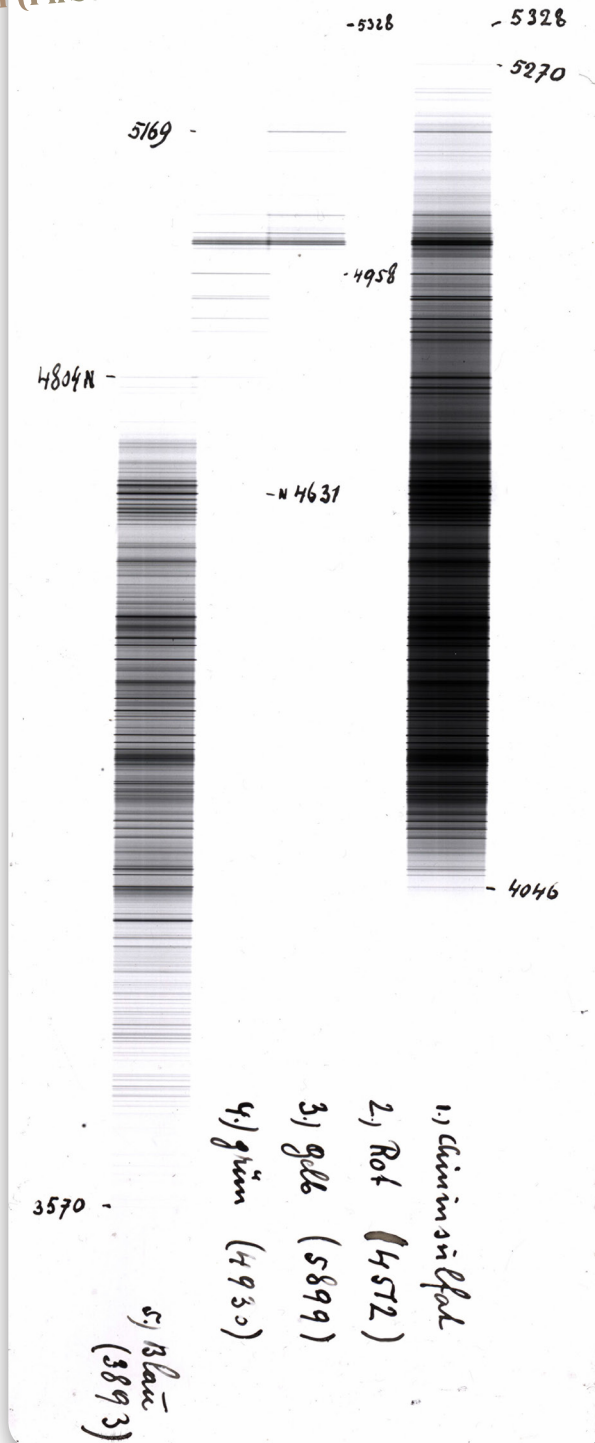


PHOTOGRAPHY

HYBRID

Intermedial Practices in Sciences and Humanities
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Étienne-Jules Marey: The Iconographic Migration and the Independence of the Image

Firstly, this paper seeks to trace the trajectory of certain specific practices of iconographic migration in the work of French physiologist Étienne-Jules Marey. In particular, it analyzes the graphic treatment applied to chronophotographic images to prepare them for inclusion in Marey's texts.

This process of graphicalizing photographic images so they could be included in printed texts, which was necessary as, at that time, it represented the only means of reproducing photographic images together with text, was an obligatory step that also granted the image increased readability and meaning: through this process of reformulation, the image gained independence and a life of its own separate from the corporeality of the subject being represented, and it was this separation that endowed the image with its character of objectivity.

The paper will thus analyze the foundations of this independence of the image, examining what kind of event these images represented and, concurrently, what statute of vision these images contributed to establishing. To this end, the paper seeks to locate the techniques used to produce these images within a history of practices of educating, training and disciplining the eye of the observer. It will thus focus on the nexus where techniques of the observer and practices of objectivity intersect: efforts to force the drawing hand to mimic the precision of a millimeter-scaled grid or to induce the eye to observe the movements of a wing in flight were aimed at both producing an image that would be tantamount to objective proof of the hypothesis in question and, at the same time, training the observer as a specific kind of the scientific Self (See L. Daston and P. Galison, *Objectivity*, New York: Zone Books, 2007, p. 38).

Lastly, this paper seeks to show how this process of transforming the photographic image into an illustration, a direct legacy of the graphic method, is wholly analogous to the process used in the same period to construct iconographic categories and traditions in both the field of scientific anthropology, clinical neurology and criminal typing, as well as the sphere of publishing and popular illustrations. The paper will thus discuss the relationship between the pathways and modes characterizing the image's movement across multiple media and the construction of the idea of "type".

The Carte du Ciel, or the Laborious Making of Intermediality

The Carte du Ciel was probably the most ambitious collaborative project of nineteenth century astronomy. Launched in 1887 by Paris Observatory director Amédée Mouchez, it counted on photography to produce the most detailed stellar map and comprehensive catalog to date. After decades of work, debates and reconfigurations, the project was abandoned in the 1970s, or rather integrated in other projects co-ordinated by the International Astronomical Union, leaving it to astronomers and historians to ponder the reasons of this "failure". I will shift the perspective somewhat to consider the Carte du Ciel as a formidable enterprise of research into photographic techniques for scientific purposes and beyond. An examination of some of the technical issues discussed by participant astronomers and instrument makers reveals that they were frequently related to problems of what we now call intermediality: most obviously in the challenge that the introduction of new photographic techniques constituted for established practices and rules of manual and ocular observation, calculation, stellar map and table making and reading; specifically, in the difficulties astronomers faced in connecting the two dimensions of the project, the map and catalogue, raising the question of how photographic observation could be employed for producing quantitative measurements and/or visual representations. These questions have gained new currency with the spread of digital photo- and reprographic technologies in astronomy through the introduction of CCD cameras for stellar mapping and the digitization of historical Carte du Ciel plates.

ESTELLE BLASCHKE teaches history of photography at ECAL, Lausanne. Her doctoral thesis *Photography and the Commodification of Images: From the Bettmann Archive to Corbis (1924–2010)* was awarded the 2012 Research Prize by the German Photographic Society. It will shortly be published at Spector Books (Leipzig). From 2009 to 2011 and in 2014 she was a fellow at the Max Planck Institute for the History of Science (Berlin). She co-curated the group exhibition and research project *Double Bound Economies: Reading an East-German Photo Archive 1967–1990* on show in Leipzig, at Centre de la photographie in Geneva and the ETH Zurich in 2012 and 2013.

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Textual Photography: The Rise and Imaginary of Microfilm

For a long time, the history of photography has been written as a history of the creative depiction of the world, as a history of styles and genres. This proposed paper sheds light on photography's purely reproductive function through the scarcely studied topic of microphotography and microfilm as a medium for knowledge production and diffusion and for the handling and conservation of vast amounts of textual and pictorial data in the service of libraries, public institutions, and businesses. Along the investigation of seminal projects and events (Project A, World Exhibition 1937, Emergency Program, Lucia Moholy's UNESCO proposal) this paper will focus on the period of the 1920s to the 1950s as a time of radical technological development in which intense debates, high financial investments and equally high expectations in the future of documentation and knowledge transfer through microfilming occurred. While the modern history of microfilm is rooted in Europe (Paul Otlet, Emanuel Goldberg et al.) the technology was further elaborated, tested and applied in the US during this precise period in form of large-scale copying programmes for books, newspapers, foreign manuscripts, pictorial material and government and business data. In a close collaboration between public and research institutions (Library of Congress, Harvard University, ACLS et al.) and the photographic industry (Eastman Kodak), the US aspired not only to develop microfilm as a modern medium of documentation, but also to take lead in the hope to eventually monopolize a future, 'global' technology that had the potential to change the ways in which information was collected, processed and shared. The history of microfilm, also called "functional" or "textual photography" at that time, ties into the earliest and deepest imaginaries present since the invention of photography: the dream of 'collecting everything', of providing access to vast archives and of rendering material objects mobile by means of their reproduction. The paper posits that microfilm needs to be reconsidered as a missing link between the world of paper and the digital. It allowed for the transition between the materiality of paper and the 'immaterial' nature of the digital. Its study is indeed vital for the understanding of today's developments and in contributing to the writing of the pre-history of the digital humanities.

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JIMENA CANALES is the author of *The Physicist and the Philosopher: Einstein, Bergson and the Debate That Changed Our Understanding of Time* (Princeton University Press) and *A Tenth of a Second: A History* (University of Chicago Press). She currently holds the Thomas M. Siebel Chair in the History of Science at the University of Illinois-UC. She was previously an Assistant and Associate Professor in History of Science at Harvard University, and a senior fellow at the IKKM (Internationales Kolleg für Kulturtechnikforschung und Medienphilosophie) in Germany. Canales received a Charles A. Ryskamp Award from the ACLS (American Council of Learned Societies) and the "Prize for Young Scholars" of the International Union of the History and Philosophy of Science. She has lectured widely nationally and internationally, presenting her work in the BBC, Juan March Institute and the Centre Georges Pompidou. She is the author of numerous scholarly and journalistic texts focusing on science and technology. Her publications have appeared in general interest venues, such as WIRED Magazine and Scientific American (Spanish version), academic journals (*Isis*, *Science in Context*, *History of Science*, the *British Journal for the History of Science*, and the *MLN*, among others) and topics on visual, film and media studies have appeared in *Architectural History*, *Journal of Visual Culture*, *Thresholds*, *Aperture*, and *Artforum*.

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LUISA FEIERSINGER, M.A., studied art history and cultural studies at the Humboldt-Universität zu Berlin and finished with a thesis on the intermedial strategies in Peter Greenaway's film *Nightwatching*. Since 2013 she works as a research associate at the project *Das Technische Bild* at the *Hermann von Helmholtz-Zentrum für Kulturtechnik*. Her research and teaching focus lies on the history and theory of popular image-practices, especially film. Within this field she is currently writing her PhD-Thesis on the history and aesthetic of stereoscopic moving images.

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ANDREW FISHER is a Lecturer in Visual Cultures at Goldsmiths (University of London) and a founding editor of the journal *Philosophy of Photography*. His work centres on photography, photography theory and phenomenological thought. Current projects include: *On the Scales of the Photographic*, a monograph analysing inter-related technical, phenomenological, geographical and political senses of scale as these structure the forms and uses of photography. A book co-authored with Nicole Wolf (Goldsmiths) for Sternberg Press: *Visual Cultures As Document*, scheduled for publication in autumn 2015.

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Recording Devices and the Fantasy of a World without Humans

Imagine a world without humans. Where does our conception of such a post-apocalyptic scenario come from? Images of what the world actually looks like without us draws from a well-defined iconographic tradition. Some of the first landscapes without people can be traced to paintings of Claude Lorraine, widely seen as threats to the neoclassical principles of ideal art. The rise of landscape paintings in the 1800s was followed by the invention of photography and other "automatic" recording devices that exponentially increased the fund of images and data about the world without people available in the public domain. With subsequent improvements that simplified photographic processes and the miniaturization and proliferation of new recording devices, the central place widely attributed to humans as image-makers and measurement-takers gave way to one dominated by automatic recording machines. As a result, human subjects were increasingly seen as ancillary forms of life, rather than as chief creators of our contemporary understanding of universe. This essay will analyze the paraphernalia of recording devices attached to the idea of a world without us.

Beyond Retouching: Hans Virchow's Mixed Media and his Drawn X-Rays of the Chinese Foot

Similar to the beginnings of photography numerous expectations were turned on the faculties of radiography when this new imaging technique emerged in early 1896. Its image-producing potential was quickly experienced in various popular and scientific fields. The contribution focusses on the Berlin anatomist and anthropologist Hans Virchow (1852-1940) and how he included the new technique in his research on the movements of the human hand and on the anatomy of the deformed Chinese foot. Virchow was convinced that knowledge arises from the use and interplay of many media. This led him not only to mix media in combining anatomical compounds, hand drawings and photographs, but also to veritably melt these techniques. Painting with ink on radiographs, Virchow obtains highly hybrid results uniting epistemic and aesthetic values of both media. In his writings, Virchow at the same time develops a most critical argumentation about the use of technical images and their epistemic values. It seems that especially practicing with x-ray pictures led him to rehabilitate the importance of subjective intervention in—even mechanical—image production.

KATHRIN FRIEDRICH has since May 2013 been a member of academic staff in the Image Guidance base project of the "Image Knowledge Gestaltung" Cluster of Excellence at the Humboldt-Universität zu Berlin. She previously worked in the Theory Department at the Academy of Media Arts in Cologne and the collaborative BMBF research project "Embodied Information. 'Lifelike' Algorithms and Cellular 'Machines'". She studied Media Studies, Law and Sociology at the University of Marburg.

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ALEXANDER GALL is research fellow at the Research Institute of the Deutsches Museum, Munich. He received his PhD from the University of Munich in 2002 on study about transport policy. He is editor of *Konstruieren, Kommunizieren, Präsentieren. Bilder von Wissenschaft und Technik (2007)*. Among his recent articles is "Authentizität, Dramatik und der Erfolg der populären zoologischen Illustration im 19. Jahrhundert: *Brehms Thierleben* und die *Gartenlaube*," in: S. Samida (ed.): *Inszenierte Wissenschaft* (2011). He is currently working on a project about dioramas in museums and on a project funded by the DFG on the fascination of technology around 1900.

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Having studied art and visual history in Berlin and Rome from 2003 to 2010, **STEFANIE GERKE**, M.A. is a teaching and research assistant at the chair of Art and New Media (Prof. Dr. Charlotte Klonk) at Humboldt-Universität zu Berlin since 2011. She is working on her dissertation about the current artistic reception of postwar architecture and its ruin iconography in film and photography. She co-founded Niche Art & Architecture Tours Berlin in 2009 (www.nicheberlin.de) and has taught at the Berlin branch of NYU.

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Translating Tumours: Images as Relations in Radiation Surgery

Current technologies for clinical radiosurgical treatments of tumours and other abnormalities rely profoundly on applying imaging techniques and operating with different kinds of medical images. Physicians are increasingly challenged to not only read images, but also to literally handle visualisations for conducting therapeutic interventions. The process of diagnostics, treatment planning and performing radiation is guided by imaging technologies such as computed tomography and x-ray imaging, as well as by interactive visualisations, e.g. graphical user interfaces of dedicated planning and control software.

To understand these contemporary practices and the different layers of abstraction and translation that are hidden inside the 'black boxes' of digital technologies as well as their demands for the practical visual knowledge of physicians, it is essential to explore the conceptions of visual operations in earlier radiosurgery systems. The presentation will do so by tracing the relational chains constituted by imaging, images and visual practices in 'analogue times' of radiosurgery. It will take the so called *Gamma Knife* as an example to analyse how radiographic and airencephalographic images were not exclusively used to visualize the brain and suspected malformation but also to operationally translate these between different stages of the therapeutic process. Here, images became more than mere representations, they were considered to be relational processes themselves to translate between the patient's body, the physicians' knowing and technical systems. The presentation will try to disentangle these multifaceted processes in early radiosurgery by focusing on the translational aspects of images during the process of diagnostics, planning and intervention.

Retouching, Staging and Authenticity: Early Animal Photography and the Tradition of Popular Zoological Illustration around 1900

Since the publication of the German magazine *Brehm's Life of Animals* in the early 1860s, biology and especially zoology were by far the most popular topics among the popular-science books in Germany. These books owed their popularity not least to their rich illustrations in the form of drawings reproduced as woodcuts. The paper argues that early photographs of animals were oriented, in their design, on these drawings. Evidence is provided by numerous manipulations of these photos which, next to clearly visible retouching, consisted primarily of various forms of staging. Despite these interventions, the photographs still lay claim to the authenticity and objectivity for their images that the camera and photography promised. While the retouching was soon discarded, other forms of image manipulation drew either no criticism in the discourse on popular zoological Photography influenced by certain naturalists, hunters and photographers, or were even recommended for achieving attractive results by the respective guidebooks/authorities. The tension between truth of nature and staging in these images lay only in part to technical shortcomings of camera and film (or plate); the—hybrid—attempt to attract public attention with the photos—without waiving scientific reputation in the process—was probably also responsible.

SARA HILLNHÜTTER currently works as a research and teaching assistant for art history at the Humboldt-Universität zu Berlin. Since 2013 she is associated with the PhD Program *The Photographic Dispositif* at the Braunschweig University of Art. She is part of the DFG-network *Naturalizing the Transcendental. Epistemic conditions and appearances of the so-called Modern Era in science, literature and art around 1900*. In 2013 she published the Glossary of inflationary terms at nGbK Berlin, which discusses processes of dislimitation within art and work contexts. After her studies in Berlin, New York City and Madrid she worked since 2008 as a project coordinator for Fine Arts at Goethe Institute Mexico City.

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After studying in Vienna and Paris, **HERBERT JUSTNIK** obtained a Master's degree in History of Art in 2007 with a thesis on alpine and polar photography. Between 2000 and 2006 he worked in different capacities at various museums in Vienna. Since 2006 he has been the curator of the photographic collections of the Museum of Austrian Folk Life and Folk Art in Vienna. His most recent exhibition *Staged: photography as agency within the Habsburg Monarchy* dealt with the role of different photographic discourses and media for the establishment of ethnology, and related cultural practices in the Habsburg-Monarchy.

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Depicting History: Measuring Architecture by means of Photography as a Strategy against Time

The architect Albrecht Meydenbauer (1834–1921) used photomechanical images to measure heritage buildings by means of perspective projection. Meydenbauer sought to mechanically minimize the curvature of the rays of light and the lines in the image in order to use the surface of the image as a kind of economy of geometric information.

The talk will interrogate scientific and historical questions regarding the transformation of the status of imagery. It argues that the adjustment of the camera for the purpose of measurement led to an adjustment of photography to the conditions of perspective drawing. Media-specific phenomena such as distortion, misalignment or curvature were thus eliminated in photography to show linear geometrical forms. The talk follows the thesis that the adjustment could be made, because the depicted object provided straight lines and right angles.

How Breath Turns into Light: Spirometric Measurements Using Instant Photography

In the last century instant photography changed possibilities and usual procedure in a large range of photography. This novel analogue *One-Step Photographic Process* had an accelerating effect in everyday life, arts and sciences. Specific construction of the devices and the characteristic photochemical composition of the Polaroid instant film made the development in a darkroom obsolete. Thus, a spatio-temporal reduction enables an immediate comparison between recording and finished photograph.

However, most of these photographs in the 1970s are assigned to scientific and technical fields. The immediate availability was of particular interest in various different ranges of applications, for example the documentation in laboratory processes and medicine. For that reason, there has been increasing trends in use and production of equipment and footage for the scientific field. Simple application and fast measuring values were also characteristic for a photo-optical recording instrument, which was used in respiratory physiology in the 1970s as spirometer, the so called Spirostat. This device was utilized in the early phase of electronic systems for pulmonary function diagnostics.

To visualize *forced vital capacity* of the lung the *Spirostat* as a hybrid photographic apparatus comprises special user-interfaces with analogue/digital/analogue-converters consisting of optical, mechanical, electronic and photographic components. The imaging method for this purpose is based on the calculation of the flow rate via electric impulses of a photocell transferred to a digital computing system, which controls a mechanical drive moving a beam of light across a photosensitive recording layer. In this way a photographic diagram of exhalation is produced. Especially, Polaroid instant film is suitable for this application because images can be directly evaluated with the help of scaled templates.

Ethnology Makes itself and its Images

This lecture will explore and discuss a plethora of ethnographic art practices as they were employed in Austro-Hungarian ethnology (Volkskunde) during its institutionalisation in Vienna (1894 and onwards).

These practices have an essential impact on several stages of image-production. Examples include photographs depicting representative ethnic peoples in traditional attire, which are entirely choreographed by either the ethnographer or a professional photographer in a studio, and manuals for said choreography, written by ethnographers themselves, which include specifications of location, attire and ethnicity.

Ethnographic image practices show during the processes used to edit and translate the images for publication, and are especially visible when the same photograph is edited and treated for different research and/or publication purposes. Treatment and editing of images is necessary to make them comprehensible- some are too ambiguous and vague, others are simply too raw to be read beforehand.

These examples clearly demonstrate that these multifarious image practices and the clarity they generate are very important for the constitution of ethnology as a discipline. Although photography and photographs were seen solely as a means of documentation in the early years of ethnology, they are now prerequisites for the further development of the discipline. Furthermore, photography is an important medium of dissemination and is used extensively in ethnography-related practices to this day.

MICHAEL KEMPF is research assistant in “History and Theory of Photography” at the department of History of Art at the University of Cologne. After studying Cultural History and Theory, Literature and History at the Humboldt-Universität zu Berlin and the Sorbonne Nouvelle, he participated in redesigning the permanent exhibition of the Dresden Museum of Military History which reopened in 2011. Currently, he works on his thesis about early photomapping.

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DAGMAR KEULTJES studied art history, visual arts education, and classical archaeology in Gießen, Kassel and Bologna. She finished her studies in 2005 with a master thesis on the anatomical theatre of Bologna. From December 2005 to October 2011 she was an assistant at the Photo Library of the *Kunsthistorische Institut in Florenz - Max-Planck Institut*. She was also a cataloger in the photo archives of the Villa I Tatti/The Harvard University Center for Italian Renaissance Studies in Florence from November 2011 to November 2012. Since March 2013 she is again a project assistant at the Photo Library of the *Kunsthistorische Institut in Florenz - Max-Planck Institut*. Her doctoral thesis is entitled *Working practices and discourses on photographic retouching 1839–1900*. (supervisor: Prof. Dr. Herta Wolf, University of Cologne)

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STEFANIE KLAMM, art/visual historian and historian of science; co-curator of the exhibition *Photography in World War I* at Collection of Photography, Art Library Staatliche Museen zu Berlin - Preußischer Kulturbesitz; PhD on the history of archaeological visualization at Institute of Art History and Visual Studies, Humboldt-Universität zu Berlin and Max Planck Institute for the History of Science; several fellowships, i.a. at Internationales Kolleg für Kulturtechnikforschung und Medienphilosophie, Bauhaus University Weimar, Excellence Cluster TOPOI (The Formation and Transformation of Space and Knowledge in Ancient Civilizations) Humboldt-Universität zu Berlin, at Getty Research Institute Los Angeles; research interests: material culture of the sciences and humanities; history of museums and collections; visualization practices in the sciences; history of archaeological practice

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Photomapping between Image Noise and Navigational Knowledge: Theodor Scheimpflug's Balloon Aerial Photography

Our maps are supposed to be photographs—this is how Theodor Scheimpflug, a former captain of the Austrian-Hungarian army, used to explain his idea of mapping. Until his early death in 1911, he worked on methods to transform aerial photographs into precise maps. If photography was applied to cartographic rectification, the map would draw itself and map production would be automated. Wide areas—Scheimpflug thought of the colonies in particular—could then be mapped rapidly. Furthermore, the inventor believed his “Photokarte” to be predestined for aeronautical charts. In his opinion, the true-to-life impression of photomaps supported orientation in the air.

The paper on Scheimpflug's balloon aerial photography discusses the techniques on which his different types of photomaps relied. Contrary to Scheimpflug's rhetoric of an inherent “naturalness” of the photomap, the hybrid character of his images will be emphasized: not only that every “Photokarte” was constructed of several aerial photographs, the map sheet had also to be heavily processed to meet cartographic standards. On closer examination, Scheimpflug's concept of a photomap exceeded therefore the idea of mimesis. On the one hand, his “Photokarte” could give a photographic impression of the terrain like in the case of his balloon panoramas; on the other, Scheimpflug later created maps that barely gave a hint on photography as their source material.

Hybrid Negatives: Techniques of Manipulating Paper and Glass Negatives 1840–1900

“We fervently ask Mr. Plaut to replace his hybrid image of the Pont-Neuf with a serious print [...],” admonished French writer Francis Wey (1812–1882) in 1851, in the journal *La Lumière*, referring to Parisian photographer Charles Henri Plaut (1819–1870?). While the other objects in the image were of commendable precision, the designing of the clouds had transformed the sky into an “incompatible mix” of discordant elements. Retouching threatened the autonomy of photography, which could now be demoted to the status of a simple sketch (*calque préparatoire*) for a watercolor or gouache. The term “hybrid-picture” (*image hybride*) is used by Wey as a pejorative one.

Although critics like Wey sought in the early years of photography to increase the quality of the new documentary medium by strictly separating conventional media, retouching techniques were often required for correction purposes. Manuals for retouching and analysis of material from the period show that theory and practice were often incompatible. Lack of sensitivity to the full color spectrum, exposure errors, and even unfavorable forehead wrinkles in portraits were common issues which were ameliorated. Retouching of the negative had the advantage that the positive print could preserve its material homogeneity. It often took place in secret and was imperceptible, in the positive, to the amateur eye. An interlacing of both retouching processes (negative and positive retouching) was common, but successful negative processing could reduce the work on the positive to a minimum.

This paper discusses various retouching techniques on paper and glass negatives from the period 1840–1900 and compares them with the guidelines presented in manuals and photographic journals. Subsequently I present some thoughts as to why “hybrid images” encountered such vehement condemnation from so many art critics.

Reconfiguring the Use of Photography in Archaeology

When archaeology established itself as an academic discipline in the 19th century, it was one of the many disciplines that relied on empirical observation. Based on the material remains of the past, photography as a new imaging technique in the 19th century was likely to affect its formation. But nevertheless a plurality of media remained crucial for archaeology until today: photographs, drawings and plaster casts (and today also digital image production) were always used side by side, and, even more, were very often intermingling with each other. It is only in relation to other media that one understands what photography means for archaeology. The paper will analyze how different imaging techniques complemented each other in archaeological practice and interacted with each other, thereby creating archaeological evidence. Photography became hybrid there in various ways: Not only complemented different media each other, but also additional narratives and inscriptions changed meaning and materiality of the photographs. The paper will focus on late 19th and early 20th century excavations as an important space of knowledge production since around 1900 is a crucial period for archaeology, very influential for the formation of an imagery that would be used by the discipline in the future.

After her bachelor's degree in Communication Studies and Art History at the University of Greifswald, **FRANZISKA KUNZE** did her master's degree in Art and Visual History at the Humboldt-Universität zu Berlin. Currently she is working in the project *Attention & Form* at the Cluster of Excellence *Image Knowledge Gestaltung* and is an associated member of the research group *Das Technische Bild*. In her PhD project she explores artistic analogue photographs which challenge their alleged transparency and instead are characterized by a distinctive opacity.

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Scrutinizing Lives and Bodies: Photography between Nation-building and Ethnology

One of the forgotten treasures in the archive of the University Museum in Bergen, Norway, is a collection of large format daguerreotypes produced in the mid 1850s by the Danish immigrant photographer Marcus Selmer (1819–1900). The collection consists of 11 beautifully framed and subtly tinted studio-portraits of Norwegians dressed in traditional costumes.

In Norway the evolvement and distribution of photography coincided with the national consolidation from the mid-1850 on one hand, and the country's growing involvement with international tourism on the other. Selmer scrutinized the subjects of his new home country, their lives and bodies—starting off with his daguerreotypes. But through the late 1850s and 1860s, he further developed his project through the introduction of a wider specter of photographic methods and formats.

What should not be overlooked in Selmer's work are the obvious pleasure, sensitivity and historic imagination that he invested in his ambitious enterprise of costume/ regional categorization. This may again be seen in relation to his private interest in botany. Like plants and in true correspondence with enlightenment ideas, he mapped his photographic subjects as members of different "species" or "families"—with reference to their "natural habitats", "functions" or stages in the cycle of life. Seen together these images form components of larger totality: A celebratory and complete photographic atlas of his new home country, Norway, represented through its different groups of inhabitants. He constantly expanded his "flora of images"—some of which were taken on location during his travels in Norway. In other images—and particularly of people from places that he never got to visit, the photographer used props in order to create convincing environments in the studio. Or he worked in a simple montage-technique, by making a cut out of the person from the first image—which he then again placed into a drawing of suitable "natural" sceneries.

So how are we to understand this work? As proposed by Elizabeth Edwards in her recent study of the British photographic survey movement, the photographs ability to spur historical imagination precedes the actual production of images. Photography, she argues, is thus not only as a visual system, but a complex and embodied cultural process of which photographs are only the final outcome (Edwards 2014). Inspired by these ideas, this paper will discuss Selmer's work as an embodiment of experiences and historical imagination. But it will also examine his images as hybrid cultural products, oddly situated between different materialities, pre-photographic and early photographic aesthetics, as well as between the visual rhetoric of nation-building, enlightenment-ideas about science/biology and the early development of ethnology (Volkskunde) as a modern academic discipline.

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CLAUDIA PFEIFFER, who studied photographic preservation and collections management in Toronto and Rochester, New York, is a photo archivist. Since 2007, she has been working at gallery Kicken Berlin, where she was involved in the research and production of publications such as *Points of View: Masterpieces of Photography and their Stories* (Steidl, 2007), *Czech Vision*, (Hatje Cantz, 2007), and *Pictorialism—Hidden Modernism: Photography 1896–1916* (Galerie Kicken Berlin, 2008). Her interests focus on popular forms of nineteenth-century photography, photography's relation to other media, and photographs as material objects. She has been research assistant for the photography collection of the Kunstbibliothek Berlin from April 2013 until July 2014.

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OMAR W. NASIM is a historian of science at the Centre for the History of Science in the School of History at University of Kent. He is the author of numerous articles, and of two major monographs: *Observing by Hand: Sketching the Nebula in the Nineteenth Century* (University of Chicago Press, 2013); and the award winning, *Bertrand Russell and the Edwardian Philosophers: Constructing the World* (Palgrave MacMillan, 2008). Currently, Nasim is working on a book on the history of astrophotography in which he explores the complexity of photographic practices in the astronomical sciences. This book will be called *Observing by Light: Photographing the Nebulae*. Nasim holds a PhD from the University of Toronto, and was habilitated at ETH-Zurich. He has worked in Berlin, Florence, Basel, Zurich, and Oxford; and at institutes for the history of science, art, the humanities, and the image.

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PAULA MUHR is a PhD Candidate at the Institute of Art and Visual Studies, Humboldt-Universität zu Berlin, Berlin. She studied visual arts, art history, theory of literature and physics in Serbia and in Leipzig, Germany. Parallel to her practice as a visual artist, she has been active as a free-lance curator and lecturer. She has published a number of articles on contemporary photography. The focus of her current research is image-based production of medical knowledge in relation to hysteria, in particular by means of functional magnetic resonance imaging (fMRI).

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Particle Tracks: About Applications of Photography in Elementary Particle Physics

Until the 1970s photography was the main visualisation technique of elementary particle physics. With the advent of affordable electronics, event reconstruction techniques based on photographs were abandoned. Nowadays, electronic particle detectors serve as giant cameras. In my talk I will give a broad-brush historical overview of the use of photographs in particle physics. Specifically I will contrast the analysis of photographs from bubble-chamber experiments with the use of data from modern silicon semi-conductor detectors.

Photography and Hybrid Images in the History of Science: The Case of Astronomical Practice

Photography's celebrated successes in the sciences are well known. What is less known is that photography did not deal a death-blow to other more traditional media, like drawing by hand. In fact, scientific photography was often used in conjunction with other media, and rarely alone. In this talk we'll be examining the detailed practices of astronomers in their quest to use photography in conjunction with other media and methods to secure images of deep-sky objects like nebulae and clusters. We will illustrate the inter-connectivity between photography and drawing, and photography and charting, essential to astronomical practice, by a close-reading of a series of case studies. In the end, we hope to pin-point the challenges, and ways in which attempts were made to surmount them, that warranted many to claim that the photography of the heavens was one of photography's greatest and "only modern" achievement.

The Photography-based Construction of Medical Knowledge in Relation to Hysteria

At the end of the 19th century, French neurologist Jean-Martin Charcot, claimed that hysteria was caused by the invisible functional brain lesion. In order to prove his hypothesis, he implemented photography in conjecture with other measurement techniques, thus systematically producing medical images of the hysterical body. Photographic images of his predominantly female patients in the throes of hysterical attack brought Charcot considerable fame during his lifetime, but also severe criticism.

Ever since the 1980s, there has been a growing literature within the humanities dealing with the photographic output of Charcot's clinic. Despite differences in their professional affiliations and theoretical approaches, most authors view these photographs as devoid of any scientific value. My analysis of Charcot's images of hysterical attack will sidestep such approaches and focus instead on a highly specific knowledge-generating role of photography in his hysteria project. I will show that the necessary framework for Charcot's implementation of photography within his research practice was a neurological model of hysteria. This framework allowed Charcot to use photography not as a means of documenting or illustrating symptoms, but, first and foremost, to implicate it, together with other techniques, into a measurement process which produced scientific data. I will demonstrate, that the interpretation of data gathered by means of photography caused a shift in Charcot's theoretical model of the hysterical attack. However, as photographic images served only as raw measurement data, their translation into schematic drawings of hysterical bodies was a necessary step in their interpretation. Only through this interaction of the two media—photography and drawing - was photographic image made legible, thus yielding new insights. Regardless of the fact if this newly won medical knowledge would stand the test of time or not, it was generated through implementation of "hybrid photography", used as a measurement instrument in conjunction with drawing.

BEATRIZ PICHEL is Wellcome Trust Research Fellow in Medical Humanities at the Photographic History Research Centre, de Montfort University, Leicester. Pichel holds a PhD in History of Science earned at the Universidad Autónoma de Madrid (Spain). Her research, at the crossroad of photographic history, history of emotions and medical humanities, has been published in journals such as *Endeavour* and collective volumes (*On Resentment*, 2013). Her current research examines how photography acted as a bridge between psychological, psychiatric and physiological theories of expressions and the gestures performed by theatrical actors at the turn of the nineteenth century.

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MORITZ QUEISNER is a research associate at the *Cluster of Excellence Image Knowledge Gestaltung. An Interdisciplinary Laboratory* of Humboldt-Universität zu Berlin. He holds a Master's degree in European Media Studies and is currently a PhD student at the research training group *Visibility and Visual Production: Hybrid Forms of Iconic Knowledge* at the Institute for Arts and Media of the University of Potsdam and the University of applied sciences Potsdam. The goal of his PhD thesis *Augmented Vision* is to develop an operative concept of iconicity in the context of augmented reality.

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ANNA L. ROETHE is a physician and cultural scientist. She is currently researching on surgical and visual practices in the Operating Room at the Charité Berlin and works as a research associate at the Cluster of Excellence *Image Knowledge Gestaltung. An Interdisciplinary Laboratory* since 2013, contributing her interdisciplinary research interests (such as visual epistemics in medical imaging and interventions, knowledge production in doctor-patient-interactions, or mappings as cultural and physiological paradigms) in the projects *Image Guidance* and *Health & Gestaltung*.

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HARALD ROTERT, Dr. med., is a board certified specialist (Facharzt) for Diagnostic and Interventional Radiology with a specialization in cross sectional imaging. He completed his medical training at the Ludwig Maximilians University Munich and Ruprecht Karls University Heidelberg and received his medical degree 1998 at the University of Heidelberg. After his Internship in General and Vascular Surgery in Heidelberg he completed his Residency at the Radiology Department of the University Clinic of Heidelberg between 2000 and 2005. He currently works as chief consultant at the Department of Radiology at the Theresienkrankenhaus in Mannheim, Germany. His special scientific interests are vascular imaging and digital image post processing.

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Between Science and Art: Chronophotography and Drawings as Research Tools in Physiology (1890–1903)

This paper explores the fruitful collaboration between the photographer Albert Londe and the physiologist Paul Richer in the work *Physiologie artistique de l'homme en mouvement*, published in 1895. Conceived as a continuation of Richer's *Anatomie artistique* (1890), this treatise exposed the movement of muscles and bones, as well as their external modifications. Its purpose was twofold: to contribute to scientific research and to provide artists with truthful models. With this aim, this work was illustrated with some photographs, but most of the images were drawings made by Richer from the chronophotographs taken by Londe at the laboratory of the Parisian hospital La Salpêtrière.

The focus of this presentation will be on the reasons why Richer turned some chronophotographs into single drawings in a time when photographic reproduction in books was not only available but also used by Richer himself. Following the turn to practices and materials in recent photographic history (Edwards, 2012; Wilder, 2011; Tucker, 2005), this paper examines the practices of drawing and photographing rather than their visual differences. In this regard, key questions include the functioning of the chronophotographic camera, the material requirements of the stage, the physical performances of photographers and models, and the differences between realistic drawings and sketches.

This discussion provides the framework to examine the ways in which photography was used as a bridge between science and art, and the role that drawings played in this process. A key source for this study is Londe's *Album de chronophotographies documentaires à l'usage des artistes* (1903), which reproduced some of the series taken during his collaboration with Richer. In conclusion, this paper aims to cast light on the relation between the practices of photography and the status of photographs as scientific and artistic tools at the turn of the nineteenth century

Image-guided Vision: Hybrid Forms of Agency in Real-time Imaging

The paper will draw upon a functional shift of photographic images from a medium of visibility and visualization towards a medium that guides operative processes. On the basis of case studies about vision, architecture and navigation in remote warfare it will discuss how real-time video technology and the mobilization of camera technology have produced a type of intervention, in which interaction is increasingly shaped and organized by imaging technology. This form of iconic practice corresponds to a hybrid concept of agency, in which the stabile, subject-centred realm of representation that belonged to classical aesthetics of perception, is replaced by a cooperation between humans and machines.

Hybrid Operatives: Multimodal Vision and Image Control in the OR

Image settings in surgical interventions have been analyzed so far addressing primarily their respective technological complexity and complementarity within the workflow, less with respect to phenomena of combination, overlay, or fusion of the images employed. Not least in neurosurgical operations, though, we encounter a multitude of morphologic-topographical, navigational and functional informations needed that influence the surgical image regime significantly. The technical improvement through visual hybridization forms an epistemic continuum between the different modalities, altering established image traditions and enabling new forms of multimodal visual action control. Dealing with these "hybrid operatives", the paper provides a few examples from brain tumor surgery and outlines a connection to the emergent installation practice of hybrid operating rooms.

FELIX SATTLER, *1979, is an exhibition curator with a research focus on museology as aesthetic practice. He studied Media Culture, Media Arts & Design and Photography at the Bauhaus-Universität Weimar and at the College of Fine Arts Sydney. From 2007 to 2013, he has been a lecturer and researcher at the Bauhaus-Universität Weimar. Since 2013 he is curator of the Tieranatomisches Theater at the Humboldt-Universität zu Berlin.

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JENS SCHRÖTER, Prof. Dr. phil., is professor for the theory and practice of multimedial systems at the University of Siegen and beginning with the 1st of April he will hold the chair for media studies at the University of Bonn. He was director of the graduate school "Locating Media", see: <http://www.uni-siegen.de/locatingmedia/> from 2008-2012. He is (together with Prof. Dr. Lorenz Engell, Weimar) director of the research project "TV Series as Reflection and Projection of Change", see: <http://www.mediatisiertewelten.de/en/projects/tv-series-as-reflection-and-projection-of-change/>. Main research topics are: Theory and history of digital media, theory and history of photography, theory and history of three-dimensional images, intermediality, copy protection, media theory in discussion with the critique of value, tv-series. Recent publications: *3D. History, Theory and Aesthetics of the Transplane Image*, New York/London/New Delhi/Sydney: Bloomsbury 2014; (Ed.) *Handbuch Medienwissenschaft*, Stuttgart: Metzler 2014.

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SIGRID SCHULZE is an art historian and curator at Mitte Museum/Kulturamt Mitte von Berlin. She published on topics related with 19th century photography in Germany and the management resp. history of photographic collections. In 1999 she was a Lisette Model Fellow in Photography at the National Gallery of Canada and Visiting Scholar at the National Archives of Canada. She has been the recipient of grants from the DAAD, the Berlin Cultural Senate and the Stiftung Weimarer Klassik.

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Seen from Above? Photographs of Terrain Models by Hermann und Adolph Schlagintweit 1854

In 1854, Hermann und Adolph Schlagintweit, two promising young German geologists, published their second major work, the "Neue Untersuchungen über die physicalische Geographie und Geologie der Alpen". In addition, they edited a brochure containing 3 photographs of certain alpine regions. The images—salted paper prints from collodion negatives—bear witness to a comparably technologically advanced practice. Today, only a few copies of the publication have survived. In my paper, I discuss the visionary but contrary epistemological potential of the publication's concept.

Following Alexander von Humboldt's and Carl Ritter's understanding of how to gain and disseminate results in geology and geography—an aspect in the history of science that is now called "Humboldtian Science"—, the Schlagintweit brothers used photography as one of various new devices in visualising their findings and observations. Although presented as a means that "promised to represent a situation in its ever specific particularity" (CfP), in this case, the photographs don't depict observed mountain regions as the works of the Bisson brothers or Aimé Civiale do somewhat later. The images show terrain models instead, viewed from above. In my paper, I refer to the images as hybrids from two different standpoints: firstly, in terms of semiology. They are images of reality doubled, showing terrain models and the (modelled) landscape at the same time. Secondly, in terms of how to interpret the photographic image as what was then a new form of visual representation in science. I focus on the latter. I argue that a second, different visual language was essential to make the photographic images readable—cartography—, and that the authors were aware of this interdependence.

Given that in the middle of the 19th century it was impossible to look down to the earth from any position in the sky, the images turn out to depict "impossible views". Today, we perceive them as artefacts that are rather closer to fiction than to the natural sciences.

OLGA SMITH, Dr., is an art historian specializing in photography, with research interests spanning landscape photography, national self-representation and critical approaches to photography. She currently holds the post of Postdoctoral Fellow at the Humboldt-Universität zu Berlin, having previously held positions at the University of St Andrews and Tate Gallery, London. Olga is a graduate of the University of Cambridge and has published on contemporary artists such as Christian Boltanski, Pierre Huyghe, Boris Mikhailov and Valérie Jouve.

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FRIEDRICH TIETJEN is currently Visiting Professor for Modern and Contemporary Art at the University of Vienna. Until 2013 he has been teaching as Assistant Professor for History and Theory of Photography at the Academy for Visual Arts (HGB) in Leipzig. His main fields of research, teaching and writing currently are bad art, the theory and history of photo-mechanic reproduction processes, portrait photography as a means of bourgeois subjectivation, and the cultural history of the moustache.

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Embalmed Reality: Diorama, Photography, Taxidermy

In the end of the 19th century the diorama became a scientific and educational device for representing natural environments within natural history museums all over the world. At the crossroads between scientific study object and illusionistic entertainment display, the diorama mimics the natural appearance and habitat of animals in order to furnish truthful information about the form, the habits and the living conditions of the specimens represented. The diorama, as we know it from Natural History museums, is composed of a panoramic background painting, a foreground, displaying real objects and plants collected in the field, and taxidermic specimens made of the real animal skin stretched over a life-size clay sculpture. As such, it shares several functions with photography.

First of all, the taxidermic technique corresponds to photography's function to "embalm time" (André Bazin) in order to provide an authentic trace of the represented specimen. It is thus hardly surprising that taxidermy, diorama, and photography have a common ground in the 19th century's debates on authenticity and truth. Like photography, the natural habitat diorama was supposed to capture a single moment in time and to furnish truthful information of a specific situation. It is striking how often dioramas are described as if they would be photographs. According to Frank Chapman they are "windows on nature", and, more recently, Boris von Brauchitsch considered photographs of dioramas as "photographs of photographs". Furthermore, photography played an important role in the production of a diorama. Photographs from the field were used to reconstruct both, the natural setting of the animals and the landscape of the background painting. Stereoscopy was used to get an idea of three-dimensional space, and animal photography played a role in studying the specimens' attitudes and behavior. Focusing on the complex relationships between taxidermy, diorama, animal photography and stereoscopic images around 1900, the paper rejects the idea of photography as a means to enhance another medium (diorama). Rather than considering photography and diorama as rivaling media that can be compared with—and distinguished from—one another, I suggest that they are, together with other media such as panorama, painting, taxidermic sculpture, stereoscopy, and museum display, part of a discursive field where science, ecology, art, and entertainment intersect.

Photography as a Form of Measurement

Photographic images can be applied as a means of measuring the height of buildings, the intensity of lights and for a number of similar purposes. The image alone however is not sufficient for the intended measurement; it seems that secondary non-photographic measurements are of crucial importance. The paper will discuss what is needed to make a photographic image fit for being applied measuring; and it will draw some conclusions on what that means for the relation of photographic images and measuring in general.

Going Viral: How Popular Media Changed Scientific Photography

The paper explores how mass popular visual and print culture played a key role in shaping the meaning and values of scientific photography from the 1880s through the 1940s. Focusing on selected examples from the history of the representation of microbes in the British and American press, it aims to show how changes in the productive interrelationship of concurrent photographic media and technologies affected the forms, functions, affects and dynamics of scientific photographs on the printed page. It considers the way that practices of production and consumption affected design and materiality, how the photograph in popular newspapers and magazines presented a new dynamic of photography's spatial and temporal qualities, and how the history of scientific photography has been delivered through the printed page.

HELMUT VÖLTER (*1978 in Berlin) is an artist and graphic designer from Leipzig. In 2011, he published his book *Cloud Studies* based on a research on scientific cloud photography. A parallel exhibition was shown in Germany, Switzerland and the Netherlands. His recent project is a research on the Japanese cloud physicist and photographer Masanao Abe. An exhibition on Abe is currently shown in Japan, a book will be published this spring by Spector Books.

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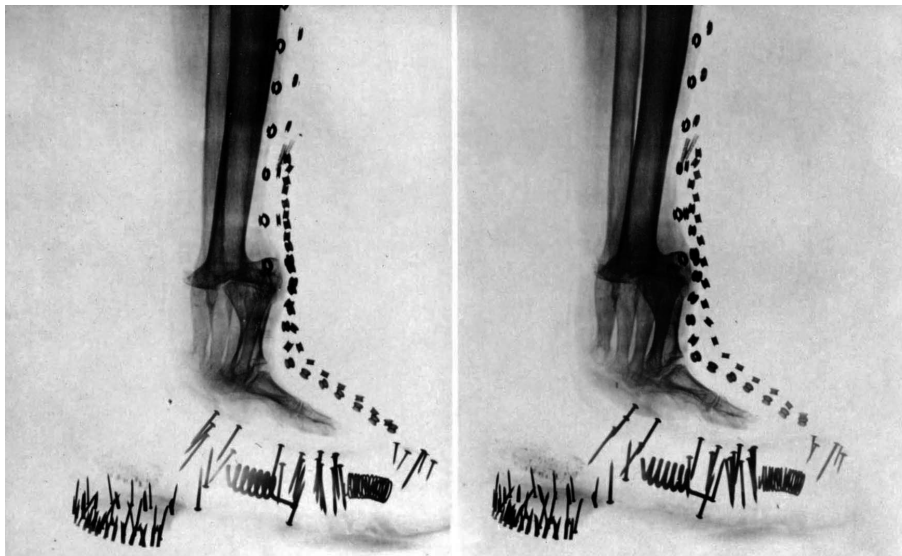
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Masanao Abe: The Movement of Clouds around Mount Fuji

In 1927, the Japanese physicist Masanao Abe built an observatory with a view of Mount Fuji. For over fifteen years, he observed the movement of the clouds around the mountain by means of film and photography. Abe's aim was the question whether the clouds could be read as visible indicators of the invisible air streams. To be able to record and measure clouds, Abe combined film and photography both in mono and stereo, further stereophotogrammetry, drawings, and topographic maps.

Stereo Atlases as Hybrid Knowledge

This paper examines the nature of stereo photography in Scientific Atlases. Taking as a starting point Daston and Galison's close work with scientific atlases, and Daston's concept of the epistemic image, I discuss the close relationship of diagrams, the flat image and the 3D image, taking into consideration scholarship on attention, observation and stereo vision.



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