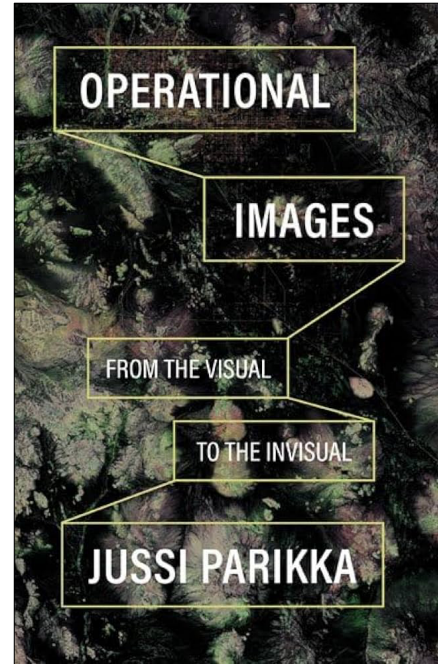
Chapter 1, "Operations of Operations," explores the multilayered meanings of "operation" in operational images. "Operation" has a rich lineage in German media theory, which emerges out of the IKKM (Internationales Kolleg für Kulturtechnikforschung und Medienphilosophie). Parikka identifies Bernhard Siegert (2015)'s theorization of cultural techniques as a starting point to bring the Heideggerian ontic/ontological metaphysics to a material realm. But Parikka argues, by way of Karen Barad (2007), that operation needs to take account of a more productive and material "entanglement" between the human and nonhuman. This reconceptualizes the world as a material process of *operationalization*. Parikka's definition of "operational image" is an onto-epistemological way of knowing, asking "what objects and processes are involved in and produced by those operations of knowing" (p. 39). This onto-epistemological drive informs the ensuing chapters as Parikka discusses a range of operations with an attention to historical genealogies: from machine learning through remote sensing to LIDAR scanning.

Chapter 2, "What Is Not an Image? On AI, Data, and Invisuality," examines machine learning as an operational aesthetics. Relying on existing scholarships on "platform" (Mackenzie & Munster, 2019), Parikka

argues that "platforms both distribute (image-events of observation and capture across various dynamic situations of people and things) and integrate (synchronizing, synthesizing these events into series, into mass-images in datasets)" (p. 70). The transformation of the image from the singular to the plural marks a shift in the nature of the image to operations of data defined by the complex ecology of platforms (p. 68). Moreover, it also articulates a new relationship with the material and the body. Such datasets become a modeling of the world that transforms knowing and seeing into probabilistic predictions. The chapter probes the ontological status of the image when it becomes embedded in machine learning platforms, datasets, and models.

Chapter 3, "The Measurement-Image: From Photogrammetry to Planetary Surface," looks at three critical historical timeframes in the emergence of the image as an instrument of scientific measurement: 1736 with geodesic measurement, 1858 with photogrammetry, and 1989 with the release of Farocki's (1989) film, *Images of the World and the Inscription of War*. Parikka first delves into the German architect and engineer Albrecht Meydenbauer. His photogrammetric measurement of the facade of Wetzlar Cathedral was one of the first practices to turn photography into a scientific instrument that predates digital computation and automation. Operation becomes a type of measurement-image and a "cultural technique of flattening" (p. 103). In this regard, the photographic image has a longer history of scientific measurement, evident in early scientific (and certainly colonial) expeditions of measuring and sensing the earth in the 1700s. But such an objective scientific instrument is ultimately flawed, as Parikka warns us that the practice of hegemonic power must be complemented with the persistence of errors and contingencies.

Chapters 4 and 5 examine contemporary film and video practices. Chapter 4 offers a detailed case study of Geocinema, an artist collective founded by Asia Bazdireva and Solveig Qu Suess, while chapter 5 mostly examines ScanLab, an artist collective based in London. Homing in on remote sensing in chapter 4, Parikka theorizes an "operational aesthetic" that is "a method of training, [. . .] to understand the various scales of the infrastructure of images, their epistemic value, institutional role, and the historical shifts" (p. 144). The Digital Belt and Road Initiative (DBAR) is a science program backed by the United Nations in alignment with sustainable development goals. By collecting a large chunk of environmental data and mobilizing a vast assemblage of satellites and computers, DBAR foregrounds geodata as the new battleground for "soft" geopolitical power. Geocinema's cinematic installation highlights "spaces where spatial data is constructed for use and spaces where infrastructure operations enable circulation of all forms of entities" (p. 151). However, a productive tension also emerges between the invisuality of data and the very process of *visualizing* DBAR in a distinctively cinematic form—an aspect that raises further consideration. How does the cinematic form deal with operative ontologies? And what is the cinematic potentiality of engaging with the seemingly abstract operative ontology?

The final chapter examines the use of LIDAR sensors in various spatial practices—mostly prominently in autonomous vehicles—which transforms spatial capturing from the photographic capture of visible light into LIDAR sensing of invisible light. ScanLab's project, "Post-Lenticular Landscapes," sets up a series of laser scanners in Yosemite National Park to produce a 3D scan of the park. Such a practice, as the collective explains, is an homage to a generation of photographers-cum-explorers such as Eadweard Muybridge and Ansel Adams; in the meantime, it turns lenticular photography into the titular "post-lenticular" scanning and rendering based on the intensity of light. We are confronted with a new

epistemology of seeing: Seeing via the LIDAR scanner, which itself is based on a mathematical operation of the intensity of the light, makes visible a spectrum of light that was previously invisible to the human eye. The collective's other project, *Dream Life of Driverless Car*, "records [light] both as a movement across the city and as a sensitive way of dealing with light that itself is a proxy for the complexity of the multiple surfaces of the city" (p. 197). In other words, the capturing of the city by the laser scan is also the capturing of light as it is recorded on multiple surfaces and levels of the electromagnetic spectra. This is to argue that the photographic discourse is *incomplete* without looking at the city as an exemplary case of an "infrastructural coupling with large-scale systems of sensing and computation" (p. 204).

A recurring point made in Parikka's book is that "we live, work, function, and imagine in the midst of such images that do not primarily represent but operate" (p. 220). The book offers a formidable synthesis of large swaths of scholarships in media theory, visual studies, and critical AI studies. While "operational image" is not a new term, the book is a timely intervention when generative AI, drone warfare, and the increasingly black-boxed nature of algorithmic life demand a new critical vocabulary for the study of images. What is particularly valuable is Parikka's continued efforts in engaging with contemporary artists and artworks in chapters 4 and 5. Parikka often draws from personal connections and conversations with artists, which is more essential at a time when media theory is increasingly divorced from praxis [see, for instance, Parikka and Geocinema (2019)]. The book is ideal for readers with broad interests in media theory, visual studies, and contemporary art, particularly those who would like to see how media theories generate productive tension with close readings of moving image practices.

Parikka's provocative analysis also raises many questions for further research: What are the cultural-political implications of shifting from "lenticular" to "post-lenticular," particularly in the ethical and political context of autonomous driving? Or how do representational images such as moving images reconcile with the operational, invisual nature of images theorized extensively in the book? Given ongoing military violence in Ukraine and Gaza, readers are left wondering if proposing "a shift from military operations to the other, closely aligned use of force that defines the current landscape of operations" (p. 15) perhaps loses the political valences inherent in the "operational image." While some of the questions raised are certainly beyond the scope of the book, these are questions that future scholars can take on to further examine the global theoretical and political implications of the "operational image." Leaving room for more systematic theorization and historicization, Parikka's formidable attempt certainly will spark new voices and scholarships to come.

References

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