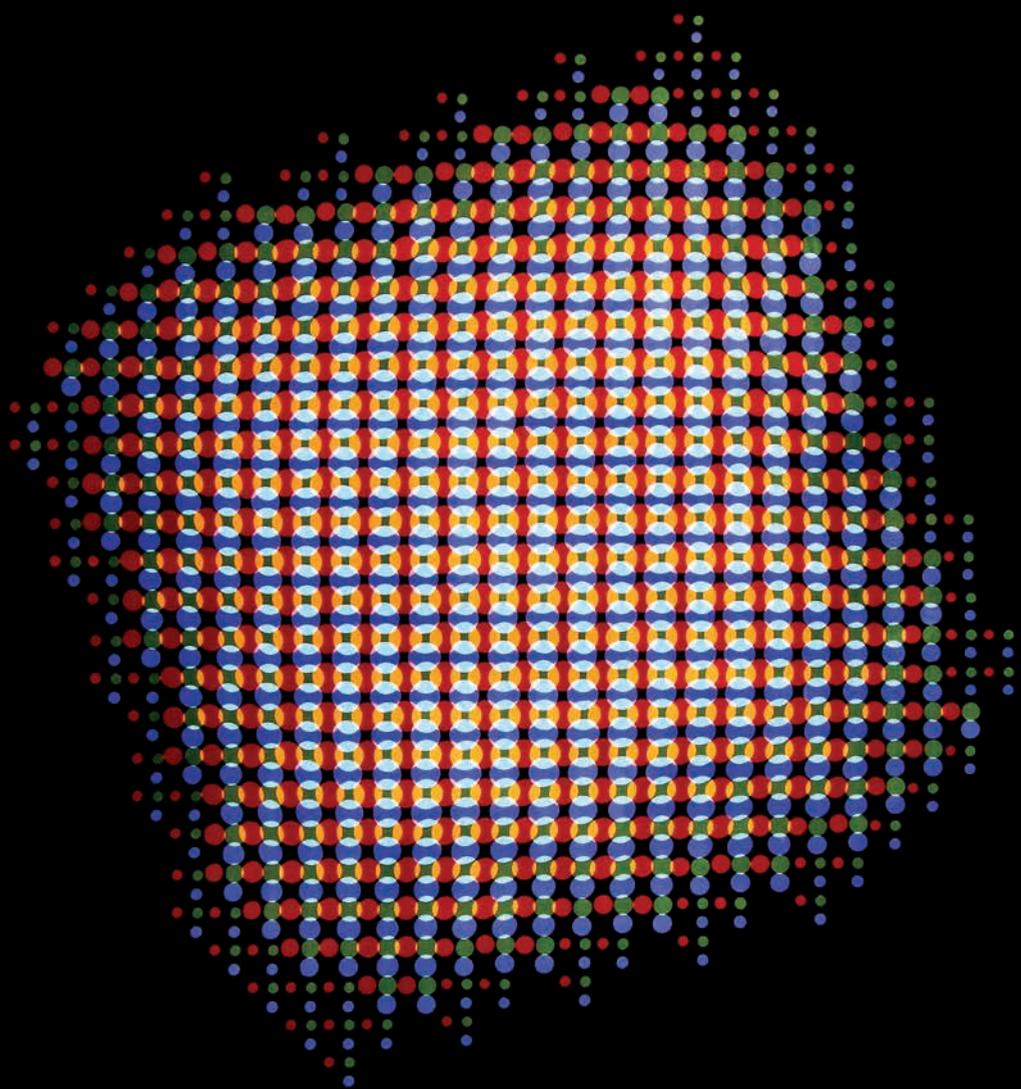


Photography
from the Turin Shroud
to the Turing Machine



YANAI TOISTER

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for Romi Mikulinsky

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Contents

Introduction	1
1. The Nature of Photography	10
2. A Philosophy of Photography	51
3. Another Philosophy of Photography	79
4. The Landscapes of Code	133
5. Photography as Algorithmic Art	183
Conclusion	209
References	216
Index	229

Form is henceforth divorced from matter. In fact, matter as a visible object is of no great use any longer, except as the mould on which form is shaped. Give us a few negatives of a thing worth seeing, taken from different points of view, and that is all we want of it. Pull it down or burn it up, if you please [...]. Matter in large masses must always be fixed and dear; form is cheap and transportable. We have got the fruit of creation now, and need not trouble ourselves with the core.

Oliver Wendell Holmes¹

Photos are 'objects' because they have a palpable support (paper or such like). Images on screens are not 'objects' in the following sense: they demand apparatus in order to be distributed. But photos are not 'objects' in the traditional sense of the term. The information that they carry is not contained in its volume but rests upon its surface and may be transferred from one support to another. Photos (just like printed texts) form a bridge between the culture of 'objects' and the culture of 'pure information'. However, photos are closer to the culture of informatics than to printed texts, because the information that they carry was elaborated according to the programme within the apparatus. Hence, photos are the last phenomenon of the culture of 'objects' and the first of the culture of 'pure information'. And their distribution illustrates such a revolutionary transition.

Vilém Flusser²

Introduction

One of the most compelling stories of modernity is that of photography. From a mere fantasy shared by a handful of people less than two centuries ago, it has become a ubiquitous form of representation and communication, embedded into every aspect of modern life. This story has since taken a dramatic twist: photography's materiality has become redundant and its symbolic apparitions have been made fluid, endlessly animated across the cultural field.³ Consequently, photography today is, quite literally, both nowhere and everywhere, difficult to define and nearly impossible to contain. Therefore, somewhat paradoxically, even though numerous technologies now seem to facilitate potentially infinite possibilities of post-industrial making, sharing and archiving of photographic images, many commentators fear that the story of photography is nearing its end. Talk about the end of photography, and what will follow it, or is already upon us, is nowadays almost commonplace.⁴

Meanwhile, in just a single generation, the advent of digital computation has wrought seismic changes in how we communicate, learn and think.⁵ It has reconfigured most, if not all, of our forms of experience and mediation of the world. Human culture, it has even been suggested, is no longer dependent on our physical being because it can emerge independently from silicon without recourse to the hydrocarbons we are still made of. Yet while these reveries are now omnipresent, fuelling much of the anxiety in our collective psyche, the operation, design and *creative* potential of information technology and computing are understood by relatively few. This might explain why there remains a reluctance to understand emerging artistic practices as deeply tied to previous technologies. This is especially disturbing when some of such practices rely on and perpetuate previous forms of aesthetic mediation. By ignoring this, we miss the opportunity to understand how earlier information machines like photography have always presented radical new potentials for extending creativity, and how computation continues to do so in similar ways.

The premise of this book is that the two aforementioned stories are not incommensurable. The former is the latter's historical precedent, not only its prologue. The latter story does not serve as the former's epilogue. In fact, we often discover that two seemingly unconnected stories are simply episodes within a single, unfolding story.

In other times, it may even turn out that they were nothing but conflicting narratives of the same story. If this is indeed the case with photography and computation, we need to weave these two threads together more consistently than the literature has done hitherto. Therefore, one task undertaken in this book is to retell the tale of photography so that its short history foretells its current state. Another is to do so theoretically and with means that do not prioritize any of the two dramatic ends but rather presents both as speculative propositions for one narrative.

To do so this book was conceived with two key metaphors: the Turin Shroud and the universal Turing machine. Both, I contend, are powerful vehicles for tracing the history and theory of photography. Nevertheless, I am interested in these metaphors only as conceptual models, as sets of propositions for philosophizing photography. Thus, neither will be scrutinized historically and both will mostly remain in the background, as befits their ephemerality.⁶ Simultaneously, I will foreground a wide range of theoretical toolkits in support of this innovative approach: ‘As a technology, photography is a primitive form of information technology. As an artistic strategy, it is an early form of algorithmic art’.

This book is also motivated by the postulation that the story of photography, as it is most often narrativized in critical or academic contexts, is remarkably monolithic. It revolves, with rare exceptions, around one of three approaches: the first based on art theory and aesthetics, the second on linguistic or semiotic investigation and the third on phenomenological inquiry. For art and aesthetics the pertinent question is photography’s potential for artefactuality. For the linguistic investigation, or semiotic approach, photography is a dynamic signage system that must always be ‘decoded’ in order to be ‘read’. Finally, phenomenology regards photography as a cluster of objects and events, all to some extent theoretical as well as actual, which should be observed, perceived and cognitivized. No matter which of the three approaches is adopted, however, most writing on photography is comprised of assumptions, definitions and dichotomies that are largely consistent. While the theory of photography played a central role in defining various phases of modernity, and has been pivotal in transitioning between them from classical to late to post-modernity, its salient feature is the narrowness of its repertoire. In sum, according to this foundational discourse, from Talbot to Bazin to Barthes, to name but a few eminent writers, every photograph can be understood as a Turin Shroud on paper.

The Turin Shroud is one of the most heavily studied and most contentious artefacts in history. It is notoriously controversial because of two trivial questions: the age of its cloth and, more importantly, the way in which the image of a man, who appears to have suffered physical trauma in a manner consistent with crucifixion, has come to appear on it. Many have argued that the image is *acheiropoietic* – created without hands and coming into existence miraculously. It has been suggested that the image depicts Jesus and that it has been created either by his

blood or by neutron radiation during the moment of his resurrection. Others have proposed contradictory theories based on disciplines ranging from chemistry to biology and from medical forensics to optical image analysis. According to these theories, the image has been created either by a form of ancient painting, by an obscure method of chemical pigmentation, or even by a medieval form of photography. Common to all scientific theories is the agreement that the image has been doctored in one way or another.

Advocates of the *acheiropoietic* view counter, however, that empirical analysis or logical methods are simply insufficient for the level of understanding required for perceiving the miracle of the shroud. In many ways they are right. Whether the laws of physics prove or refute this religious myth is of marginal importance. The shroud may or may not have been in contact with the body of Jesus Christ. The image may or may not have been created independently of human agency. Nevertheless, it *does* resemble many other manmade depictions of how Jesus looked or how he died.

Thus, the outcome of the debate about the shroud's authenticity remains largely irrelevant to both religious belief and science. We may refute the claim that the shroud or the image fixed on it date back to the first century, and therefore must be forms of subsequent fakery, but we must nevertheless concede that the shroud *is* an immensely important symbolic object. As such, it is more important to art and communication than it is to other fields of inquiry.

Somewhat surprisingly, the Turin Shroud metaphor has been mentioned only occasionally with reference to photography,⁷ far too rarely considering how often photography, much like the shroud, is used as a site for discussion about the relation between depiction and representation. This discussion leaves photography torn between the supposed polarities of expression and authenticity, but also bound to both and confined between truth-to-appearance and truth-to-world. This has been reiterated in most theoretical accounts of photography, even those that seem to be distinguishable. Much like the religious paradigms of the shroud, these may not be fully scientific definitions but they are immensely important and useful to many authors. Writing about photography thus all too often reads like a discussion of the Turin Shroud. In other words, this writing revolves around 'an ontological privilege' with which photography has been born, separating it from other breeds of pictures. Arguably, although the names, definitions and descriptions for this privilege often change, many still cling to it. It may be explained and understood via a special mode of access, namely the artefact known as the photograph. This shall be the focus of Chapter 1.

Considered generically, photographs are commonly viewed as instances of privileged if not miraculous transference. That magic lies in how objects in the world re-present themselves in photographs, or in the precise kind of presence they afford objects. Either way, it is continually alleged that it is not abstractions, concepts, or

calculations that inhabit photographs but precisely the objects that appear in them. By virtue of the power of these appearances, beliefs may be enshrined, doctrines disseminated, and doubts dissipated. Crucially, in a photograph, objects do not appear by the power of a living god but rather by virtue of another power: the benevolence of nature and its ‘hand’ made of light.

Thus, the photographic camera has traditionally been equated to the eye. As such, the camera has often been understood as an extension of our perceptual and cognitive apparatus. This conditioning of visual perception makes human vision and pictorial representations co-extensive, setting up a supposed uniformity between looking at a photograph and looking at the world. However, as forms of perceptual magic transform, so do the material conditions of living generally, along with technologies and modes of representation. In time, these changes have led us to think in particular ways that are appropriate to them. This holds true for cave paintings, holy texts, theatre performances and other forms of human expression, but perhaps above all for photographs.

In other words, the construal wherein the only equivalence actuated in photography is the eye-camera is lacking, because it is contingent on an all-too-specific premise of ‘nature’. At best, it can be taken to convey the idea that the camera replicates the basic physiological structure of the biological eye, namely a photosensitive surface encased by a darkened chamber with an opening formed of a lens, and that both systems articulate the same electromagnetic material. But as photography has changed, and photographs are no longer produced exclusively by cameras, we can appreciate how much can be gained from another construal. Because the construction of an image always involves extremely complicated processes, from either a physiological or a cultural point of view, the mutual relations forged between these two types of optical instruments can compound this complexity in various ways. If our vision has forever been ‘camerified’ then, I propose, this is because photography is an apparatus and practice for generating visual representations, thereby heralding new kinds of human-machine reciprocities. As it affects minds more than eyes, it not only challenges definitions of vision but also problematizes beliefs and dogmas pertaining to perception, cognition and creativity. This shall be the focus of Chapter 2.

Being a migratory system, photography has come to be used by many disciplines. Note, for example, how quickly it was incorporated into newspaper journalism, not to mention fairground entertainments or the timeworn culture of the erotic, to cite just a small, provocative array of first uses. Today it is being integrated into numerous multimedia systems – in a plethora of specialties, disciplines and sub-disciplines and across fields as various as law enforcement, medicine and astronomy. Within many of these domains, the exponentially growing powers of computer programming are yoked into technologies such as machine vision, augmented reality and virtual reality where they conjure up veritable spaces of

experience and sensation. Therein, photograph-like images no longer make or even care to make a claim for a causal connection to anything in the world. The new image (also called digital, algorithmic or ‘softwared’,⁸ see Chapter 4) is located in a cybernetic sphere removed from human habitation, occupied by objects that have never basked in any kind of light or that have never occupied space and time as these have been popularly understood since the European enlightenment. Quasi-photographic images, as I call them, are rarely ‘a type of icon or visual likeness, which bears an indexical relationship to its object’⁹ as photographs have so often been described.

The photographic image, which Roland Barthes famously described as ‘a message without a code’,¹⁰ is now better served if comprehended as nothing but code. In fact, without code the contemporary photograph is nothing at all. If anything, it is a cluster of voltage differences that can just as easily be outputted as a text or audio file, or a long and inscrutable string of digits. Thus, the traditional photo-theoretical model of object-image consistency must give way to an alternative, perhaps almost semiotic, model of object-code-image interdependency. Put differently, photography could be defined in terms of multiple systems of classification and abstraction, multiple symbolic processes of transformation, and their interchangeability with other processes and syntactic systems.

It is often overlooked that not only the photographic image but also the camera, film (or sensor) and algorithm are cultural objects. This means that their design and construction contain much information and many implicit affordances. All these need to be made explicit and then interrogated so that we can understand the structures of belief and the patterns of cognition that photography, considered as a general apparatus, tends to generate, even as individual images themselves often appear, distractingly, not to be principally concerned with such large, philosophical issues. Important insights may thus be gained from dissociating thinking *about photography* from thinking *through photographs*. Photography’s cultural value has for too long been measured almost exclusively in terms of its products. Instead, it now ought to be redefined by studying the relationships between its components: the electromagnetic, optical, mechanical and photochemical, and now the exclusively digital elements and procedures that combine as a prototypical process for the production of prototypical artefacts. So how should we apprehend these extensive systems that empower photography?

This book argues that photography has never been a ‘natural’ process but rather a radicalization of a cultural process of abstraction that has for 40,000 years defined human communication. As such, it is the culmination of a process leading to the gradual abolition of all natural dimensions. Friedrich A. Kittler defined this process as the $n-1$ dimensional signifier.¹¹ Crucial for this alternative definition is the understanding that the $n-1$ dimensional signifier does not only reduce dimensions. More

importantly, it *conceals*, *disguises* and *distorts* the signified, that is, the n dimensional. Photography catapulted humanity into a ‘zero-dimensionality’, which Vilém Flusser dubbed ‘the universe of technical images’.¹² Kittler similarly referred to ‘the world of the symbolic’ or ‘the world of the machine’,¹³ which he believed came to exist with the ‘super-medium’ of the computer. In this book, I draw on both Flusser’s and Kittler’s terminologies to contend that photography and the computer are complementary. When theorized *as* computation, photography is the most elegant explanation for *how* so many human modes of visual expression have been abstracted and *why* these modes are nowadays being replaced by electronic code. Appropriately, the alternative construal advanced in this book stems from Flusser’s unique ‘programmable cosmology’. This also facilitates two secondary objectives of this book: to bridge between two different and largely unconnected lineages of photography scholarship practised in the English-speaking world and Continental Europe, and do so using toolkits from both photography theory and media studies.

In Flusser’s taxonomy, traditional human consciousness comprises two competing, albeit very similar ‘world images’. These are dubbed, the ‘finalistic’ and ‘causal’. The former view is the reflection of religious traditions and mystical, foundational experiences. The latter arises from the natural sciences, according to which every event is the effect of specific causes, which are in turn causes of specific effects. One may therefore conclude that, in the absence of another, third, perspective, it is possible to live simultaneously with both finalistic and causal realities. Furthermore, both views have an identical linear structure, which could be summarized as ‘purpose-aim’ and ‘cause-effect’. Traditional photography theory, I argue, is comprised of both and consequently necessitates that photographs should always be demonstrative or consequential. Contrariwise, Flusser argues that photography is prototypical of the programmable world image and is free of this dichotomy. In it, finalistic and causal linearity are but two dimensions, two modes of an ever-expanding, all-inclusive program. This program both absorbs preceding world images and transforms them. Here, the universe and everything in it are explained as a situation in which ‘particular and inherent virtualities – part of the universe since its origin – have realized themselves by chance, whilst other virtualities – that will be realized by chance in the future – remain, as yet unrealized’.¹⁴ This shall be the focus of Chapter 3.

What characterizes programs is the fact that they are systems in which chance becomes necessity. They are ‘games’ in which every virtuality, even the least probable ones, will sooner or later be realized, so long as the game is played for a sufficiently long time, regardless of who the ‘player’ is. While this view puts all ideologies within parentheses, it is especially relevant for the theory and philosophy of photography. In that specific context, chance has never been described as a relevant factor within the technical process. Thus, the calculation of chance events has until recently

rarely been seen as fundamental to the structure of the medium. The universal Turing machine metaphor, which is contrasted to the Turin Shroud metaphor, thus emerges as a potent means for enhancing our understandings of photography's intricate workings. Such a construal does not contradict the dominant perspective, that of the Turin Shroud, or attempt to nullify it. It simply integrates it into a richer conceptual framework, which has the force to become the new paradigm for theorizing photography.

A Turing machine is a hypothetical device conceived by British mathematician Alan Turing to help understand the limits of mechanical computation.¹⁵ As such, it models a machine that mechanically operates on a roll of paper imprinted with symbols that the machine can read and sometimes write onto. The roll shifts just a bit to the left, a bit to the right or not at all. Notably, the manner in which the machine reads determines what is subsequently written. It depends on the sign or its absence: whether Turing machines leave the mark standing or delete it, or conversely, whether they leave the empty space standing or replace it with the sign. The operation of the machine is always fully determined by a finite set of elementary instructions that are set down in advance, or, in other words, an algorithm.

The Turing machine has never been intended as a practical computing technology and as such, remained a fully hypothetical device. Nevertheless, various models of the machine have been described in Turing's papers and in the exchanges that followed. More importantly, Turing machines can be harnessed together for complex computations, the output of one becoming the input of another, and so on. Thus, Turing postulated the possibility of a universal machine, now mostly known as a universal Turing machine, which could emulate the behaviour of *any* given Turing machine. Given any table of instructions that defined a Turing machine, it could therefore carry out those very instructions. Crucially, such a universal machine would thus become programmable.

Here, as before with the Turin Shroud, I am deliberately using a metaphor that is as versatile as it is abstract. This time, however, with regard to the history and theory of photography, there is not even the odd reference or note anchoring this connection to precedent. To date, the universal Turing machine has never been applied as a conceptual framework for examining photography's past or present. According to such an alternative account, photography may be defined not merely in terms of capturing devices, imprinting processes or depiction traditions. These are, we might say, but a few of its protocols and they do not exclusively define its entirety. There is an abundance of other possibilities that are discernible and others that have simply not yet been realized. Attuned to this historical yet ever-developing complexity, this book concludes in Chapter 5 by articulating select photographic explorations as akin to early forms of algorithmic art. This is also the place to clarify that, while art and art history are but one context for photography, this book is often a book

about photography *in* art and *as* art, particularly when it engages with questions of objecthood, artefactuality and artisthood.¹⁶

To think of photography as an algorithmic art form is to argue that it potentially creates, and in fact must create, *classes* of artworks, and never just individual ones. It is a form wherein creative agents, be they photographers or programmers, never work in the realm of realities. Rather they always work in the realm of undecidable propositions, possibilities and potentialities. Therefore, a work of art in photography is by default, just like in any form of algorithmic art, a single instantiation of an infinite multitude of possible works.

Algorithms are finite descriptions of infinitely dynamic processes. However, these descriptions have a unique standing: they are both operational *and* executable. Algorithms are, we could say, text and machine rolled into one – a machine born of text and a text that can grow into a machine.¹⁷ But the same has always been true of photography as well, as Peter Henry Emerson declared in 1892: ‘If you think photography to be an art, you must decide who is the artist in the case of an automatic machine – the penny, the person who drops the penny in the slot, or the automatic machine [...]’.¹⁸ This book makes the argument that photography *is* the realm of automatic machines but that its artists are never required to drop a penny in the slot because they can, and in fact must, design the machine. In photography, as in later forms of algorithmic art, ideas and their instantiations are always code, and this code, both historically and contemporarily, is incorporated into its own execution. It is artistic concept in its strictest form of description – a programmatic master form for all arts in the age of post-industrial production: technical, electronic, digital, interactive and networked. In concluding this introduction, we must keep in mind that one of the most intelligent definitions for photography, qua medium, was ‘the engine of visualization’.¹⁹ However, because the medium of photography has clearly become *media*, we now require additional definitions. The definition proposed in this book is ‘the program of visualization’ or more simply ‘A Visualization Turing Machine’.

NOTES

1. Oliver Wendell Holmes, ‘The Stereoscope and the Stereograph’, *The Atlantic Monthly* (June 1859).
2. Vilém Flusser, ‘The Distribution of Photographs’, in *Something Other Than Photography: Photo & Media*, ed. Claudia Giannetti (Oldenburg: Edith-Russ-Haus for Media Art, 2013), 134.
3. Daniel Palmer, ‘Light, Camera, Algorithm: Digital Photography’s Algorithmic Conditions’, in *Digital Light*, ed. Sean Cubitt, Daniel Palmer and Nathaniel Tkacz (London: Open Humanities Press, 2015), 144.
4. I should note that this discourse isn’t without nuance and has shifted in the past two decades from ‘after photography’ to ‘post-photography’ and recently to ‘post-post-photography’.

5. Jon McCormack and d’Inverno Mark, eds., *Computers and Creativity* (Heidelberg: Springer, 2012), vii.
6. The Turin Shroud is a real object but, for all intents and purposes, it is almost inaccessible, having been put on public display only 18 times since the fourteenth century. The Turing Machine is not an object or a ‘real’ machine but rather ‘an abstract machine’, a hypothetical construct described in Alan Turing’s papers.
7. André Bazin, *What Is Cinema?*, trans. Hugh Gray (Berkeley: University of California Press, 2005), 14; Patrick Maynard, ‘The Secular Icon: Photography and the Functions of Images’, *The Journal of Aesthetics and Art Criticism* 42, no. 2 (1983): 155; Cynthia Freedland, ‘Photographs and Icons’, in *Photography and Philosophy: Essays on the Pencil of Nature*, ed. Scott Walden (Malden: Blackwell Publishing, 2008), 58.
8. Respectively: Daniel Rubinstein, ‘The Digital Image’, *Mafté’akh; Lexical Review of Political Thought* 6, no. 1 (2014); Eivind Røssaak, ‘Algorithmic Culture: Beyond the Photo/Film-Divide’, in *Between Stillness and Motion: Film, Photography, Algorithms*, ed. Eivind Røssaak (Amsterdam: Amsterdam University Press, 2011); Ingrid Hoelzl and Rémi Marie, *Softimage: Towards a New Theory of the Digital Image* (Bristol, UK: Intellect, 2015).
9. Rosalind Krauss, *The Originality of the Avant-Garde and Other Modernist Myths* (Cambridge, MA: The MIT Press, 1985), 203.
10. Roland Barthes, ‘The Photographic Message’, in *Image, Text, Music*, ed. Stephen Heath (New York: Hill and Wang, 1977), 17.
11. Friedrich A. Kittler, *Optical Media: Berlin Lectures 1999*, trans. Anthony Enns (Cambridge, UK: Polity Press, 2010), 227.
12. Vilém Flusser, *Into the Universe of Technical Images*, trans. Nancy Ann Roth (Minneapolis: University of Minnesota Press, 2011).
13. Friedrich A. Kittler, ‘The World of the Symbolic – A World of the Machine’, in *Literature, Media, Information Systems*, ed. John Johnston (London: Routledge, 2012).
14. Vilém Flusser, ‘Our Programme’, *Philosophy of Photography* 2, no. 2 (2011): 206.
15. Alan M. Turing, ‘On Computable Numbers, with an Application to the *Entscheidungsproblem*’, *Proceedings of the London Mathematical Society* 42, no. 2 (1936).
16. These three terms designate the condition of being an object, an artefact and an artist, respectively. The first two terms are relatively common in art discourses. The third term is coined by van Winkel. Camiel van Winkel, *The Myth of Artisthood* (Amsterdam: Mondriaan Fund, 2013).
17. Frieder Nake, ‘Paragraphs on Computer Art, Past and Present’ (paper presented at the ‘Ideas Before Their Time: Connecting Past and Present in Computer Art’ conference, London, 2010).
18. Original publication: Peter Henry Emerson, ‘Photography Not Art’, *The Photographic Quarterly* (January 1892). Excerpts reprinted in: Nancy Newhall, *P.H. Emerson: The Fight for Photography as a Fine Art* (New York: Aperture, 1975), 98.
19. Patrick Maynard, *The Engine of Visualization: Thinking through Photography* (Ithaca: Cornell University Press, 1997).

Photography from the Turin Shroud to the Turing Machine

This book introduces two conceptual models for theorizing about photography: the Turin Shroud and the Universal Turing Machine. The former is utilized to articulate a discussion on photography's frequently acclaimed 'ontological privilege', and how it has conditioned an understanding of photography as a *sui-generis* breed of images wherein pictorial representation is co-extensive with human vision. This is then contrasted with the Universal Turing Machine. The latter model integrates photography into a framework of media philosophy and algorithmic art. Here photography becomes more than just the present-day sum of its depiction traditions, capturing devices and dissemination networks. Rather it is archetypical of multiple systems of abstraction and classification and various other symbolic processes of transformation.

Yanai Toister is an artist, curator and scholar. Toister's artwork and writing re-conceptualize photography within the contexts of computation and algorithmic art. Toister currently serves as director of the unit for History and Philosophy at Shenkar College of Engineering, Design & Art, Israel.

'In this original and insightful take on photo theory, Toister argues for an understanding of photography as algorithmic art, with a specific focus on its generative potential. By presenting a range of thoughtful examples from the 19th century onwards, and a careful contextualization of his theory into seminal debates, this book is informative, rich in detail, and a pleasure to read. It provides crucial tools to reassess the relationships between programs, cameras and humans, a task that is of increasing importance for all who deal with images and media.'

Asko Lehmuskallio, Tampere University

'Photography, once miraculous, has become banal. From the icon captured on the Turin Shroud to the pseudo-random variables of a Turing machine, Toister traces a surprising narrative of struggle between the world and how we know it, ontology and epistemology, automatism and programmability. With cunning and grace, his book unstitches the warp and woof of trusted theories of photography to propose a new, troubling yet utopian account of images in human history and the human, or other-than-human, future.'

Sean Cubitt, University of Melbourne

