

HISTORICAL PERSPECTIVE

Concrete Photography

(In-Between) Light Image and Data Image

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ABSTRACT

The author discusses his works of concrete photography contributed to the Peter C. Ruppert Collection, *Concrete Art in Europe after 1945*, in the Museum im Kulturspeicher Würzburg. He discusses Concrete Photography as a form of nonrepresentational photography in which the medium itself moves away from its classical role of representing the external world to take on a strict self-referential role, in between both traditional light-images and images of the digital world.

Following the origin of the term *concrete photography* in the 1960s, and then its reappearance around 40 years later, a number of publications have documented its history, theory and practice [1] as a form of nonrepresentational photography in which the medium itself moves away from its classical role of representing the external world to take on a strict self-referential role. Yet the roots of concrete photography go back much further, to the thought of the German philosopher Konrad Fiedler (1841–1895) on the “visibility of the image” in 1887 [2]. Twenty years later, they reappear in the words and works of the American-born British Vorticist Alvin Langdon Coburn (1882–1966) [3]. Coburn was a pioneering concrete photographer and the first to formulate its program, enhancing the latter in a logical, aesthetically compelling manner with his *Vortographs*—abstract and entirely self-referential camera compositions of light and shadow. Concrete photography could subsequently be regarded both as a discrete form of photography and as an autonomous form of concrete art—although the term *concrete* did not as yet exist in an artistic context at the time. It only found acceptance through Theo van Doesburg’s manifesto of concrete art [4], which led to the

universal idea of concrete art and its practice in the fields of painting, graphic art, sculpture and, later, in poetry, music, dance, film as well as eventually in concrete photography [5]. After Coburn, corresponding forms and images emerged in the wake of experimental photography at the Bauhaus and in the photography of the Neues Sehen in the 1920s, as well as in West Germany after 1945, when the *fotoform* movement picked them up once again. They were developed further by subjective, generative and concept photography, the projects of which gradually exposed the autonomous structures of the photographic process, making them visible through their intrinsic means [6]. This is established history and has often been documented, not least in Würzburg in connection with the collection of Peter C. Ruppert. We could then consider concrete photography almost a *topos* well established in the history of photography and art, and simply move on—were the traces of concrete photography simply lost there. This, however, is not the case. The traces led to a lively present and even beyond. We are required to investigate in various directions.

TRACES OF THE PAST: LIGHT IMAGES

Fiedler

We have already mentioned Konrad Fiedler. He defined a concept of the image in which “the forms of the image are autonomous from any aesthetic or cognitive functions” [7]. This was an unusual notion at the time and refuted the idea that an image had to depict or represent something in order to be a “picture.” It seemed inconceivable that the “forms of the image” could be void of any such notion of representation one day. Yet the idea led to one of the great artistic achievements of the twentieth century: abstract art (followed by concrete art, with of course clear distinctions between the two) [8]. Fiedler provided the central idea that “something is created which seems to be present *only on account of its visibility*” (emphasis added). This established the formula for a new pictorial understanding: the visibility of the image! Neither the depiction of the visible, nor the visibility of the non-visible, nor the reflection of perceptions, but rather the

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Article Frontispiece. Ursel Jäger, *Gottfried Jäger presents His Pinhole Structure 3.8.14 F 2.6, 1967*, Bielefeld, 1968. (© Ursel Jäger)

production of *visibility* alone, provided the grounds for the image. It was only to be visible.

Such words evolved into an image a mere 20 years later. The historic date is 1910, the year in which Wassily Kandinsky (1866–1944) painted the so-called First Abstract Watercolor [9]. Even if abstract pictures might already have been produced [10], Kandinsky was the first “who truly reflected on and simultaneously experimented with the aesthetic possibilities of communicating meaning through nonfigurative forms and colors, ushering in a new aesthetic era” [11]. It was to take another 20 years, however, until the image found its proper designation: “concrete painting.” In 1930, Theo van Doesburg and his colleagues published the liberating manifesto: “*Concrete painting*, not *abstract*, because we have left behind us the time of searching and speculative experiments” [12]. Words and images may be allied partners at the interface of scientific theory and artistic practice, but they need time to find each other properly and establish new concepts.

Coburn

This can be seen in the development of concrete photography as well. We regard as its founding father Alvin Langdon Coburn, who attained a new type of image on the basis of the terms of *form* and *structure*. In 1916, he suggested “that an exhibition be organized of ‘Abstract photography’ [for which] no work will be admitted in which the interest of the subject-matter is greater than the appreciation of the extraordinary. A sense of design is, of course, all important” [13]. In this renowned text penned by the great photographer in 1916, the concept of design (which means form and structure) appears as an *operative* term for the very first time in the history of photography: What is essential is not reproduction or representation of forms and structures, but their production—not what the image shows, but what it is. Coburn thus applied Fiedler’s ideas to the field of photography for the very first time—and so created nothing less than a new pictorial genre: concrete photography. Its results can be considered *structural images* [14].

This new type of image initiated a discourse on the (ontological) position of photography hitherto endorsed as a medium of realism and on photography’s (epistemic) role over and above this assumption. An extension of the concept of photography was the consequence. Coburn not only wrote the key text on this question but supported his ideas with his own images as well. He called them *Vortographs*, crystalline images of whirls or eddies exuding an unusual beauty. When first exhibited at the London Camera Club in 1917, they caused a sensation. “The photographic press went wild” [15].

Indeed, a different, a *concrete* photography was in the process of being created here—although the actual term did not as yet exist in this context. What was different was, quite simply, the abstract element, as shown in Kandinsky’s first watercolor. Yet the latter is not so much an abstract but a concrete watercolor: without external reference, pure visibility. Both terms are now used interchangeably, sometimes without a clear distinction between them. However, they represent two contrary methods of knowledge acquisition. The abstract method works in a *deductive* manner. It draws a conclusion

from the general to the particular—from the universally visible, for instance, to a specific detail. The concrete method proceeds in an *inductive* fashion. It starts with “nothingness,” a thought, an idea, which is then realized and concretized. In short: abstraction idealizes a reality; concretion realizes an idea. This is confirmed when looking at abstract and concrete photographs [16].

CONCRETE PHOTOGRAPHY

From this we can therefore deduce: Aesthetically, and as far as their production is concerned, concrete photographs are not intended to reproduce or represent anything beyond their own being. They are nothing but themselves—in contrast to conventional photographs, which always depict an external object. Concrete photographs merely refer to their own inner-pictorial rules and principles. They are opaque, not transparent [17]. They are not medium but object; they *are* the object. Their self-reference is their program. Inevitably, however, human perception wants to see something in them, attribute something to them—content, meaning—and understandably so, for in their elusiveness, they are attractive and possess a certain signal effect. They demand attention and, in terms of semiotics, are related to forensic indices and diagnostic symptoms insofar as they are treated, like them, as a causal, obvious and irrefutable consequence of a definitive origin. Just like traces. That is their appeal. Yet as far as their aesthetic reception goes, they provide neither icons nor symbols but only the indexically authentic and permanently visible trace of electromagnetic radiation (light, warmth) on radiation-sensitive material (AgX, chip). Therein lies their potential.

A history of concrete photography would go beyond the scope of this article. The earliest known appearances of the term “concrete photography” emerged toward the end of the 1950s in an international context. An account of its first milestones follows.

Brazil

On 24 August 1958, an article entitled “*Recriação—ou a fotografia concreta*,” penned by writer and art critic Ferreira Gullar, was published in the Sunday supplement of Rio de Janeiro’s *Jornal do Brasil* [18]. In English, the title reads “Recreation (rebirth)—for a concrete photography,” and the content of the contribution certainly allows for such an interpretation. Yet the article focuses on photographic works by the Brazilian entomologist and artist José Oiticica Filho (1906–1964); years later, in 2008, the works were honored at the Centro de Arte Hélio Oiticica in Rio as part of the *Projeto Hélio Oiticica* [19]. The article advocated a new approach to photography by concretizing the inherent means of the medium—very similar to the method chosen by the German *fotoform* movement around 1950. At the time, there existed an active artistic exchange between the photographic avant-gardes of Brazil and Germany [20].

The published illustrations reveal a graphic pattern of triangles that gradually changes into complex geometric black-and-white compositions (Fig. 1). These are patterns atypical of photographs. Yet the method used corresponds to the



Fig. 1. José Oiticica Filho, *Recriação 1-5*, 1958, Projeto Helio Oiticica, Rio de Janeiro. (© José Oiticica Filho)



Fig. 2. José Oiticica Filho, *Recriação 25-64*, 1964, Projeto Helio Oiticica, Rio de Janeiro. (© José Oiticica Filho)

forms of experimental photography known at the time, and to the international style of the period, with its free geometric forms—as represented by Max Bill (1908–1994), among others, at the first international São Paulo Art Biennial in 1951. However, there also existed trends against the rigid doctrine of concrete art in the guise of constructivism. In José Oiticica Filho's photographic work, it finds expression in photographic mixed media in the style of cliché-verre, with free gestures of paint manually applied on transparent materials and sheets of glass and fragments of cellophane in polarized light (Fig. 2)—a manner hardly in line with the Swiss master of concrete constructive art. Some notable examples are found in a book on José Oiticica Filho published in 1983 [21]. Thus, both the title and content of the article and the interview should be interpreted as an appeal for a new beginning, a “neo-concretism” with regard to concrete art primarily making use of constructive means. The criticism voiced at the time is a remarkable indication of the stylistic breadth and diversity signified by concretism, and it takes on a pleasant dimension in the photographic works of José Oiticica Filho [22].

Germany

Berlin is a second, equally significant location for the first appearance of the term “concrete photography.” Its subject is discussed in a meeting with Pit Kroke (1940–2016), a metal sculptor of international standing, who has been living and working on Sardinia since 1964. In Berlin in 2014 [23], he reflected on his years as a student at the Hochschule der Künste, from which he graduated in 1962 as a master student under the steel sculptor Hans Uhlmann. His student records show that he was registered for a course entitled *Fotografik* with Heinz Hajek-Halke (1898–1983) in 1958. Hajek-Halke was an

experimental photographer and, at the time, the director of photo workshops. It was here that the budding artist Kroke discovered a new field: photography and film—in particular, “the moving and structured light generated by grid patterns and other technical devices,” a topic that still dominates his lifework, “the duality of light and shadow” [24].

Shown in Fig. 3 is the hitherto-unpublished result of Pit Kroke's studies: a book object, 21.5 × 24 cm, original prints on silver gelatin baryta paper, with photoinherent patterns that bear no resemblance to familiar objects. One of Kroke's fellow students, Ralph Wünsche (1932–2004), wrote a text



Fig. 3. Pit Kroke, Ralph Wünsche, *konkrete fotografie. Eine Fotografie ohne Abbildung realer Objekte. Dokumentation und 34 Abbildungen* (concrete photography. A Photography Without Representation of Real Subjects. Documentation and 34 Images), book object, 1959, Berlin, archive Pit Kroke. (© Pit Kroke)

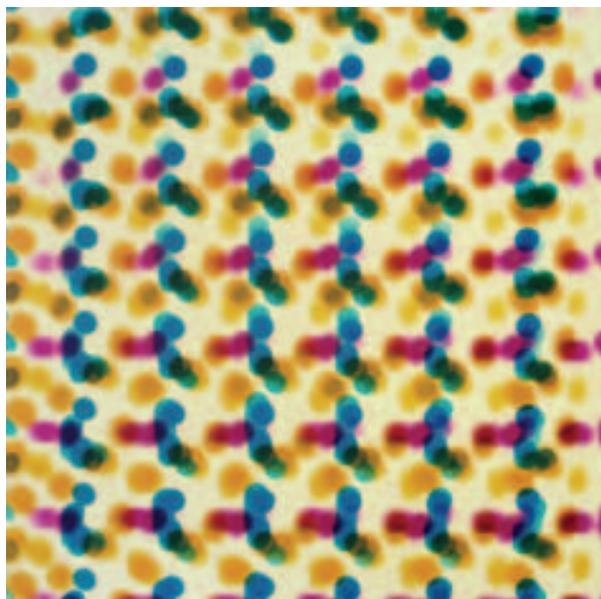


Fig. 4. René Mächler, *Lochraster*, luminogram, unique chromogenic print, 23.5 x 23.5 cm, 1967, Fotostiftung Schweiz, Winterthur. (© René Mächler/Fotostiftung Switzerland, Winterthur)



Fig. 5. Roger Humbert, *Lichtstruktur*, luminogram, unique gelatin silver print, 50 x 50 cm, 1962, artist's archive. (© Roger Humbert)

for the book, now lost. We are therefore dealing with a fragment, a draft, never published. Only today do we see it as an authentic object of concrete photography referring to its own pictorial history and, above all, to the history of the term. What counts is its title; to the best of our knowledge, the term concerned is thus mentioned for the first time in a European context—and only now, with the emergence of the book object, do we clearly see its connection. The term “concrete photography” only met the light of day in Europe eight years later—as an exhibition title at the *Galerie aktuell* in Bern in January 1967.

Switzerland

This very exhibition in Bern brought together four Swiss avant-garde photographers: Roger Humbert (1929–), René Mächler (1936–2008), Frédéric Schnyder (1945–) and Rolf Schroeter (1932–). It exhibited grid projections, light structures and luminograms of a primarily constructive style. An invitation, a poster and a review in *Schweizerische Photo-rundschau* are the only surviving references to this exhibition [25]. The group did not receive the response they had hoped for—admission to the circle of concrete artists surrounding Max Bill in Zurich and acceptance within its framework—although they similarly worked on the basis of elementary concrete concepts. Thus the term *concrete photography* gradually disappeared and did not appear again for about three decades [26]. However, several members of the group continued its aesthetic legacy: above all René Mächler, the leader of the group (Fig. 4). His concept found recognition in 2006 in his last solo exhibition, publication and collection in Winterthur [27]. Roger Humbert (Fig. 5) also continued work on the *light drawings* he had begun in 1962, but with new means. An academic paper relating to it was published in 2011 [28].

GENERATIVE PHOTOGRAPHY

One year after the exhibition held in Bern, the Kunsthau Bielefeld, Germany, presented *Generative Fotografie* (Fig. 6) [29], with works by Kilian Breier (1930–2011), Pierre Cordier (1933–), Hein Gravenhorst (1937–) (Fig. 7) and myself (1937–) (Article Frontispiece). Its program of a systematic and constructive image-generating photography picked up on and included the budding ideas of a computer aesthetic, as suggested in those eventful years by the art theorist Herbert W. Franke, with his cybernetic aesthetic, and the Stuttgart school of thought around Max Bense (1910–1990), with its generative aesthetic: information theory, generative grammar [30] and the relationship between man and machine [31] played a role. Numerous activities, publications and exhibitions by representatives of this scene followed, such as participation in the international exhibition *Wege zur Computerkunst* [32] and the European avant-garde movement *Neue Tendenzen I* [33] based in the Yugoslavian metropolis of Zagreb. For some years, their activities produced a rationally enforced “apparative art” [34] which not only combined both camera and computer, but also included the new electronic media in its programmatic discourse.

The publication that followed seven years after the Bielefeld exhibition acquainted expert circles with the program and term of generative photography [35]. Over the years, however, the pioneers’ artistic development shifted from an initially determinist and serial style to a more liberal handling of the means and methods inherent to photography. Gestural and material-related concepts were the result of a development *from generative to concrete photography* [36] whereby, today, generative photography is considered a subdivision of concrete photography. It is characterized by its proximity to algorithms and programs. Conceptually and methodically, therefore, it represents a link to computer art and is a bridge between light and data image.



Fig. 6. Exhibition *Generative Fotografie*, Art Museum (Kunsthau) Bielefeld, 1968. Left: Hein Gravenhorst, *Fotomechanische Transformationen* (© Hein Gravenhorst); right: Gottfried Jäger, *Pinhole Structures*. (Photo: Gottfried Jäger. © 2015 VG Bild-Kunst Bonn.)

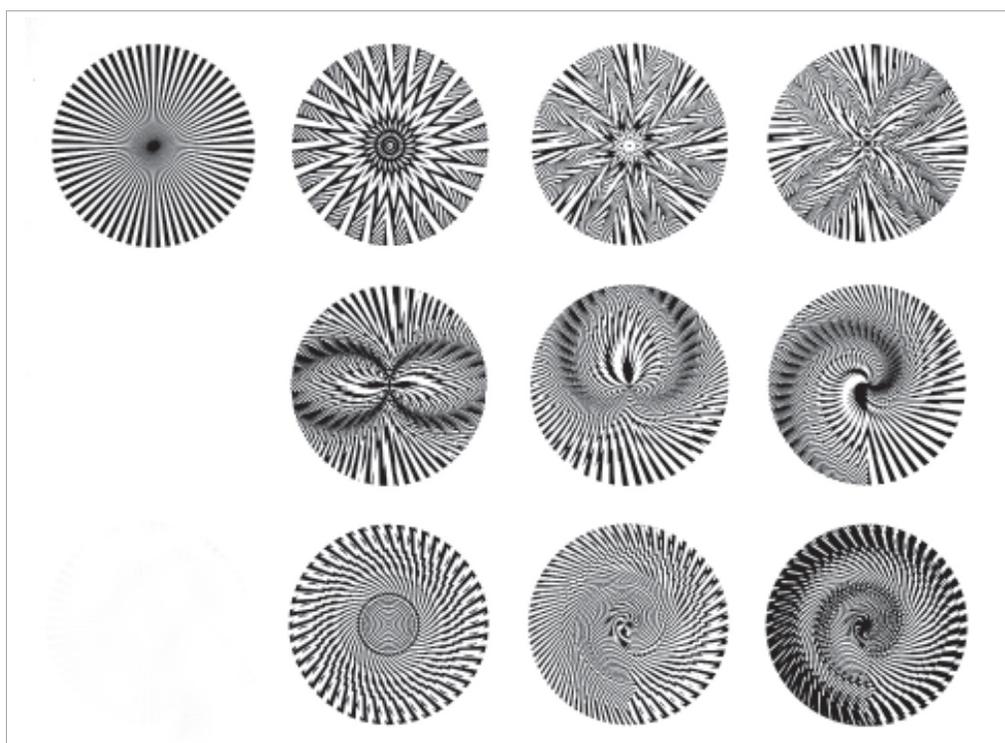


Fig. 7. Hein Gravenhorst, *Fotomechanische Transformationen*, gelatin silver prints, tableau, 1966/1967, exhibition *Generative Fotografie*, Bielefeld 1968. (© Hein Gravenhorst)

TRACES OF THE FUTURE: DATA IMAGES

This article has thus far quite naturally considered photographs as analogue light images, whether representational or abstract. They rely on the exposure of light-sensitive material (film, photo paper) which, in line with its (analogue!) conditions, absorbs and saves the optically produced image on the photographic layer. Both exposure and the act of saving are simultaneous, generating a “latent image” in the layer that is subsequently developed, fixed and treated chemically.

The digital process is based on the electric conductivity of solid bodies in the semiconductor technology, enabling the complex data *stream* (of a light image) to be split into binary data *impulses* (chip) and so to be saved. This allows data to be edited, disseminated, manipulated and deleted in almost any way possible—indeed, without a trace! Whereas it is possible to verify the transformation of an analogue photograph on its way from the repository (film, negative) to a visible image, this is virtually impossible in digital photography. The authenticity and credibility of the digital photograph are

therefore highly controversial, discrediting its role as a reliable “document of direct testimony.”

This loss, however, also comes with a considerable gain of creative possibilities, which is the point here. When existing photos are uploaded (scanned) into a computer or taken from the vast mass of pictures available on the Internet, photo-typical images can be generated without a camera, without photo material or light(!). In a paradox reversal of their origins, these photos appear “deceptively genuine”—without “really” being photos. However, they are still associated with the photographic and rely on its characteristics.

The new generation of photo artists pick up parameters of the photographic aesthetics, develop and concretize them further, as Karl Martin Holzhäuser with his digital montages (Color Plate C); they play with its means, which become independent and begin a life of their own on the basis of algorithms of historic patterns, gained from the originals of photograms of Moholy-Nagy; thus, forms slowly develop that no longer seem to bear any resemblance to the original photograph (Fig. 8). A semiotic legend might perhaps be the only way of providing clues. These are *pictorial traces*, traces of the photographic. They do not depict *external* conditions, such as a real landscape, but make a virtual landscape visible—they visualize *internal* conditions of the technical informational image system. The pictorial process as such is objectified, concretized. “You don’t take a photo, you make it” [37]. This formula of an image-generating photography provides the basis of the new data images—and at the same time, these also confirm it.

Crucial, alongside their idiosyncratic beauty, for the intrinsic value of the new generation of images is their “apparent” logic, their “inner necessity” (Kandinsky) [38]. This concerns the plausibility between image agent and image outcome, a condition described earlier as the constancy of the trace. This is confirmed through the serial aspect that often characterizes the new works, akin to the thought and practice of serial music. We may then refer to them as serial pictorial works. Their feature is the gradual change of individual creative parameters against the constant background of others, thus creating a certain kind of transparency and plausibility. In other words: “The results visualize the respective indexical-technological relationship between input and output as the essential element of aesthetic perception” [39]. Even if this is not immediately apparent, the ambitious and calculated manipulation of the image process is more than obvious. They are *process images*.

Stylistically, these are *photographisms* reflected here, photographisms in the data image—comparable with the photographisms that emerged under the auspices of photorealism in the painting of the 1970s [40]. Their results are *photoreferential*, not *photographical*, but of a *photological* and *photoreflexive* kind. They are the outcome of a produc-

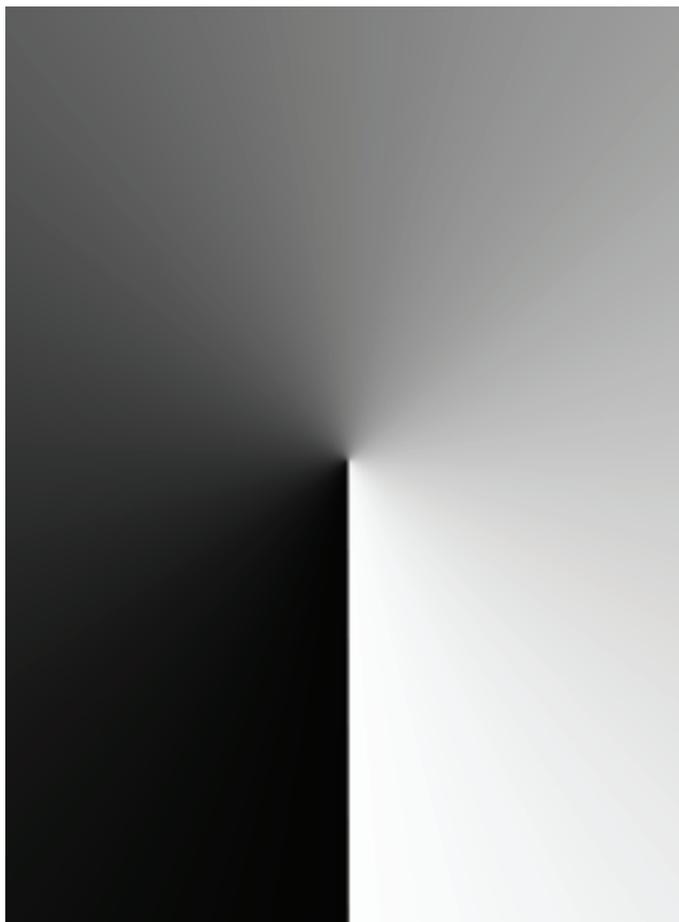


Fig. 8. Gottfried Jäger, *Photo 081023.1655*, digital composition, Digigraphie™, 150 × 110 cm, 2004–2008, courtesy Epson Kunstbetrieb Düsseldorf. (© 2015 VG Bild-Kunst Bonn)

tive pictorial engagement with the photographic process, which, originally, was entirely focused on replication. The photo-referential data image refers to this origin—and simultaneously lays a trace into the future.

Language, in turn, comes into play in this context. What can we name these new-generation images, what are the theories that accompany them and what theories do they create? A new field opens up, urging a creative dialogue between word and image. The shown must be accompanied by the named. Both the discourse and the practice of concrete photography—from Fiedler and Coburn to van Doesburg and Max Bill et al.—provide a vivid picture.

I therefore suggest referring to the results of form-giving processes as *photogenic* images—but not in the common or literal sense of the word referring to something that is attractive: they are *photogenic* images because they are photo-generated. In the same manner, the new photoreferential data images could be named *photological* images. Both kinds of image—the *photogenic* and the *photological*—produce new realities, each in their very own way. The *photographic* images may be juxtaposed with the image-recording “that-is-how-it-was” images. In short, we might reduce the three potential attributes to *photographic*, *photogenic* and *photological* images. A photo-based science of the image—let us call it *photology*—would be able to elucidate connections of this kind in more detail [41].

References and Notes

- 1 Gottfried Jäger, *The Art of Abstract Photography* (Stuttgart, New York, 2002); Gottfried Jäger, Rolf H. Krauss, Beate Reese, *Concrete Photography/Konkrete Fotografie* (Bielefeld, 2005); Gottfried Jäger, "What Is Concrete Photography?" in *European Photography 77* (Göttingen, 2005) pp. 3–12; Lyle Rexer, *The Edge of Vision. The Rise of Abstraction in Photography* (New York, 2009).
- 2 Cf. Lambert Wiesing, "Von der Sichtweise zur reinen Sichtbarkeit," in Lambert Wiesing, *Die Sichtbarkeit des Bildes. Geschichte und Perspektiven der formalen Ästhetik* (Reinbek, 1997), pp. 154–160, here p. 159.
- 3 Alvin Langdon Coburn, "The Future of Pictorial Photography," in *Photograms of the Year* (1916), cited in Beaumont Newhall, *Photography: Essays and Images: Illustrated Readings in the History of Photography* (New York, 1980) pp. 205–207.
- 4 Theo van Doesburg, "Kommentare zur Grundlage der konkreten Malerei," (1930) in Margit Weinberg Staber, ed., *Konkrete Kunst. Manifeste und Künstlertexte, Studienbuch 1* (Zürich, 2001) p. 25; Hans Jörg Glattfelder, ed., *Alexander Kojève. Die konkrete Malerei Kandinskys* (Bern, Berlin, 2005)—the editor's afterword gives an account of the gradual appropriation of the term "concrete" in the context of art until 1930.
- 5 Cf. Andrea Seyfarth, *Zum Begriff künstlerischer Konkretion (in Bezug auf Malerei, Musik, Poesie, Fotografie)* (Universität Jena, 2001).
- 6 Cf. Gottfried Jäger, *Bildgebende Fotografie. Fotografik Lichtgrafik Lichtmalerei. Ursprünge, Konzepte und Spezifika einer Kunstform* (Cologne, 1988).
- 7 Konrad Fiedler, "Über den Ursprung der künstlerischen Tätigkeit" (1887) in Gottfried Boehm, ed., *Schriften zur Kunst*, vol. 1 (Munich, 1991), pp. 111–220, cited in Wiesing 1997, here p. 159.
- 8 For more detail on this distinction, see Gottfried Jäger, *Concrete Photography/Konkrete Fotografie* in Jäger, Krauss, Reese [1], pp. 15–26, 43–54, here pp. 15 ff., pp. 43 ff.
- 9 The so-called First Abstract Watercolor is a draft for *Komposition VII*, 1910, also dated 1913, 50 × 65 cm, Musée National d'Art Moderne, Paris; cf. Michel Seuphor, *Knaurs Lexikon Abstrakter Malerei* (Munich, Zurich, 1957), p. 211; Peter Anselm Riedl, *Kandinsky* (Reinbek, 1983), pp. 69 ff., p. 136.
- 10 As early as 1899, the Munich art nouveau artist August Endell found the term for "an art of using forms that mean nothing and represent nothing and recall nothing, forms that stir our souls as deeply and as powerfully as only music is capable of doing with sounds" in Riedl [9], p. 51.
- 11 Riedl [9] p. 53.
- 12 Van Doesburg [4] p. 26.
- 13 Coburn [3] p. 207.
- 14 Cf. Gottfried Jäger, "Bildsystem Fotografie," in Klaus Sachs-Hombach, *Bildwissenschaft. Disziplinen, Themen, Methoden* (Frankfurt/Main, 2005) pp. 349–364, here p. 355.
- 15 Nancy Newhall, "Alvin Langdon Coburn. Der jüngste Stern," in Karl Steinorth, ed., *Alvin Langdon Coburn. Fotografien 1900–1924* (Zürich, New York, 1998), p. 44.
- 16 For more detail on this subject, see: Gottfried Jäger, *Concrete Photography/Konkrete Fotografie* in Jäger et al. [1] pp. 15–26, 43–54; also cf. Jäger, "What Is Concrete Photography?" [1], p. 3.
- 17 Cf. Winfred Nöth, "Photography between Reference and Self-Reference" in Ruth Horak, ed., *Rethinking Photography I + II* (Salzburg, 2003), pp. 22–39.
- 18 *Jornal do Brasil*, Suplemento Dominical (24 August 1958) (Rio de Janeiro) p. 3.
- 19 *Projeto Hélio Oiticica* is the foundation that manages the estate of Hélio and José Oiticica. The title of the exhibition was *José Oiticica Filho: fotografia e invenção* (photography and invention).
- 20 Cf. Martina Merklinger, *Deutsche Kunst in São Paulo* (Bielefeld, 2013).
- 21 Paulo Herkenhoff, Nadja Peregrino and Evandro Outriques, *José Oiticica Filho. A ruptura da fotografia nos anos 50* (Rio de Janeiro, 1983).
- 22 I am indebted to my Brazilian colleague, the photographer and image theorist Professor Andreas Valentin, for the information he provided me for this paragraph, November 2014.
- 23 Pit Kroke, conversations with author, Berlin, September and October 2014.
- 24 Christoph Brockhaus, "Über Pit Kroke. Licht und Schatten oder Raumkunst und Lebensform," in *Künstler. Kritisches Lexikon der Gegenwartskunst* 62/13, 2003, p. 3.
- 25 Jacques Dominique Rouiller, "Photographie concrete" in *Schweizerische Photorundschau* 4, 1967, pp. 138–140.
- 26 The term appeared again at the beginning of the 1980s in a number of publications, among others, for instance, Gottfried Jäger, *Konstruktive Entwicklungen in der Fotografie*, lecture held in Vienna, 1981, in *Camera Austria* 10 (1982), pp. 41–47.
- 27 Martin Gasser, ed., *René Mächler. Am Nullpunkt der Fotografie. Fotografien und Fotogramme 1952–2004*, Fotostiftung Schweiz Winterthur (Sulgen/Zürich, 2006).
- 28 Katharina Lang, *Roger Humbert und die konkrete Fotografie. Einordnung seines Werks (1945–1974) und kritische Analyse eines Doppelbegriffs der Fototheorie*, University Zürich (Zürich, 2011).
- 29 Exhibition *Generative Fotografie*, Kunsthau Bielefeld, exh. leaflet with texts by Herbert W. Franke and Gottfried Jäger, curator (Bielefeld, 1968).
- 30 Cf. Noam Chomsky, *Syntactic Structures* (The Hague, 1957).
- 31 Karl Steinbuch, *Automat und Mensch. Kybernetische Tatsachen und Hypothesen* (Berlin, Heidelberg, New York, 1965; first publ. 1961).
- 32 Cf. Herbert W. Franke, "Wege zur Computerkunst. Ein Rückblick," in *Murnau Manila Minsk. 50 Jahre Goethe-Institut* (München, 2001) pp. 172–175.
- 33 Cf. exh. cat. *Die Neuen Tendenzen. Eine europäische Künstlerbewegung 1961–1973*, Museum für konkrete Kunst Ingolstadt 2006; *A Little-Known Story about a Movement, a Magazine, and the Computer's Arrival in Art: New Tendencies and Bit International 1961–1973*, Darko Fritz curator, Margit Rosen ed., Neue Galerie Graz 2007, ZKM Karlsruhe 2008.
- 34 Herbert W. Franke, Gottfried Jäger, *Apparative Kunst. Vom Kaleidoskop zum Computer* (Cologne, 1973).
- 35 Gottfried Jäger, Karl Martin Holzhäuser, *Generative Fotografie, Theoretische Grundlegung, Compendium und Beispiele einer fotografischen Bildgestaltung*, introduced by Herbert W. Franke (Ravensburg, 1975); Gottfried Jäger, "Generative Photography: A Systematic, Constructive Approach," *Leonardo* 19, No. 1 (1986), pp. 19–25.
- 36 Gottfried Jäger, *From Generative Towards Concrete Photography*, Lecture, University Nottingham, 30 June 2007 in Kerstin Stremmel ed., *frame #2*, (DGPh, Cologne, 2008) pp. 122–236.
- 37 Alfredo Jaar, title of a poster work, installation in Nederlands Fotomuseum Rotterdam, 75 × 75 × 75 cm, 2013; cf. exh. cat. (Essen, 2014) p. 412.

- 38 An approach, however, which bears mystic overtones since Kandinsky's text *Concerning the Spiritual in Art* (1910). Cf. Riedl [9], pp. 38–56, here p. 45. In our context, it should be understood in the sense of a logical precondition that must be fulfilled in order for a credible apparatus artwork to be generated.
- 39 Markus Kramer, *Thomas Ruff: Modernism* (Heidelberg, 2011) p. 49.
- 40 The art historian J. A. Schmall gen. Eisenwerth (1915–2010) defined *Photographismen* as “photo-dependent phenomena of painting and the graphic arts”; see “Naturalismus, Realismus, Photorealismus” in Schmall gen. Eisenwerth, *Vom Sinn der Photographie* (München, 1980) p. 205.
- 41 Gottfried Jäger, “Das fotogene Bild: Strukturfotografie. Gedanken zur Fotologie” in Gottfried Jäger, Enno Kaufhold, eds., *Die Bielefelder Schule. Fotokunst im Kontext* (Heidelberg, 2014) pp. 93–105, here p. 104.

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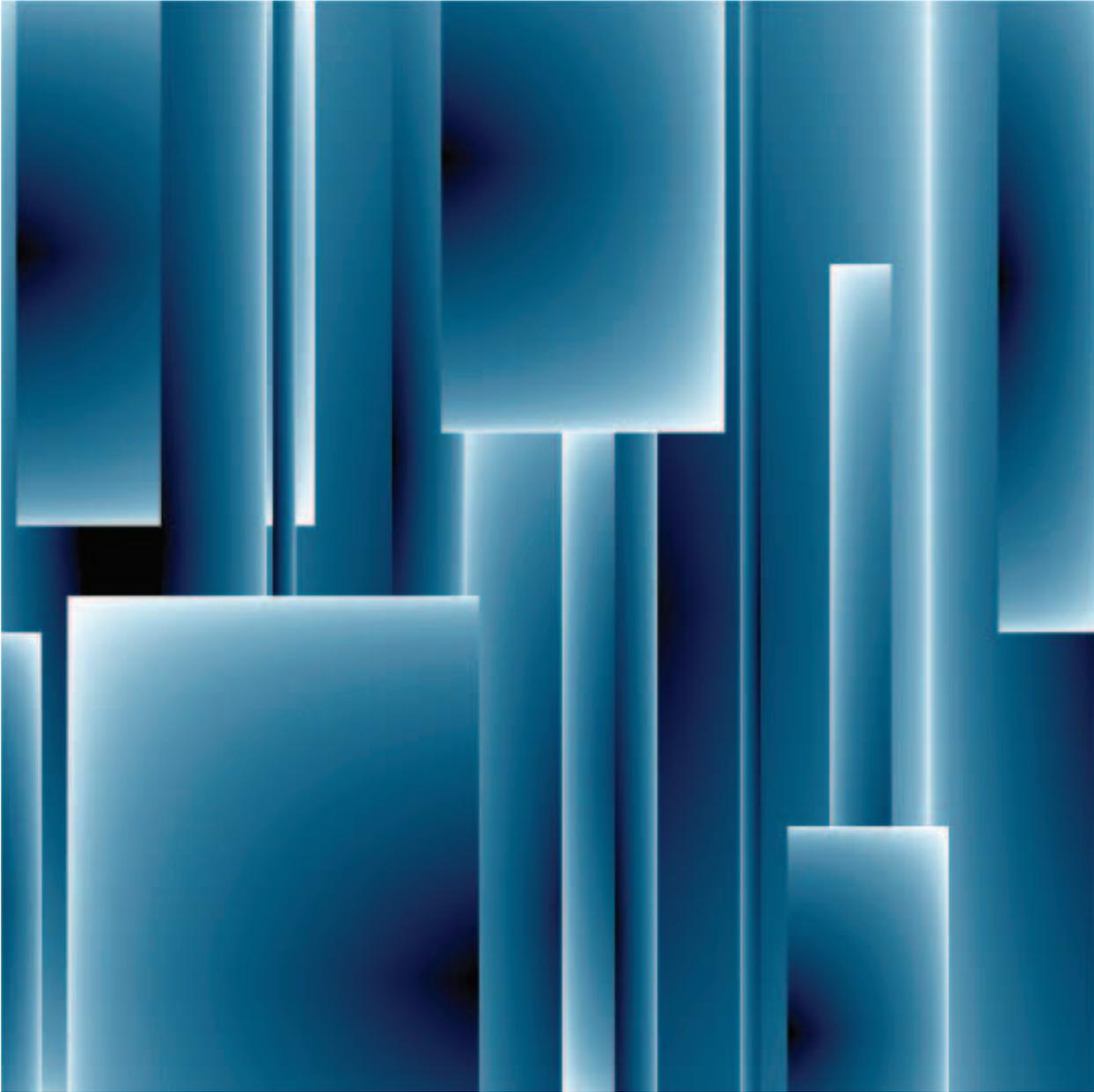
GOTTFRIED JÄGER was born in 1937 in Burg, near Magdeburg, Germany. He trained and worked as commercial photographer and studied photo-engineering in Cologne. In 1960 he became Lecturer in photo technology at Academy of Applied Art (Werkkunstschule) Bielefeld. From 1972 to 2002 he taught photo art and design at University of Applied Sciences (Fachhochschule) Bielefeld. He coined and established the term “generative photography” in 1968 with a group exhibition. He received his PhD in art and music from University of Bielefeld with a thesis on the Bielefeld microphoto artist Carl Strüwe (1898–1988).

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COLOR PLATE C: **CONCRETE PHOTOGRAPHY:
(IN-BETWEEN) LIGHT IMAGE AND DATA IMAGE**



Karl Martin Holzhäuser, *Montage 43.2008*, digital montage, Digigraphie™, 120 x 120 cm, 2008, courtesy Epson Kunstbetrieb Düsseldorf. (© 2015 VG Bild-Kunst Bonn) (See article in this issue by Gottfried Jäger.)