# Introduction

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> "The virtual is fully real in so far as it is virtual."
> (Gilles Deleuze, *Difference and Repetition*)

> "Virtualization fluidizes existing distinctions, augments the degrees of freedom involved, and hollows out a compelling vacuum."
> (Pierre Lévy, *Becoming Virtual*)

The term "virtual photography," which gives this book its title, is simultaneously axiomatic and obfuscating as it conveys an idea that is both banal and novel. It refers to a kind of photography that is practiced ubiquitously but is defined only elusively—everybody seems to know about the virtualization of photography, but nobody knows what a virtual photograph actually is. Virtual photography has already found its place in common parlance; however, its conceptual territory is still uncharted for researchers and practitioners of photography. Obviously, as isolated terms, "virtual" and "photography" have their histories, theories, and discourses. Their combination, though, causes indecision that oscillates between immanent orthodoxy and imminent heresy because it stitches a *virtuality-inducing* crux onto the *reality-infusing* medium of photography. In other words, due to the reluctance of photography to be virtualized and the resistance of the virtual to be realized, the term "virtual photography" appears to be oxymoronic. Thus, one might ask: What is virtual photography? And what can be considered a virtual photograph? To answer these questions, we first need to take a brief detour to the early days of the medium, long be-

fore photography was included under its contemporary virtual disguise. Doing so will show that photography has arrived at its present virtual condition after enduring many deaths and rebirths over the past decades.

## The Birth and Death(s) of Photography

Since its conception around two centuries ago,[1] photography has been frequently defined etymologically as "drawing/writing with/in light." This drawing or writing happens when the camera shutter opens and the light rays that have been reflected off the photographed subject penetrate the lens and are inscribed on a photosensitive surface. For the photography enthusiasts of the early nineteenth century, more, it was the transposition of light from the physical world to the photograph that was amusing and amazing, rather than what the first photographs showed. During this period, photography was replete with luminous metaphors, such as reflection, inflection, deflection, and refraction, for without light there could be no photography—their existence was codependent. William Henry Fox Talbot, an early inventor of photographic technology, underscored this aspect in the title of his 1844 book *The Pencil of Nature*.[2] For him, it was as if light could inscribe itself without any technological mediation or human intervention, thereby turning the photograph into its double. What Talbot understood as "nature," which was later to be called the "referent," became the defining agent of photography for several decades to come.

Unlike Talbot, who was fascinated by the mystifying inscription of light, other thinkers declared the camera to be the main operator of photography between the mid- and late-twentieth century. For them, the camera was a

1 Historians have debated the exact year in which photography was invented. In 1814, Joseph Nicephore Niépce, the French inventor of photography, started actively pursuing the process of making a permanent camera image. In 1816, he temporarily fixed a photographic print for the first time. For a detailed discussion of the invention of photography, see Robert Hirsch, *Seizing the Light: A History of Photography* (New York: McGraw-Hill, 2000).

2 William Henry Fox Talbot, *The Pencil of Nature* (London: Longman, Brown, Green, and Longmans, 1977).

"mold machine"[3] that could "mummify"[4] time and "freeze"[5] space into the form of a photograph. During this period, the camera was not simply an omniscient device; it was an omnipotent machine—a prosthetic gateway to the "optical unconscious" where temporality and spatiality were intertwined.[6] However, the shift of perception from the quasi-seamless inscription of light to the semi-mechanical production of the photograph did not last long. In 1980, literary theorist Roland Barthes situated the locus of photography in the photograph itself, calling it "that-has-been"[7]—the indexical and spectral presence of the physical reality (i.e., the referent) entombed in the photograph.[8] Finally, the early twenty-first century has foregrounded the role of yet another operator of photography, the spectator, without whom the photographed event/person/place would vanish in time and space.[9] Consequently, for nearly

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3 Stanley Cavell, *The World Viewed: Reflections on the Ontology of Film* (Cambridge, MA: Harvard University, 1979).

4 André Bazin, "Ontology of the Photographic Image," in *What Is Cinema?*, trans. Hugh Gray (Berkeley/Los Angeles, CA: University of California Press, 1967).

5 Susan Sontag, *On Photography* (London: Penguin Books, 1977).

6 Walter Benjamin, "A Small History of Photography," in *One-Way Street and Other Writings*, trans. E. Jephcott and K. Shorter (London: Lowe and Brydone, 1979), 243.

7 Roland Barthes, *Camera Lucida*, trans. Richard Howard (London: Vintage Books, 2000).

8 In the history of photography, there has been an ongoing debate about whether the photographic image can be deemed a sign of the reality it represents, particularly whether it is an iconic or indexical sign. The indexical sign implies that the photo has a causal relationship to its referent (e.g., smoke is an index of fire), while the iconic sign suggests that the photograph conveys what it represents only by means of imitation and likeness (e.g., a painting of a fire is an icon of a real fire). However, as film theorist Tom Gunning argues, the indexicality and iconicity of photographs have always been intertwined, since our evaluation of a photograph as accurate depends not only on its indexical basis but also "on our recognition of it as looking like its subject." Therefore, Gunning contends that "the photograph exceeds the function of a sign" precisely because its "truth value" always depends on its "visual accuracy" (indexicality) to the same extent that it does on its "recognizability" (iconicity). See Tom Gunning, "What's the Point of an Index? Or, Faking Photographs," *Nordicom Review* 25, no. 1–2 (2004), 41–48. Literary theorist Walter Benn Michaels offers a similar critique of seeing the photograph merely as a sign when he argues that the indexicality of photographs is not a one-to-one relationship with the reality they represent; rather, it is "the bypassing of the artist's intentionality." See Walter Benn Michaels, "Photography and Fossils," in *Photography Theory: The Art Seminar*, ed. James Elkins (New York: Routledge, 2007), 441.

9 For a detailed discussion of the role of the spectator in photography, see Ariella Azoulay, *The Civil Contract of Photography*, trans. Rela Mazeli and Ruvik Daieli (New York: Zone Books, 2008) and Abigail Solomon-Godeau, *Photography at the Dock: Essays on Pho-*

two hundred years, theories of photography have been continually changing the defining agent of photography: from light to camera, from camera to photograph, and from photograph to spectator. However, while historians and theoreticians were debating who the dominant agent of photography was—the agent who could define its medium-specific qualities—photography suddenly lost its agency and was quickly pronounced dead in 1992.[10]

Between 1990 and 1995, the digitization of photographic images and the expansion of the World Wide Web brought photography to its unexpected demise. Temporarily, all discussions concerning its autonomy as a medium were suspended. Due to the digital computation and online transmission of photographic images across the globe, it was now the task of "digital culture" to investigate the dissipating ontology of photography.[11] This period was epitomized by the instantaneous massification and circulation of images on the internet, and it was hailed as the "post-photographic era"—the era when "the computer-processed digital image superseded the image fixed on silver-based photographic emulsions."[12] Suddenly, what we had once known as "the photograph," which allegedly had a causal/indexical relationship with its represented reality, ceased to exist. Having been converted into data, it was no longer the photograph but the screen that was at the center of theoretical debates. This paradigm shift was accelerated after the development of Web 2.0, the rapid growth of social networks, the enormous accumulation of photos in online databases, and the mass availability of a new hybrid communication device—the camera phone. Thanks to the omnipresence of smartphones, it seemed that photography was simultaneously "everywhere" and "nowhere."[13] As a technology, photography was dead, but as a practice, it was fully alive. It was as if photography had become "undead."[14]

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*tographic History, Institutions, and Practices* (Minneapolis, MN: University of Minnesota Press, 1991).

10 William J. Mitchell, *The Reconfigured Eye* (Cambridge, MA: MIT Press, 1992).

11 Martin Lister, *The Photographic Image in Digital Culture*, 1st edition (London: Routledge, 1995).

12 Mitchell, *The Reconfigured Eye*, 120.

13 Martin Lister, *The Photographic Image in Digital Culture*, 2nd edition (London: Routledge, 2013), 5.

14 Nina Lager Vestberg, in *The Photographic Image in Digital Culture*, ed. Martin Lister (London: Routledge, 2013), 113–131.

Over the past two decades, photography has repeatedly and obstinately avoided its hasty demise.[15] By immediately adapting to the technological transformations and innovations of the early twenty-first century, it has proven that it is not dead; rather, it has been resurrected and reincarnated. Seemingly disinterested in prefixes such as "post,"[16] "after,"[17] and "non,"[18] photography has outlived its indexical past and entered the present dematerialized, cybernetic, and algorithmic era. Still, there has been a persistent reluctance to refer to highly technological imagery as "photographs," which is something that *Virtual Photography* intends to break free from.

## Not (Only) the Image, but (Also) the Photograph

In media and image studies, it is common knowledge that the family of images is extensive and expanding, ranging from optical, graphic, perceptual, mental, verbal, and psychological images[19] to industrial, transparent, opaque, spatial, and temporal ones.[20] Clearly, a photograph is an image, one that came into existence during the transition from "traditional images" (e.g., paintings and drawings) to "technological images" (i.e., images made with mechanical and computational devices).[21] However, referring to nascent manifestations of

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15 See Lev Manovich, "The Paradoxes of Digital Photography," in *Photography after Photography: Memory and Representation in the Digital Age*, eds. S. Iglhaut and H. Amelunxen (London: Art Stock, 1997), 57–65; Martha Rosler, "Image Simulations, Computer Manipulations," in *Decoys and Disruptions: Selected Writings* (Cambridge, MA: MIT Press, 2004), 259–317.

16 Geoffrey Batchen, "Post-Photography," in *Each Wild Idea: Writing, Photography, History* (Cambridge, MA: MIT Press, 2000).

17 Fred Ritchin, *After Photography* (New York: W. W. Norton & Company, 2009).

18 François Laruelle, *The Concept of Non-Photography* (Cambridge, MA: MIT Press, 2011).

19 See W. J. T. Mitchell, *Iconology: Image, Text, Ideology* (Chicago/London: The University of Chicago Press, 1986).

20 See John Lechte, *Genealogy and Ontology of the Western Image and its Digital Future* (New York: Routledge, 2012).

21 Vilém Flusser organized different media into three categories—traditional images, texts, and technical images—and he considered photography to be the epitome of the third kind due to its chemical and/or electronic basis (45). In his words, "The difference between traditional images and technical images, then, would be this: the first are observations of objects, the second computations of concepts. The first arises through depiction, the second through a peculiar hallucinatory power that has lost its faith in

photography *only* as images means depriving them of their evolutionary trajectories and photographic historicity. For example, if photo-like pictures generated in computer games are just images,[22] then exploring their photographic genealogies is pointless. To be clear, this is not a lexical matter but an ontological one. As soon as there is a new modality of photographic making/thinking, the grand family of images exerts its supremacy on photography. That is precisely why referring to recent AI-generated images as photographs seems inappropriate to some. This is a tendency, as well as a hesitancy, which has been ongoing for the past two decades—to refer to technologically produced pictures that have caused a paradigm shift in art theory and history as *images* rather than *photographs*.

Many examples of this trend can be found. Nonreflective and desocialized photos from logistic and military actions are called "operational images."[23] Excessively downloaded, reformatted, reedited, and alienated photos are "poor images."[24] Computational photos that continually multiply in cyberspace are defined as "algorithmic images."[25] Programmable and synchronizable photos become "soft images."[26] Dematerialized and malleable digital photos are called "versatile images."[27] Oversaturated, intertwined, and atmospheric online pho-

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rules." Vilém Flusser, *Into the Universe of Technological Images* (Minneapolis, MN: University of Minnesota Press, 2011).

22 For art historian Hans Belting, the distinction between images and pictures is a crucial one. An image, he proposes, "may live in the work of art, but does not necessarily coincide with the work of art"; a picture is where an image "may reside." See Hans Belting, *An Anthropology of Images*, trans. Thomas Dunlap (Princeton, NJ: Princeton University, 2011), 2.

23 In 2000, filmmaker Harun Farocki coined the term "operational image" in the first part of his three-part audiovisual installation called *Eye/Machine*. For a recent account of this concept, see Jussi Parrika, *Operational Images: From the Visual to the Invisual* (Minnesota, MN: University of Minnesota Press, 2023).

24 Hito Steyerl, "In Defense of the Poor Image," *E-flux Journal*, no. 10 (2009), 1–9.

25 Daniel Rubinstein and Katrina Sluis, "The Digital Image in Photographic Culture," in *The Photographic Image in Digital Culture*, ed. Martin Lister, 2nd edition (London: Routledge, 2013), 22–40.

26 Ingrid Hoelzl and Rémi Marie, *Softimage: Towards a New Theory of the Digital Image* (Chicago: University of Chicago Press, 2015).

27 Alexandra Moschovi, Carol McKay, and Arabella Plouviez, eds. *The Versatile Image: Photography, Digital Technologies and the Internet* (Leuven: Leuven University Press, 2013).

tos are "ambient images."[28] Photos that travel and circulate are described as "unfettered images."[29] Photographs whose existence is inherently tied to the screen have been termed "screen images."[30] Regardless of these neologisms, if the photos in question *retained* and *conveyed* photographic "functions",[31] they could also be referred to as photographs. In other words, if some of these images were made through *photographic means* and for *photographic ends*—through what has been called "photomediation"[32]—they can be seen as photographs. This is precisely the intention of *Virtual Photography*: to salvage the photograph from the depthless family of images thanks to the conceptual strength and vitality of the notion of the virtual.

Accordingly, instead of succumbing to the grand family of images, to cohesively account for the most recent photographic practices and technologies, this book proposes the term "virtual photography" as a unifying theoretical and methodological framework. This term has so far been loosely applied only to in-game photos, but this volume aims to consider any photographic technology that has a virtual core as an example of virtual photography.

## What Is Virtual Photography?

The adjective "virtual" comes from the Latin *virtus*, which means "having the virtue of." Therefore, when we refer to, say, a "virtual desk," we mean that that object has all the qualities (i.e., the virtues) of a desk even though it is not a real desk. Based on this, the definition of "virtual" can be "not in actual fact."[33] Because it intrinsically evades facticity, dealing with the term "virtual" is difficult.

Notable thinkers of the twentieth century have shown that the concept of virtuality is difficult to understand because its definition is contingent upon

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28 Sean Cubitt et al. "Ambient Images," *The Nordic Journal of Aesthetics*, no. 61–62 (2021), 68–77.

29 Michelle Henning, *Photography: The Unfettered Image* (New York: Routledge, 2022).

30 Winfried Gerling, Sebastian Möring, and Marco De Mutiis, eds. *Screen Images: Screenshot, Screencast, In-game Photography* (Berlin: Kadmos Verlag, 2023).

31 See Vilém Flusser, *Into the Universe of Technological Images*; Vilém Flusser, *Towards a Philosophy of Photography* (London: Reaktion Books, 2000).

32 Joanna Zylinska, "Photomediations: An Introduction," in *Photomediations: A Reader*, eds. Kamila Kuc and Joanna Zylinska (Online: Open Humanities Press, 2016), 1–17.

33 Denis Berthier, "Artificial Agents and their Ontological Status," *International Conference on Computers and Philosophy* (2006), 4.

other ideas. Henri Bergson[34] in philosophy and Marcel Proust[35] in literature initially broached the concept, thus planting the seed of virtuality. Later, other thinkers fleshed out its philosophical aspects. The list of such thinkers includes, but is not limited to, cultural theorist Paul Virilio, who opposed the terms "virtual" and "factual";[36] philosopher Jean Baudrillard, who equated the virtual with "the computerized";[37] sociologist Rob Shields, who saw the opposite of the virtual in "the material";[38] epistemologist Denis Berthier, who equated the virtual with "the ideal";[39] philosopher Brian Massumi, who ontologized the virtual as "the potential";[40] essayist Philippe Quéau, who associated the virtual with "the liminal";[41] and theorist Simon O'Sullivan, who situated the virtual into the realm of "affect."[42] Despite their differences, these authors agree that the virtual does *not* oppose the real, nor does it coincide with it, since it has a reality of its own. The alleged tension between the virtual and the real manifests itself in the syntagma of "virtual reality," which, in everyday language, suggests that there is an implied opposition between the virtual and the real. However, if that were the case, we could not speak of virtual reality as a distinct entity as we do today—that is, as one being.[43]

To eliminate the friction between the virtual and the real, the philosopher Gilles Deleuze postulated separate ontological doubles for these concepts: the virtual vs. the actual and the possible vs. the real. This point is clarified in *Difference and Repetition*, where Deleuze lucidly distinguishes between the two processes undergone by the virtual and the possible. He outlines the difference in question as follows:

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34 See Henri Bergson, *Creative Evolution*, trans. A. Mitchell (New York: Random House, 1944) and *Matter and Memory*, trans. N. M. Paul and W. S. Palmer (New York: Zone, 1991).

35 See Marcel Proust, *The Captive and the Fugitive*, the fifth volume of *In Search of Lost Time*, ed. William C. Carter (Connecticut/London: Yale University Press, 2023).

36 Paul Virilio, *The Vision Machine* (London: Indiana University Press, 1994), 60.

37 Jean Baudrillard, "The Virtual Illusion: Or the Automatic Writing of the World," *Theory, Culture & Society*, vol. 19 (1995), 97–107.

38 Rob Shields, *The Virtual* (London/New York: Routledge, 2003).

39 Berthier Denis, "Intentionality and the Virtual," *Intellectica*, no. 40 (2005), 91–108.

40 Brian Massumi, *Parables for the Virtual: Movement, Affect, Sensation* (Durham, NC: Duke University Press, 2002).

41 Philippe Quéau, "Virtual Multiplicities," *Diogenes*, vol. 46, no. 183 (1998), 107–116.

42 Simon O'Sullivan, "The Aesthetics of Affect: Thinking beyond Representation," *Angelaki*, vol. 6, no. 3 (2001), 125–135.

43 See Roberto Diodato, "Virtual Reality and Aesthetics Experience," *Philosophies*, vol. 7, no. 29 (2022), 1–8.

> The only danger in all this is that the virtual could be confused with the possible. The possible is opposed to the real; the process undergone by the possible is therefore "realization." By contrast, the virtual is not opposed to the real; it possesses a full reality by itself. The process it undergoes is that of actualization. It would be wrong to see only a verbal dispute here; it is a question of existence itself.[44]

Having a full reality of its own, the virtual is never a *realized* but an *actualizing* entity for Deleuze. Unlike the possible, which irreversibly enters existence via realization, the virtual sustains its existence through endless actualization. The following example can help clarify the vital distinction between realization and actualization. During its existence, a seed may become a tree or a desk. The difference here is that the process undergone by the tree is the *realization* of the seed while the process undergone by the desk is the *actualization* of the seed. While the former is determined and constituted (realization), the latter is indeterminate and constituting (actualization). In other words, if the realization of the possible is a means toward an end (i.e., the real), the actualization of the virtual is a means without an end. *The end of actualization is the sustenance of the virtual*. This, however, does not mean that a virtualized entity (e.g., photography) is devoid of reality; the perpetual and permeable modality of the virtual is what constitutes its very reality. Therefore, as the philosopher Pierre Lévy proposed, "Virtualization is not a derealization (the transformation of a reality into a collection of possibles) but a change of identity, a displacement of the center of ontological gravity of the object considered."[45]

Following Deleuze's idea that the virtual is not opposed to the real, Lévy argued that the process of virtualization is by no means a "derealization"—an emptying out of reality. During its actualization, the virtual constitutes its self-contained reality, which runs parallel to, but never collides with, the reality of the possible. According to the philosopher Grant Tavinor, placing too much emphasis on the distinction between the virtual and the real is the principal mistake we make when trying to understand the virtual, whereas something virtual can be fully real. Hence, a virtual x is almost or nearly an x, but not actually so. "[The] virtual retains the efficiency or function of a real x, while mani-

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44 Gilles Deleuze, *Difference and Repetition* (New York: Columbia University Press, 1994), 211.

45 Pierre Lévy, *Becoming Virtual: Reality in the Digital Age* (New York/London: Plenum Press, 1998), 26.

festing these in an unfamiliar or noncustomary form."[46] As Deleuze would have put it, unlike the possible, which undergoes an *irreversible realization*, thus becoming a destined real, the virtual undergoes an *incessant actualization*, which reflects the becoming of virtualization.

The concept of virtual photography follows a similar logic; it refers to a kind of photography that retains the efficiency and function of real photography (made with or without a camera) while manifesting these in an unfamiliar or noncustomary form. Camera-based/camera-less photography underwent its *intended realization* in the past two centuries. In contrast, virtual photography manifests the *unbounded actualization* of photography in our dematerialized, cybernetic, and algorithmic era. In other words, while analog photography and digital photography were born out of the realization of the *possible* (*light*), virtual photography has come into existence through the constant actualization of the *virtual* (*data*)—the fabric of reality in the age of gamification, artificial intelligence, and extended reality. Having evolved and revolutionized itself over the past 200 years, the reality of photography is no longer dependent on the alleged indexicality or causality of camera-based/camera-less photography. Instead, it is now the never-ending and ever-changing actualization of the virtual that constitutes the reality of photography. This means that virtual photography is "real" photography and virtual photos are "real" photos only if we admit that in a time when computer-generated imagery is proliferating rapidly, our sense of reality is being incrementally and irrevocably infused with virtuality. Hence, at present, the virtualization of photography does not amount to the derealization of the medium—a hallowing out of reality from the kernel of its ontological gravity. Conversely, it is precisely the *data-perfused* and *algorithm-infused* actualization of photography that gives it its sense of reality today. To put it concisely, *virtual photographs are real photographs undergoing indeterminate and indefinite actualizations*. This is how the pliability and perpetuity of the virtual creates a reality that runs parallel to, and never clashes with, the conventional reality of photography.

Therefore, by focusing on the concept of the virtual and the medium of photography, this book asks the following question: What are the ontological and epistemological modalities of virtual photography in contemporary culture and how can they enable us to view memory, identity, and subjectivity anew? To answer this question, the book reflects on the most recent resurrections and reincarnations of photography.

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46 Grant Tavinor, *The Aesthetics of Virtual Reality* (New York: Routledge, 2022).

## Virtual Resurrections/Reincarnations of Photography

Having technologically and ontologically transmuted itself, photography has now managed to find its way into every corner of our lives, from urban spaces to cyberspace, from criminology to cosmology, and from war weaponry to love wizardry.[47] Stealthily permeating our emotional, social, and political lives, the latest manifestations of photographic technology have altered our perceptions of individuality and communality as well as private ipseity and public illeity. Thus, they have changed our very grip on reality. Traditionally, photography has been seen as a means of documenting an external reality or expressing an internal feeling; today, though, photography is capable of actualizing nonexistent pasts and never-lived experiences. For instance, recent developments in computational photography allow us not only to adjust the size, focus, tone, color, and scale of a photograph but also to create omnipictures—that is, multiple-capture single images that aspire to better resonate with the intricacies of our lived experiences.[48] Whereas photography once was limited to the inscription of (visible) light, the emerging field of phasmagraphy expands the "boundaries of the visible photographic spectrum to the adjacent wavelengths," such as radiography, thermography, ultraviolet, data clouds, electron microscopy, and functional magnetic-resonance imaging.[49] Thanks to recent advancements in laser imaging, detection, and ranging, free-floating Wi-Fi transmissions in cities can now be turned into photographs, which reminds us that "everything that exists in [a] signal can also exist as an image."[50] Some see these changes as the creation of a "new visual regime,"[51] while others view

47 See Mervin Heiferman, ed. *Photography Changes Everything* (New York: Aperture, 2012).

48 Ramesh Raskar, "Computational Photography: Epsilon to Coded Photography," in *LIX Fall Colloquium on Emerging Trends in Visual Computing* (Berlin: Springer, 2008), 238–253.

49 Elke Reinhuber, "Phasmagraphy: A Potential Future for Artistic Imaging," *Technoetic Arts: A Journal of Speculative Research*, vol. 15, no. 3 (2017), 261–274.

50 Jussi Parikka, "On Seeing Where There's Nothing to See: Practices of Light Beyond Photography," in *Photography off the Scale: Technologies and Theories of the Mass Image*, eds. Jussi Parikka and Tomáš Dvořák (Edinburgh: Edinburgh University Press, 2021), 185–201.

51 Daniel Rubenstein, Johnny Golding, and Andy Fisher, *On the Verge of Photography: Imaging Beyond Representation* (Birmingham: Article Press, 2013).

them as the promise of still-to-come subjectivities.[52] Regardless of this, the question is no longer whether photography is an "expanded field"[53] or still an "expanding form,"[54] but in which direction it is transmuting.

At present, the most prevalent and contentious examples of these photographic transformations are extended reality (ER), artificial intelligence (AI), and in-game photography. Over the past decade, the latter has been gaining momentum on social networks and in virtual art galleries. Initially, the practice of in-game photography referred to the act of taking screenshots during gameplay by so-called virtual tourists both offline and online. One of the earliest instances of this practice was a digital portrait series entitled *Thirteen Most Beautiful Avatars* by the artists Eva and Franco Mattes, which was shot in *Second Life* (2006).[55] Originally, in-game photos were effectively screenshots; however, the video game industry extended the screenshot function by introducing the photo mode and camera mode. These features were first embedded in *Gran Turismo 4* (2005), and they were later expanded by popular games such as *The Elder Scrolls V: Skyrim* (2011), *Grand Theft Auto* (2013), *The Last of Us Remastered* (2014), and *Fall Out 4* (2015). Depending on the video game, in-game photography generally allows players to capture photos in four different ways: 1) taking screenshots, 2) modifying and/or hacking the game, 3) simulating the action of taking a photo, and 4) simulating camera technology.[56] As a result, in video games, photographic mediation operates along two main axes: diegetic (e.g., access to a photographic device or prompt to take a photo) and nondiegetic (e.g., hacking/modding and photo mode/replay).[57] While for some these technological

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52 David Bate, "The Emancipation of Photography," in *The Versatile Image: Photography, Digital Technologies and the Internet*, eds. Alexandra Moschovi, Carol McKay, and Arabella Plouviez (Leuven: Leuven University Press, 2013).

53 George Baker, "Photography's Expanded Field," *October*, no. 114 (2005), 114–120. Geoffrey Batchen, "Post-Photography," in *Each Wild Idea: Writing, Photography, History* (Cambridge, MA: MIT Press, 2000).

54 Sandra Plummer, "Photography as Expanding Form," *Photographies*, vol. 8, no. 2 (2015), 137–153.

55 See the virtual gallery here: https://01001011101011o1.org/show-13-most-beautiful-avatars/.

56 Sebastian Möring and Marco De Mutiis, "Camera Lucida: Reflections on Photography in Video Games", in *Intermedia Games—Games Inter Media: Video Games ad Intermediality*, eds. Michael Fuchs and Jeff Thoss (New York: Bloomsbury Publishing, 2019), 69–93.

57 Vladimir Rizov, "PlayStation Photography: Towards an Understanding of Video Game Photography," in *Game | World | Architectonics: Transdisciplinary Approaches on Structures*

transformations lay bare the intrinsic ludic nature of photography,[58] others view them as thrilling ontological shifts in the history of aesthetics.[59] During the past decade, in-game photography was a niche, a trend, or an optional feature; today, there are games entirely dedicated to photographic shooting (*Umurangi Generation*, 2020), perceiving (*Viewfinder*, 2023), and exploring (*Lushfoil Photography Sim*, 2024).

The technological and aesthetic implications of in-game photography are still being debated. In contrast, the sociocultural and ethical-political ramifications of AI photography are yet to be explored. Over the past couple of years (2022–2024), AI platforms such as DALL-E 2, Midjourney, DreamStudio, Craiyon, and DeepAI have become increasingly popular. As a result, AI photography is transforming various creative industries.[60] AI photography refers to the practice of generating entirely new photos, or enhancing existing ones, through AI or machine learning. The most common method for creating AI photos has been dubbed "promtography," a portmanteau that combines the word "prompt" (i.e., a textual mode of interaction between a human and AI) with "photography." This method allows users to feed the AI any kind of text (e.g., a question, information, or coding), which may or may not be supplemented with an image, in order to elicit a desired synthetic image, which may or may not be called a photograph. The results can be glamorous and astonishing, or unsettling and desensitizing, depending on how skillfully the promtographer has instructed the machine. While text-to-image photo production is a new trend in photography, the use of AI in the field is not. Over the past decade, AI has been steadily, though imperceptibly, (re)shaping photography through (among others) facial recognition, advanced image restoration, image synthesis, noise reduction, automated enhancement, object-detection autofocus, and object removal.[61] The current use of AI in photography, however, extends far beyond these gradual and unobtrusive developments, and

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*and Mechanics, Levels and Spaces, Aesthetics and Perception, ed. Marc Bonner* (Heidelberg: Heidelberg University Publishing, 2021), 50–62.

58 Cindy Poremba, "Point and Shoot: Remediating Photography in Gamespace," *Games and Culture*, vol. 2, no. 1 (2007), 49–58.

59 Jon Robson and Grant Tavinor, *The Aesthetics of Videogames* (New York: Routledge, 2018).

60 For example, see how Adobe is using AI and machine learning to produce photographs: https://blog.adobe.com/en/publish/2021/11/12/how-is-machine-learning-transforming-modern-photography (accessed January 22, 2024).

61 See Joanna Zylinska, *The Perceptive Machine: On Photographic Future between the Eye and AI* (Cambridge, MA: MIT Press, 2023).

it presents us with a somewhat super photography—a kind of photography that is fully entwined with the photographic even though it surpasses its ontological boundaries.[62] In 2023, by utilizing the visual language of the 1940s, the artist Boris Eldagsen won the Sony World Photography Award with his AI-generated image called *The Electrician*—a world's first. Eldagsen refused to accept the prize, thereby calling into question the artistic legitimacy of AI photography. Evidently, AI photography requires digital authorship and documentary veracity;[63] it also demands that we formulate new ways of thinking about individuality, collectivity, and subjectivity at large.

Slowly but surely, photography is also becoming part of ER platforms in the form of virtual reality, augmented reality, mixed reality, and cross reality.[64] ER photography became mainstream thanks to Adobe's 3D models of virtualized objects.[65] At present, it is generating promising results across other platforms and disciplines. For instance, in ecological psychology, visual post-occupancy evaluation is used to restore and revitalize the mental and physical health of individuals.[66] This is a multimethod approach employed by environmental psychologists to assess design outcomes from the users' perspectives. To move in the world from multiple perspectives, VR designers have developed the intricate method of viewpoint-free photography, which enables users to interactively control the viewpoint of a photograph after capture, either in a sedentary or ambulatory position.[67] ER photography has also found its place among behavioral and information scientists exploring the possibility of enhancing spatial memory through the use of panoramic photography.[68] If ER photography was once limited to object design and 3D modeling, it has now become a promising tool in psychology, architecture, and memory studies.

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62 Michael Peter Schofield, "Camera Phantasma: Reframing Virtual Photographies in the Age of AI," *Convergence*, vol. 0, no.1 (2023), 1–23.

63 Deutsche Fotografische Akademie (2023). See https://dfa.photography/.

64 Samuel Greengard, *Virtual Reality* (London: MIT Press, 2019).

65 See https://www.adobe.com/products/substance3d/discover/virtual-photography.html (accessed January 16, 2024).

66 Marco Boffi, et al. "Visual Post-occupancy Evaluation of a Restorative Garden Using Virtual Reality Photography: Restoration, and Behavior in Older and Younger People," *Environmental Psychology*, vol. 13, no. 1 (2022), 1–20.

67 Peter Hedman, *Viewpoint-Free Photography for Virtual Reality* (London: University College London, 2019).

68 M. Carmen Juan, et al. "A Virtual Reality Photography Application to Assess Spatial Memory," *Behaviour & Information Technology*, vol. 42, no. 6 (2022), 1–14.

Having changed dramatically over the past few decades, photography has become integral to video games, AI, and ER platforms. Currently, these are the most common manifestations of virtual photography, but this book considers any photographic practice that originates from a virtual core as virtual photography. Doing so allows us not only to welcome expansions of the medium but also to embrace its future realities.

## Structure of the Book

To classify the current manifestations of virtual photography, this book is divided into three thematic parts, each focusing on a particular aspect of the virtualization of the medium. Part I, "Artificial Intelligence and the Algorithm," focuses on the current applications and ramifications of AI, CGI, and deep learning for photography. In chapter 1, drawing on Baudrillard's concepts of simulation, generation, and models, Amanda Wasielewski investigates the historically fraught connection between photography and the real and its implications for the photographic image after the advent of generative AI. Like photography, which is supposed to reveal the latent objective world, Wasielewski suggests that AI-generated photography reveals the hidden facets of the data used to produce it—the objective world of the dataset. In chapter 2, David Bate examines the status of AI photography and the photographic image by distinguishing between fantasy and fiction vis-à-vis photographic image making. He suggests that a great deal of contemporary generative-AI photography can be seen through the conceptual lens of speculative fiction. To highlight this, he explores the evolution of the CGI images produced by IKEA, showing how they have managed to retain a semblance of realism by referring to tangible objects in the experiential world of the viewer. In chapter 3, Ali Shobeiri explores the conjunction of memory and AI photography through Generative Adversarial Networks, asking whether these synthetic photographs can actualize a memory that has never existed factually. By drawing on Henry Bergson's idea of the virtual and Jacques Derrida's notion of the spectral, Shobeiri examines the virtuality of memory and the spectrality of the photograph. In doing so, he proposes the term "larval memory" as a conceptual framework for the ontological status of the memories that have been summoned through AI photography.

Part II, "In-Game Photography and Virtual Adventurism," concentrates on the evolution of photography and photographic functionalities in computer

games. In chapter 4, Marco De Mutiis offers an overview of the relationship between photography and computer games from the 1950s to the present, and he investigates how picture taking in games has been evolving in tandem with the development of game hardware and software. In doing so, he suggests the term "playable imaging" to highlight the agency of play in relation to the act of taking pictures and to counter the traditional understanding of photography as a medium that is merely mediated in ludic spaces. In chapter 5, Natasha Chuk examines how the development of photography and the practice of in-game photography reflect our changing relationship with the landscape by both retaining and reimagining aspects of traditional landscape photography. By introducing the idea of the player-game-camera triangle in computer games, Chuk shows how photorealist environments can reflect on the idea of the technological sublime. In chapter 6, Martin Charvát focuses on the photographic representation of the landscape and looks at the transformations of the subgenre of the picturesque in computer games. He proposes that the photographic embodiment of the picturesque is not only an expression of pleasure in the virtualized world but also an index of the existence of the player, which functions as a unique marker of identity across social media communities. In chapter 7, Paula Gortázar shows how the logic of in-game photography is in part driven by the spirit of adventurism—a thrill induced by a range of psychological and biological reactions generated by the accomplishments of different objectives in the game. Gortázar suggests that this sense of adventure is not always derived from confronting risky situations; it is mostly a product of challenging the gameplay's rules and disrupting its behaviors.

Part III, "Extended and Limited Realities," investigates how photography can both define and limit our conceptions of reality and virtuality. In chapter 8, Jens Schröter shows that image modeling and simulation have a much longer history than statistical images, and he explores the photographic technology that long preceded and heavily influenced contemporary virtual photography—photorealist computer graphics. By tracing its roots in the 1970s, Schröter argues that early photorealist computer graphics not only formed the basis of computer simulation but also shaped our contemporary understanding of virtual objects, which can be photographed with a virtual camera. In chapter 9, Francesco Giarrusso examines the transformative impact of virtual photography on scientific exploration. He discusses how the visualization of supermassive black holes with the Event Horizon Telescope has redefined contemporary photography. By investigating the methodologies used to create the images of M87, a supergiant elliptical galaxy in the constellation of Virgo con-

taining trillions of stars, Giarrusso shows that virtual photography expands the visual representation of astronomical phenomena and shifts our ontological and epistemological perspectives. In chapter 10, Kris Belden-Adams discusses the role of photography as a lithophane in geological exploration, or as source material for 3D printing and data visualization, thus showing how it can be used to monitor volcanoes for clues of imminent eruptions. Belden-Adams proposes that the highly technological photographs in question are not merely data visualizations; they reveal how virtual photography can insert a hypothetical core into our very understanding of reality. In chapter 11, Dominik Lengyel and Catherine Toulouse demonstrate how photography is employed to represent abstract architectural hypotheses that lead to uncertain, and at times contradictory, assumptions. They argue that the use of virtual photography in architecture can give this uncertainty a concrete shape through spatial projection, thereby creating measurable criteria that serve the unambiguous interpretation of architectural space. Finally, in chapter 12, Helen Westgeest looks into the increasing awareness of the limitations of human vision by exploring what lies just beyond it. Using comparison, she shows that near-infrared photography does not simply virtualize what humans cannot see with their eyes; it also actualizes a world beyond our visual limitations. Westgeest suggests that these virtual photographs invite humans into a contact zone where they can meet nonhumans halfway.

Despite their different approaches and disciplinary backgrounds, the chapters of *Virtual Photography* are meant to serve as historical, theoretical, and methodological examinations of the growing interdisciplinary field of virtual photography, of which this book is an example.